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CRITERIA 3

3.7.1 – Collaborative Activities

Algorithm 1 Continuous HCA.

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// Continuous HCA
Input: IM data, machine data number 'i', total number of machine data items 'N'
Output: IM data satisfying multiple objectives
Step 1: Choose current IM data as initial data
Step 2: Threshold value for slip  $F_1(y) < 0.03$ 
Step 3: Threshold value for rotor current  $F_2(y) = 6.5A$ 
Step 4: Threshold value for starting torque  $F_3(y) = 1.5 \text{ Nm}$ 
Step 5: Threshold value for power factor  $F_4(y) = 0.75$ 
Step 6: while( $i \leq N$ )
Step 7:   For each machine data item
Step 8:   Calculate the four objective function data items using (9), (11), (12) and (15)
Step 9:   If (calculated value satisfies all the objective functions)
Step 10:  IM data are collected for local search
Step 11: Else
Step 12:   IM data are not collected for local search
Step 13: Increment machine data number and repeat until condition is satisfied
Step 14:   End if
Step 15: End for
Step 16: End

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efficiency IM data) are identified by means of discrete HCA. Discrete HCA is initiated with an arbitrary solution for addressing the efficiency issues and then finds the exact state space, (i.e., IM data) to identify the enhanced solution by varying a single element of the solution. If the change creates an enhanced solution, an incremental change is implemented for the new solution and repeated until no additional enhancement is identified.

To satisfy the multi-objective function, the threshold conditions of four objective functions must be satisfied. The threshold values for slip, rotor current, starting torque and power factor are 0.03, 6.5 A, 1.5 N-m and 0.75 respectively. The calculated value of slip and rotor current must be less than the threshold value. The calculated value of starting torque and power factor must be greater than the threshold value. The continuous hill climbing algorithm is used to perform the global search to identify the machine data that satisfy the four objective functions. The identified IM data are collected for performing the local search. The algorithmic flow of continuous HCA is described in [Algorithm 1](#).

[Algorithm 1](#) describes the process of a continuous HCA for collecting the IM data satisfying the objectives. After collecting these data, the discrete HCA is used for local search purposes; to identify the IM data set that produces higher efficiency. The discrete HCA is an iterative algorithm that is initiated with random IM data and which then calculates the efficiency of current IM data. The IM efficiency is formulated as

$$\text{Induction Machine Efficiency} = \frac{P_{out}}{P_{in}} \quad (16)$$

In (16), the IM efficiency is calculated. ' P_{out} ' is the output power and ' P_{in} ' represents the input power of the IM. The input power is given by,

$$P_{in} = V * I * \cos \phi \quad (17)$$

In (17), ' V ' and ' I ' denote the supply voltage and current. The output power is calculated as

$$P_{out} = P_r - I_r^2 R_r - \text{mechanical loss} \quad (18)$$

where, $P_r = P_{in} - \text{stator loss}$.

In (18), the output power of the IM is calculated. After calculating the IM efficiency, a comparison is carried out with the efficiency of the neighboring IM data set. If the current IM data produce an enhanced result, the current data are taken as the optimal solution. Otherwise, the enhanced performance data set is taken as the current data. The process is iterated until no further enhancements are identified. The algorithmic steps of the discrete HCA are described in [Algorithm 2](#).

4. Simulation settings

The proposed HC-LSO technique was simulated using MATLAB/Simulink 2015b with a 3.4 GHz Intel Core i3 processor, 4GB RAM, and Windows 7 platform. The proposed HC-LSO technique used to obtain the optimal design of three IMs is compared with two existing methods [\[1,2\]](#). The parameters of IM 1, 2 and 3 and their values are given in [Tables 1–3](#).

5. Results analysis

In this section, the results of the Hill Climbing Based Local Search Optimization (HC-LSO) technique are analyzed. The performance of the HC-LSO technique is compared with existing techniques [\[1,2\]](#). The HC-LSO technique considers a framework of three different IM data sets for conducting a simulation in MATLAB. The performance of the HC-LSO technique is evaluated along with the following metrics, with the help of tables and graphs.

Algorithm 2 Discrete HCA.

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// Discrete HCA
Input: IM data
Output: Improved IM efficiency
Begin
Step 1: Define multi-objective function  $F(y)$ 
Step 2: Choose current IM data from collected data as initial data
Step 3: Do
Step 4:  $N = \text{neighbors (current IM data)}$  [ $E_N = E_{N1}, E_{N2}, E_{N3}, E_{N4} \dots E_{Nn}$ ]
Step 5: Evaluate the efficiency of current IM data ' $E_c$ ' using (16)
Step 6: Evaluate the efficiency of next neighboring IM data ' $E_N$ ' using (16)
Step 7: If  $E_c > E_N$ 
Step 8:   Current IM data set is optimal
Step 9: Else
Step 10:   Choose the neighboring IM data as the current IM data
Step 11:   Repeat steps 4–10 until (TerminationCriterion not met)
Step 12: End if
Step 13: End

```

Table 1
Induction machine 1.

Parameter	Value
Number of poles	4
Supply voltage	400 V
Power	7.5 kW
Frequency	50 Hz
Maximum speed	3000 rpm

Table 2
Induction machine 2.

Parameter	Value
Number of poles	6
Supply voltage	400 V
Power	30 kW
Frequency	50 Hz
Maximum speed	4000 rpm

Table 3
Induction machine 3.

Parameter	Value
Number of poles	6
Supply voltage	400 V
Power	22 kW
Frequency	50 Hz
Maximum speed	970 rpm

5.1. Measurement of rotor current

Rotor current is defined as the ratio of the product of slip and emf induced by the rotor to the impedance of the rotor. It is measured in terms of amperes (A). The rotor current is measured using Eq. (11). When the rotor current is lower, the technique is said to be more efficient.

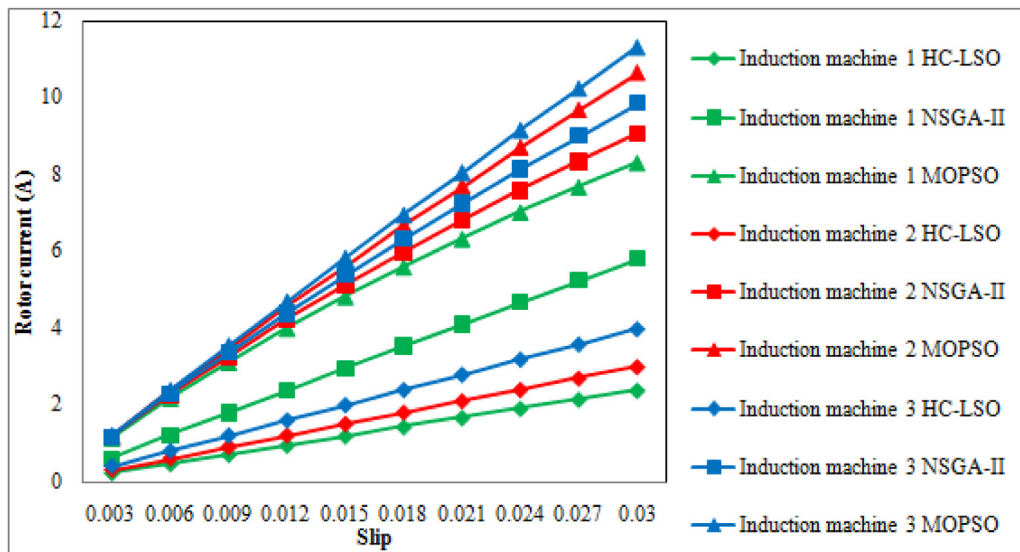
Table 4 shows the comparative results of the rotor current based on slip in the range 0.003–0.03, using three methods, namely, the HC-LSO technique and two existing methods [1,2]. Therefore, the rotor current using the proposed HC-LSO technique is less than for other existing methods. The rotor current of IM 1 is less than that of IM 2 or IM 3. The experimental results for the rotor current are shown in Fig. 3.

Results for rotor current versus slip value, using the three methods, are shown in Fig. 3. As demonstrated in the figure, the HC-LSO technique gives the minimum rotor current, compared to other existing methods [1,2]. In addition, when the slip value increases, the rotor current also increases for all three methods. However, comparatively, the rotor current using the HC-LSO technique is less for the other techniques. This is due to the application of the continuous hill climbing algorithm, used to select the enhanced IM data to design the machine with higher efficiency. The HC-LSO technique reduces the rotor current value by 59% and 74%, compared to the existing techniques [1,2] in IM 1. For IM 2, the rotor current value is reduced

Table 4

Tabulation for rotor current.

Slip	Rotor current (A)								
	Induction machine 1			Induction machine 2			Induction machine 3		
	HC-LSO	NSGA-II	MOPSO	HC-LSO	NSGA-II	MOPSO	HC-LSO	NSGA-II	MOPSO
0.003	0.23987	0.598	1.14	0.3	1.1574	1.1841	0.3999	1.1722	1.1929
0.006	0.47948	1.192	2.1764	0.5999	2.238	2.3377	0.7997	2.2925	2.3717
0.009	0.71884	1.782	3.1287	0.8997	3.2526	3.4625	1.1994	3.3658	3.5369
0.012	0.95793	2.3682	4.0112	1.1996	4.2099	4.5601	1.5989	4.3965	4.6888
0.015	1.19677	2.9506	4.8349	1.4993	5.1168	5.6319	1.9983	5.3882	5.8277
0.018	1.43536	3.5292	5.6086	1.799	5.9793	6.6793	2.3976	6.3442	6.954
0.021	1.67369	4.1042	6.3389	2.0986	6.8021	7.7035	2.7967	7.2673	8.068
0.024	1.91176	4.6754	7.0315	2.3982	7.5895	8.7057	3.1957	8.1602	9.1699
0.027	2.14958	5.2431	7.6908	2.6977	8.3448	9.687	3.5946	9.0251	10.26
0.030	2.38714	5.8072	8.3205	2.9972	9.0711	10.648	3.9933	9.8639	11.339

**Fig. 3.** Measurement of rotor current.

by 70% and 73% compared to the existing techniques [1,2] and similarly, for IM 3, the rotor current value is reduced by 62% and 65%, compared to existing techniques [1,2].

5.2. Measurement of power factor

Electrical system efficiency is measured by the power factor, which is defined as the ratio of the resistance of the rotor to the impedance of the rotor. The power factor of the IM is mathematically expressed in (12). When the power factor is higher, the technique is said to be more efficient.

Table 5 shows the comparative results analysis of power factor based on slip in the range 0.003–0.03, using the three methods, namely, the HC-LSO technique and the two existing methods [1,2]. Three different IMs with different ratings are considered. The power factor of IM 1 is higher than that of IM 2 or IM 3. Therefore, the power factor using the proposed HC-LSO technique is higher, compared to other existing methods. The experimental results for the power factor are shown in Fig. 4.

The power factor versus slip values, using the three different techniques, is illustrated in Fig. 4. As described in the figure, the HC-LSO technique provides a higher power factor value, compared to other existing methods [1,2]. In addition, increasing the slip value reduces the power factor in all three techniques. However, comparatively, the power factor using the HC-LSO technique is higher for the other techniques. This helps in increasing the power factor value of the IM. The HC-LSO technique increases the power factor value by 1% and 25%, compared to existing techniques [1,2] in IM 1. For IM 2, the power factor value is increased by 16% and 5%, compared to existing techniques [1,2] and similarly, for IM 3, the power factor value is increased by 12% and 3%, compared to existing techniques [1,2].

Table 5
Tabulation for power factor.

Slip	Power factor								
	Induction machine 1			Induction machine 2			Induction machine 3		
	HC-LSO	NSGA-II	MOPSO	HC-LSO	NSGA-II	MOPSO	HC-LSO	NSGA-II	MOPSO
0.003	0.9995	0.9966	0.95	0.9965	0.9645	0.9868	0.9998	0.9768	0.9941
0.006	0.9989	0.9933	0.9068	0.9923	0.9325	0.974	0.9997	0.9552	0.9882
0.009	0.9984	0.99	0.8691	0.9875	0.9035	0.9618	0.9995	0.9349	0.9825
0.012	0.9978	0.9868	0.8357	0.9861	0.8771	0.95	0.9993	0.9159	0.9768
0.015	0.9973	0.9835	0.8058	0.9855	0.8528	0.9386	0.9992	0.898	0.9713
0.018	0.9968	0.9803	0.779	0.9812	0.8305	0.9277	0.999	0.8811	0.9658
0.021	0.9962	0.9772	0.7546	0.98	0.8098	0.9171	0.9988	0.8652	0.9605
0.024	0.9957	0.974	0.7324	0.9756	0.7906	0.9068	0.9987	0.85	0.9552
0.027	0.9952	0.9709	0.7121	0.9712	0.7727	0.8969	0.9985	0.8357	0.95
0.030	0.9946	0.9679	0.6934	0.9701	0.7559	0.8874	0.9983	0.822	0.9449

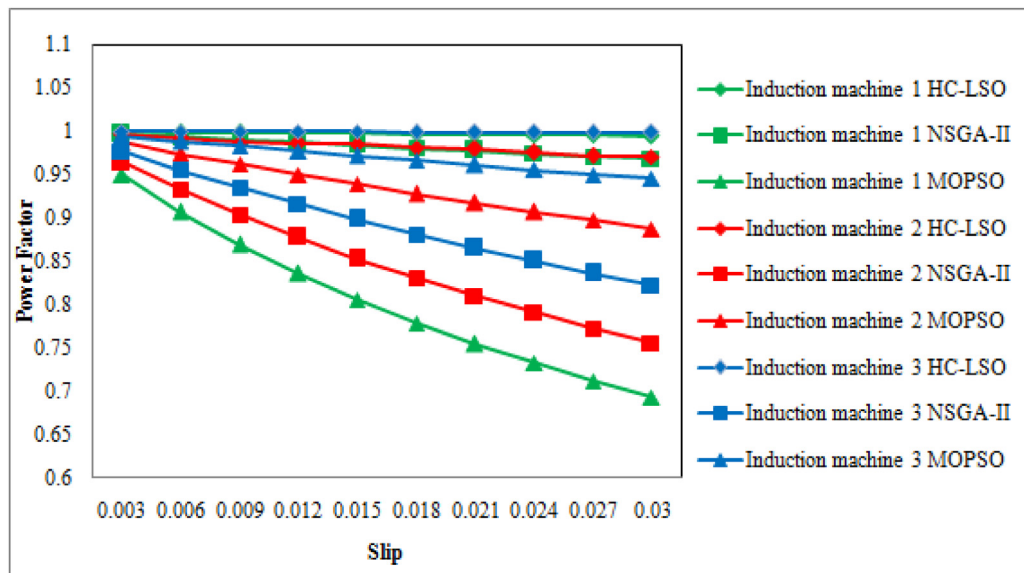


Fig. 4. Measurement of power factor.

Table 6
Tabulation for induction machine efficiency.

Slip	Induction machine efficiency (%)								
	Induction machine 1			Induction machine 2			Induction machine 3		
	HC-LSO	NSGA-II	MOPSO	HC-LSO	NSGA-II	MOPSO	HC-LSO	NSGA-II	MOPSO
0.003	95.26	75.01	70.96	85.45	64.68	61.23	81.23	58.23	55.45
0.006	92.85	73.65	68.85	83.62	63.56	60.85	80.63	57.25	54.96
0.009	91.12	72.56	67.46	84.96	62.96	59.45	79.89	56.98	53.67
0.012	90.69	71.34	66.96	82.69	61.39	58.63	78.45	55.84	52.94
0.015	89.69	70.64	65.78	80.46	60.79	57.96	77.56	54.269	51.49
0.018	88.96	69.87	64.65	79.23	59.89	56.12	76.12	53.97	50.66
0.021	87.85	68.45	63.23	77.63	58.96	54.48	75.65	52.59	48.13
0.024	85.68	67.96	62.12	76.96	57.36	53.26	74.36	51.96	46.95
0.027	82.95	66.23	61.63	75.74	56.89	52.96	73.98	50.15	45.59
0.030	80.36	65.1	62.45	74.63	55.36	50.54	72.21	48.96	46.53

5.3. Measurement of IM efficiency

The IM efficiency is the ratio of the IM power output to the IM power input. It is measured in terms of a percentage (%). The IM efficiency is formulated as in (16). When the IM efficiency is higher, the technique is said to be more efficient.

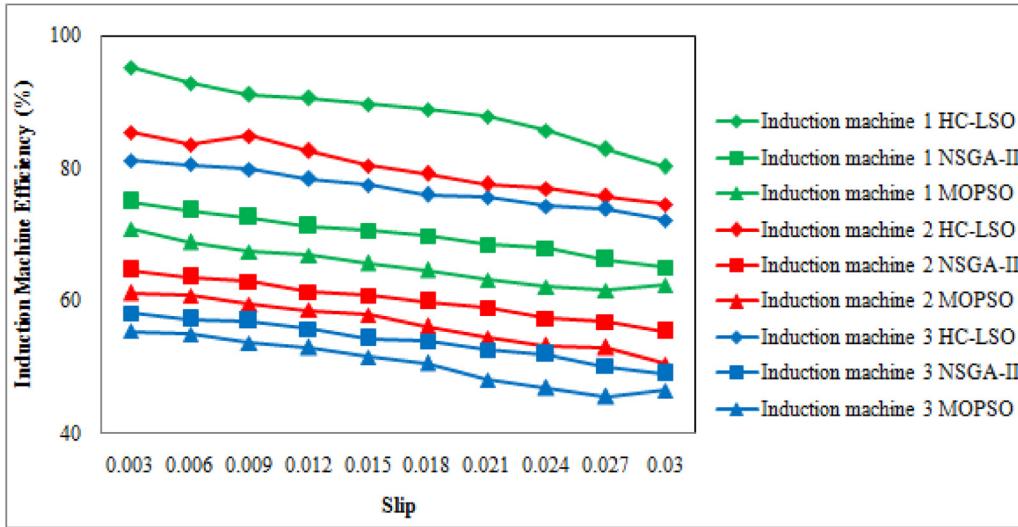


Fig. 5. Measurement of induction machine efficiency.

Table 6 shows the comparative results analysis of IM efficiency based on slip in the range 0.003–0.03, using the three methods, namely, the HC-LSO technique and the two existing methods [1,2]. The efficiency of IM 1 is higher than that of IM 2 or IM 3. Therefore, the IM efficiency using the proposed HC-LSO technique is higher than the other existing methods. The experimental results for the IM efficiency are shown in Fig. 5.

IM efficiency versus slip values, using the three different techniques, is shown in Fig. 5. As shown in the figure, the HC-LSO technique provides higher IM efficiency, compared to the other existing methods [1,2]. In addition, increasing the slip value reduces the IM efficiency in all three techniques. However, comparatively, the IM efficiency using the HC-LSO technique is higher for the other techniques. This is due to the application of the continuous hill climbing algorithm with a multi-objective function. The four objective functions satisfy the threshold conditions and the optimal value is selected using the discrete hill climbing algorithm. This iteratively helps to increase IM operation efficiency. The HC-LSO technique increases the IM efficiency by 26% and 35%, compared to the existing techniques [1,2] in IM 1. For IM 2, the IM efficiency is increased by 33% and 41%, compared to existing techniques [1,2] and similarly, for IM 3, the IM efficiency is increased by 42% and 52%, compared to existing techniques [1,2].

Tables 4–6 show that the HC-LSO technique reduces the rotor current value by 59% and 74% in IM 1, by 70% and 73% in IM 2 and by 62% and 65% in IM 3, compared to existing techniques [1,2]. In addition, the HC-LSO technique increases the power factor value by 1% and 25% in IM 1, by 16% and 5% in IM 2 and by 12% and 3% in IM 3, compared to existing techniques [1,2]. Therefore, the HC-LSO technique increases the IM efficiency by 26% and 35% in IM 1, by 33% and 41% in IM 2 and by 42% and 52% in IM 3, compared to existing techniques [1,2]. Generally, the HC-LSO algorithm improves the performance of the IM compared to state-of-the-art techniques.

6. Conclusion

The Hill Climbing Based Local Search Optimization technique selects an optimal induction machine data set for designing the induction machine with higher operation efficiency. Random restart local search optimization was used to solve the local maxima problem, which involves repeated explorations of induction machine data. The simulation was carried out for various parameters, such as rotor current, power factor and induction machine efficiency, for three different induction machines. The simulation results illustrate that Hill Climbing Based Local Search Optimization technique provides better performance, with an enhancement of induction machine efficiency and a reduction in rotor current, compared to state-of-the-art techniques.

The random restart local search provides optimal solutions in polynomial time for the most difficult cases. However, the huge number of local maxima can be a source of improvements in the computational complexity. Furthermore, all neighboring states have similar heuristic values, so selecting the immediate possibilities, (i.e., the next state) through making local comparisons, is uncertain.

Future work includes probability theory and local sampling to perform restarting of the Hill Climbing Algorithm for providing optimal results in non-deterministic polynomial-time hard problems. The intention of the hill climbing algorithm process will be to concentrate on reducing the computational complexity. In addition, the work will also be extended further by finding the precise local optimum for the induction machine data set.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.compeleceng.2018.11.023](https://doi.org/10.1016/j.compeleceng.2018.11.023).

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Machine Learning Perspective Gene Optimization for Efficient Induction Machine Design

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Abstract – In this paper, induction machine operation efficiency and torque is improved using Machine Learning based Gene Optimization (ML-GO) Technique is introduced. Optimized Genetic Algorithm (OGA) is used to select the optimal induction machine data. In OGA, selection, crossover and mutation process is carried out to find the optimal electrical machine data for induction machine design. Initially, many number of induction machine data are given as input for OGA. Then, fitness value is calculated for all induction machine data to find whether the criterion is satisfied or not through fitness function (i.e., objective function such as starting to full load torque ratio, rotor current, power factor and maximum flux density of stator and rotor teeth). When the criterion is not satisfied, annealed selection approach in OGA is used to move the selection criteria from exploration to exploitation to attain the optimal solution (i.e., efficient machine data). After the selection process, two point crossovers is carried out to select two crossover points within a chromosomes (i.e., design variables) and then swaps two parent's chromosomes for producing two new offspring. Finally, Adaptive Levy Mutation is used in OGA to select any value in random manner and gets mutated to obtain the optimal value. This process gets iterated till finding the optimal value for induction machine design. Experimental evaluation of ML-GO technique is carried out with performance metrics such as torque, rotor current, induction machine operation efficiency and rotor power factor compared to the state-of-the-art works.

Keywords: Induction motor, annealed selection, Adaptive Levy Mutation, two point crossovers, fitness function, optimized genetic algorithm.

1. Introduction

An induction motor is an ac electric motor where the electric current in rotor produces torque by electromagnetic induction from magnetic field of stator winding. The multi-objective design optimization was introduced in [1] with Non-dominated Sorting Genetic Algorithm (NSGA-II) for three phase induction motors. For attaining the Pareto optimal solutions, ranking method was introduced. However, the optimal solution failed to increase the efficiency of induction machine. Two fuzzy logic inputs with speed error, speed variation derivative and fuzzy output, motor reference torque (T_e^*) were calculated. The genetic optimization algorithm was designed in [2] with higher efficiency and minimal losses. Though the efficiency of induction machine was improved, the torque value was not increased.

Induction machines with external rotor were used in industrial fans with fixed load for increasing the efficiency by redesigning the machine to attain the objective function. The optimal design of induction machine with external

rotor was introduced in [3] using Genetic Algorithm (GA). But, the stator and rotor copper loss were not reduced.

The hybrid control of induction motor depending on combination of direct torque control (DTC) and the back stepping one were optimized by Genetic Algorithm (GA) in [4]. DTC was described where torque and stator flux were managed by non linear hysteresis controllers that are large ripple in motor torque at steady state operation. Though the torque level was improved, the efficiency remained unaddressed.

A control plan was introduced in [5] for energy efficiency enhancement of three-phase induction motors (TIM). The control was depending on indirect field oriented approach. A loss model-based controller minimized the copper and iron losses of TIM for many load values. A nonlinear equation depended on quadrature currents and attained suboptimal flux reference in steady-state conditions. Though the copper and iron losses were reduced, the power factor value was not improved. A new method was introduced in [6] for optimization of inverter-driven Induction Motor (IM) by modified Particle Swarm Optimization (PSO). The maximum efficiency of motor was attained through identifying the optimal output frequency and voltage of drive at any operating point. The optimal amplitude and frequency of excitation voltage were identified by modified PSO algorithm. But, the

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efficiency was not improved beyond the certain level.

The magnetic wedges usages in induction motors with semi-closed slots were studied in [7]. The strategy minimized the copper as well as core losses and improved the motor efficiency. The study examined the low power motors based on different permeabilities and geometries for magnetic wedges. Though the motor efficiency was improved by reducing the copper and core losses, the rotor current value was not reduced. A complete theory and analysis method for analytical calculation of induction motors efficiency with combined star-delta windings was introduced in [8]. A new hybrid model was introduced in [9] for optimization of induction motor drives (IMD). Search control technique was employed in steady condition of drive and loss model in transient processes. A new hybrid model for efficiency optimization of the direct vector-controlled induction motor drives was introduced in [10]. The efficiency enhancement approach changed the rotor flux with load torque to minimize the total losses in induction machine. But, the losses were not reduced beyond certain level to increase the efficiency.

The main contribution of the work is as follows: Machine Learning based Gene Optimization (ML-GO) Technique is introduced with Optimized Genetic Algorithm (OGA) to select the optimal induction machine data. Initially in OGA, many number of induction machine data are given as input for OGA. Then, fitness value is calculated for all induction machine data to find whether the criterion is satisfied or not through fitness function. When the criterion is not satisfied, annealed selection approach in OGA is used to move the selection criteria from exploration to exploitation to attain optimal solution. After the selection process, two point crossovers is carried out to select two crossover points within a chromosomes and then swaps two parent's chromosomes for producing two new offspring. Finally, Adaptive Levy Mutation is used in OGA to select any of value in random manner and gets mutated to obtain the optimal value.

The paper is outlined as follows. Section 2 portrays the review of related work of induction machine operation in brief manner. Section 3 describes Machine Learning based Gene Optimization (ML-GO) Technique with neat flow diagram and algorithmic process. In Section 4, the empirical results are discussed in Section 4 with detailed discussions provided in Section 5. Finally, section 6 summarizes the conclusions of the paper.

2. Related Works

The induction motor design by Genetic algorithm was introduced in [11] for increasing the efficiency. Though the efficiency was improved, the computational cost remained unaddressed. A genetic algorithm based self-tuned Neuro fuzzy controller (NFC) for speed control of induction motor drive (IMD) was introduced in [12]. Though the

induction motor speed was controlled using Neuro fuzzy controller (NFC), the efficiency remained unaddressed. In NFC system, Fuzzy logic and Artificial Neural Network (ANN) structure with Genetic Algorithm scheme was employed. A new and efficient method with Improved Big Bang-Big Crunch (I-BB-BC) Algorithm was introduced in [13] for efficiency estimation in induction motors. For calculating the induction motor efficiency, current value, power factor and input power were used and suitable objective function was introduced. However, the torque value was not improved using Improved Big Bang-Big Crunch (I-BB-BC) Algorithm.

For nonintrusive efficiency evaluation of inverter-fed induction motors, quantification of additional losses was computed for harmonic equivalent circuits. Recommended methods were designed in [14] for efficiency estimation of highlighted inverter-fed induction motors. Full-load and partial-load efficiency were calculated through dynamometer. But, the rotor current was not improved using recommended methods. A new technique was designed in [15] for calculating the refurbished induction motor's full-load and partial-load efficiencies. An air-gap torque (AGT)-based method was introduced in [16] for efficiency estimation of induction motors. A new stator resistance was estimated through particle swarm optimization approach depending on stator flux equations and reduction of torque error at rated operation point. Though the torque error was reduced, the induction machine efficiency was not improved using air-gap torque (AGT)-based method.

A bacterial foraging algorithm was employed in [17] as an economic, exact and low-invasive tool to work in field conditions, output power, losses and efficiency of induction motors with unbalanced voltages. A multi-objective optimization method was introduced in [18] depending on Genetic Algorithm to improve the efficiency as well as power factor and to reduce motor weight. A cost efficient off-line method was designed in [19] for circuit parameter evaluation of induction motor through genetic algorithm and particle swarm optimization (HGAPSO). Multi-objective fuzzy genetic algorithm (MFGA) was introduced in [20] for optimal design of induction motors. But, the above mentioned techniques failed to reduce the computational complexity. In order to overcome the above mentioned issues, Machine Learning based Gene Optimization (ML-GO) technique is introduced for designing induction machines. In ML-GO technique, OGA is employed to select the optimal machine data to reduce the computational complexity for designing induction machine which is explained in next section.

3. Machine Learning Based Gene Optimization (ML-Go) Technique

Induction motors are used in many applications due to its low cost maintenance and robustness. However at light

loads, no balance in between copper and iron losses leads to reduction in efficiency of induction machine. The efficiency and power factor performances are enhanced through performing the motor excitation adjustment based on load and speed. To increase the efficiency performance of induction machine, Machine Learning based Gene Optimization (ML-GO) technique is designed. In ML-GO technique, Optimized Genetic Algorithm (OGA) is used to attain the best optimal induction machine data for designing the induction machine with higher efficiency.

ML-GO technique finds the optimal induction machine data using Optimized Genetic Algorithm for designing the induction machine. The optimal induction machine data is selected for calculating the fitness function with multiple constraints. When the fitness function satisfies the threshold criteria, the induction machine data is selected for induction machine design with higher efficiency. When the criteria are not satisfied, selection, crossover and mutation process is carried out to select the global optimal solution using optimized genetic algorithm by satisfying all criteria. Through selecting the optimal machine data for induction machine design, the efficiency of IM gets increased. The detailed explanation of Machine Learning and Optimized Genetic Algorithm is explained in Section 3.1 and 3.2.

3.1 Machine learning

Machine learning in ML-GO technique is the subfield of computer science where the computer has ability to learn without any clear programming. Machine learning is used for designing the algorithms for making the predictions on data. Machine learning is used in the range of computing tasks where the designing and programming algorithms with better performance is not infeasible. Optimized Genetic Algorithm (OGA) is the one of the machine learning algorithms. An optimized genetic algorithm is a search heuristic method that uses the selection, crossover and mutation to create new genotype for finding the optimal solution.

3.2 Optimized Genetic Algorithm (OGA)

In OGA, optimum design of induction motor is a non-linear multi dimension issue while optimal control is single or two dimension issues. Then, optimization technique is used in design of IM to obtain global optimal solution.

3.2.1 Population initialization

In ML-GO technique, population initialization is carried out for generating many individuals (i.e., induction machine data) in random manner. It is an iterative process where the population in iteration called as a generation. The generation initiates with the iteration count '0' to address the optimization problem with optimal solutions.

Each individual has set of properties (i.e., chromosomes) that are mutated and varied. After that, fitness function is calculated.

3.2.2 Fitness function

The fitness is the value of objective function where the optimization issues are solved. Fitness value of induction machine data is calculated based on four objective functions, namely

- x_1 = starting to full load torque ratio
- x_2 = rotor current
- x_3 = power factor
- x_4 = maximum flux density of stator and rotor teeth

The total objective function is the sum of all the objective function. Total objective function is formulated as,

$$x = x_1 + x_2 + x_3 + x_4 \quad (1)$$

From (1), the total objective function is calculated. The total objective function and its constraints are given by,

$$A_j(x) \leq 0 \leftrightarrow \left\{ \begin{array}{l} \text{starting to full load torque ratio} \geq 1.5 \\ \text{Rotor current} \leq 6.5 \\ \text{Rotor power factor} \geq 0.7 \\ \text{maximum flux density of stator and rotor teeth} \leq 2 \end{array} \right\} \quad (2)$$

From (2), the primary design variables of induction machine are given with its constraints. Based on the design variables, the induction machine efficiency are to be calculated. The induction machine efficiency is formulated as,

$$B(x) = \text{Induction machine efficiency} \\ = \frac{\text{Output Power}}{\text{Output Power} + P_{TL}} \quad (3)$$

From (3), the induction machine efficiency is given by the ratio of the output power to the sum of output power and total power loss. The total power loss in induction machine design is the sum of stator copper loss 'SCL', rotor copper loss 'RCL' and Stator Iron Loss 'SIL'. The total power loss 'P_{TL}' is given by,

$$P_{TL} = SCL + RCL + SIL \quad (4)$$

From (4), the total power loss is calculated. Copper loss is the heat produced by electrical currents in electrical devices. Copper losses are undesirable transfer of energy that results from induced currents in adjacent components. The stator copper loss is calculated by the product of square

of current and resistance. Stator copper loss is given by,

$$SCL = I^2 R_s \quad (5)$$

From (5), ' I ' denotes the current in amps and ' R_s ' represents the stator resistance in ohms. The rotor copper loss is given by,

$$RCL = SI_b R_b \left(L_r + \frac{2D_e}{p} \right) \quad (6)$$

From (6), ' S ' represents the number of rotor slots, ' R_b ' denotes the resistance of each bar in the rotor, ' I_b ' symbolizes the rotor bar current, ' L_r ' represents length of the core, ' D_e ' denotes the mean end ring diameter and ' p ' symbolizes the number of poles. The stator iron loss is calculated based on the weight and losses in stator teeth as well as in stator core. The stator iron loss ' SIL ' is formulated as,

$$SIL = (W_{st} * W_{lst}) + (W_{sc} * W_{lsc}) \quad (7)$$

From (7), ' W_{st} ' symbolizes the weight of stator teeth, ' W_{lst} ' represents the losses in stator tooth, ' W_{sc} ' denotes the weight of stator core and ' W_{lsc} ' symbolizes the losses in stator core. After calculating the loss value, the induction machine efficiency is calculated. Then in ML-GO technique, the fitness function of each induction machine data is calculated. The fitness function is mathematically formulated as,

$$\text{Fitness Function} = \frac{B(x)}{\sum_{j=1}^N A_j(x)} \quad (8)$$

From (8), ' $B(x)$ ' denotes the induction machine efficiency and ' $A_j(x)$ ' represents the objective function and its constraints. The algorithmic process of fitness function calculation was given below,

Algorithm 1: Fitness Function Calculation Algorithm

- Step 1 :** Begin
- Step 2 :** Initialize Gene Population
- Step 3 :** Set Generation (i.e., Iteration count $i=0$)
- Step 4 :** Define objective function with its constraints using (2)
- Step 5 :** For each individuals ' j '
- Step 6 :** Calculate objective function
- Step 7 :** Calculate the Induction Machine efficiency using (3)
- Step 8 :** Compute Fitness Function using (8)
- Step 9 :** end for
- Step 10 :** End

From algorithm 1, the fitness function calculation for all induction machine data are made. The annealed selection

approach is discussed in next sub-section.

3.2.3 Annealed selection approach

Annealed Selection approach in ML-GO technique is used to move the selection criteria from exploration to exploitation to attain perfect solution. For Annealed Selection approach, fitness value of each individual are calculated. Selection probability of each individual is calculated based on ' j^{th} ' individual on ' i^{th} ' generation represented as ' $X_{i,j}$ '. When the generation of population varies, fitness value and selection probability of each individual also gets varied. The blended selection operator calculates fitness value of individual based on current number of generation. Selection probability of ' j^{th} ' individual ' PX_j ' is calculated by,

$$PX_j = \frac{FX_j}{\sum_{j=1}^N FX_j} \quad (9)$$

From (9), ' FX_j ' denotes the Average Fitness of the population in ' j^{th} ' individual in Annealed Selection approach and ' N ' denotes the total number of individuals. The algorithmic process for Annealed Selection Approach is given in below figure,

Algorithm 2: Annealed Selection Algorithm

Begin

Step 1: Initialize Gene Population

Step 2: Set Generation (i.e., Iteration count $i=0$)

Step 3: For each individuals ' j '

Step 3: Calculate Fitness function using (8)

Step 4: Select the individual using Annealed Selection Approach using (9)

Step 5: end for

End

From Algorithm 2, annealed selection is carried out in OGA. After the selection process, the two point crossover operation is carried out. The brief discussion of two point crossover is discussed in next sub-selection.

3.2.4 Two point crossover

In ML-GO technique, two point crossover is a genetic operator for changing the chromosomes from one generation to the next generation. Crossover process takes more than one parent chromosomes and produces offspring for them. Two point crossovers choose the two crossover points inside the chromosomes and then swap the two parent's chromosomes between points for producing two new offspring.

3.2.5 Adaptive levy mutation

In ML-GO technique, Adaptive Levy Mutation is carried

out to balance the Classical Evolutionary Programming (CEP) for local search with Fast Evolutionary Programming (FEP). Adaptive Levy Mutation changes one or more design variable values in chromosome from their initial state. In Adaptive Levy Mutation, the solution has the possibility of changing entirely from the previous solution. Mutation takes place in evolution depending on Levy probability distribution function. Adaptive Levy Mutation is carried out by generating two mutated offspring from each parent with help of Levy probability distributions and choosing the most suitable one for rest of the population. The Levy probability density function is given by,

$$f_{levy(\alpha, \gamma)}(x) = \frac{1}{\pi} \int_0^{\infty} e^{-\gamma q^{\alpha}} \cos(qx) dq \quad (10)$$

From (10), ‘ α ’ and ‘ γ ’ are parameters used for characterizing the distribution ‘ $0 < \alpha < 2$ ’ and ‘ $\gamma > 0$ ’. In mutation, a gene value is chosen from the chromosome attained in past generation and gene value is varied for creating the new offspring.

Randomly chosen value

$$\begin{array}{ll} \text{Original sequence} & <110011101> \\ \text{Mutated Sequence} & <110011001> \end{array} \quad (11)$$

From (11), the mutation sequence is obtained after using Levy probability density function in the original sequence. The orange color indicates the randomly chosen value for mutation in ML-GO technique. The Levy mutation operation comes from local optimal solution and search for the global optimal solution. The process gets repeated and the best global optimal value is selected for induction machine design with higher efficiency. The algorithmic description of Optimized Genetic Algorithm in ML-GO technique is explained below,

Algorithm 3: Optimized Genetic Algorithm

Input: No. of individuals (N),

Output: Improves Efficiency of Induction Machine Design

Step 1: Begin

Step 2: Generate an initial population

Step 3: Compute the fitness of each individual

Step 4: if criterion satisfied then

Step 5: Select the individual as an optimal one

Step 6: else

Step 7: Perform Annealed Selection using (9)

Step 8: Perform Two point Crossover

Step 9: Perform Adaptive Levy Mutation using (10)

Step 10: Goto Step 3

Step 8: End if

Step 9: End

As shown in Algorithm 3, initially population is generated. Then, the fitness function of each individual are

calculated based on the objective function. After calculating the fitness function, it checks whether the fitness function satisfies the criterion. When the criterion is satisfied, it is said to be optimal solution. Otherwise, selection, crossover and mutation process is carried out in Optimized Genetic Algorithm till finding the optimal solution (i.e., induction machine data). With help of that data, induction machine gets designed. This in turn helps to improve induction machine operation efficiency in efficient way.

4. Simulation Settings

The proposed ML-GO technique is implemented with MATLAB 2015b with 3.4 GHz Intel Core i3 processor, 4GB RAM, and windows 7 platform. The proposed ML-GO technique and two existing Non-dominated Sorting Genetic Algorithm (NSGA-II) and Genetic Optimization Algorithm are used to obtain the optimal design of three IMs. The parameter and values of induction machine 1, 2 and 3 are explained in Table 1.

For induction machine 1, induction machine 2 and induction machine 3, the number of poles taken is 4. The supply voltage and the input power of the induction machine 1 are 400V and 6kW respectively. For induction machine 2, the voltage and the input power of induction machine is given as 400V and 7.5kW respectively. For induction machine 3, the supply voltage and the input power of induction machine 3 is given as 400V and 2.2kW respectively.

By using proposed ML-GO technique the optimal values is chosen to design the induction machines is shown in above Table 2.

Table 1. Parameters and values of Induction Machine 1,2 &3

Parameter	IM 1	IM 2	IM 3
Number of Poles	4	4	4
Supply Voltage	400V	400V	415V
Power	6 kW	2.2 kW	7.5 kW
Frequency	50 Hz	50 Hz	50 Hz
Maximum Speed	1500 rpm	1500 rpm	1440 rpm

Table 2. Optimal values of Induction Machine 1,2 &3

Description	Optimal design using ML-GO		
	IM 1	IM 2	IM 3
Starting to full load torque ratio	1.526	1.416	1.636
Rotor current A/mm ²	4.81	4.03	5.83
Rotor power factor (P.F)	0.762	0.69	0.808
Maximum flux density stator and rotor teeth wb/m ²	1.632	1.567	1.736

5. Result Analysis

The efficiency of ML-GO technique is compared against with the two existing methods namely Non-dominated

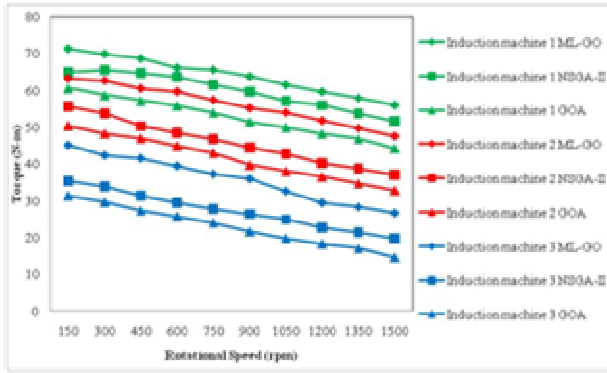


Fig. 1. Measurement of torque

Sorting Genetic Algorithm (NSGA-II) [1] and Genetic Optimization Algorithm [2]. The performance of ML-GO Scheme is evaluated along with the metrics such as torque, rotor power factor, rotor current and induction machine operation efficiency.

5.1 Measurement of torque

Torque (T) is defined as the ratio of power to the rotational speed. Torque is measured in terms of Newton meter (N-m). Torque is mathematically formulated as,

$$T = \frac{\text{Power}}{2 * \pi * N} \quad (12)$$

From (12), 'T' represents torque and 'N' symbolizes rotational speed in rpm. When the torque level is higher, the technique is said to be more efficient.

The impact of torque versus different speed range using three methods is described in Fig. 1. As explained in figure, ML-GO technique provides maximum torque when compared to other existing methods namely Non-dominated Sorting Genetic Algorithm (NSGA-II) [1] and Genetic Optimization Algorithm [2]. When the rotational speed increases, torque values get reduced in all three methods. ML-GO technique produces higher torque value than other techniques. This is due to the application of optimized genetic algorithm that select the induction machine data with higher efficiency. Consequently in induction machine 1, the ML-GO technique increases the torque value by 7.0% as compared to NSGA-II [1] and 21.7% as compared to Genetic Optimization Algorithm [2] respectively. In induction machine 2, the torque value gets increased by 23% as compared to NSGA-II [1] and 36.5% as compared to Genetic Optimization Algorithm [2] respectively. For induction machine 3, torque value gets increased by 32% as compared to NSGA-II [1] and 5.9% as compared to Genetic Optimization Algorithm [2] respectively.

The Machine Learning based Gene Optimization for Induction motor 1, Induction motor 2 and Induction motor 3 are described in Fig. 2 with three parameters namely,

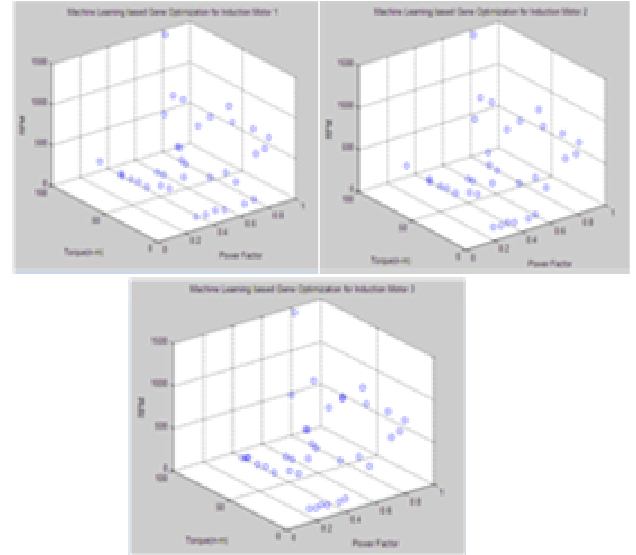


Fig. 2. ML-GO of rotational speed (RPM), torque and power factor for Induction motor 1, Induction motor 2 and Induction motor 3

rotational speed (RPM), torque and power factor. The bubble graph is explained for three induction motor to achieve the higher induction machine efficiency. The figure describes three parameter performance evaluations in one bubble graph. Through satisfying the criterion function, the efficiency of all induction machines gets increased.

5.2 Measurement of rotor power factor

Rotor Power factor is defined as the ratio of real power of the rotor to the apparent power of rotor. The rotor power factor of induction motor is formulated as,

$$\begin{aligned} \text{Rotor Power Factor} &= \frac{\text{Real Power}}{\text{Apparent Power}} \\ &= \frac{R_r}{\sqrt{R_r^2 + \left(\left(\frac{N - N_s}{N_s} \right) X_r \right)^2}} \end{aligned} \quad (13)$$

From (13), ' R_r ' denotes resistance of rotor, ' X_r ' denotes the reactance of rotor, 'N' symbolizes rotational speed and ' N_s ' denotes the synchronous speed of induction motor. When the rotor power factor is high, the technique is more efficient.

The rotor power factor using proposed ML-GO technique is higher when compared to other existing methods [1] and [2]. The rotor power factor of induction machine 1 is comparatively higher than other two machines. The graphical analysis of the rotor power factor is shown in Fig. 3.

The impact of rotor power factor versus different speed range using three methods is explained in Fig. 3. As

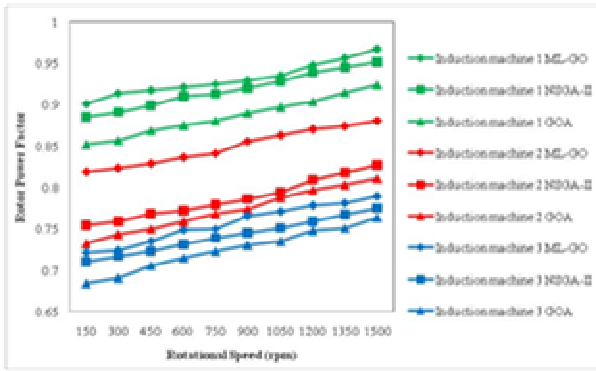


Fig.3. Measurement of rotor power factor

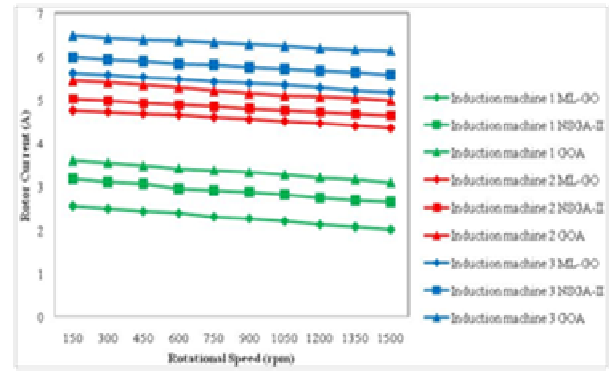


Fig. 5. Measurement of rotor current

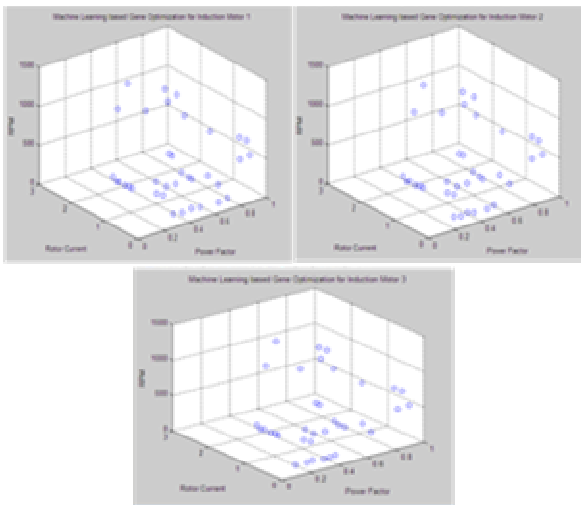


Fig. 4. ML-GO of rotational speed (RPM), rotor current and power factor parameter for Induction motor 1, Induction motor 2 and Induction motor 3

described in figure, ML-GO technique provides higher rotor power factor value when compared to other existing methods namely Non-dominated Sorting Genetic Algorithm (NSGA-II) [1] and Genetic Optimization Algorithm [2]. When the rotational speed gets increases, rotor power factor value gets increased in all three methods. ML-GO technique produces higher rotor power factor value than other techniques. This is due to the application of optimized genetic algorithm that select the induction machine data by Annealed Selection approach using probability density function with higher efficiency. Consequently in induction machine 1, the ML-GO technique increases the rotor power factor value by 1.4% as compared to NSGA-II [1] and 5.0% as compared to Genetic Optimization Algorithm [2] respectively. In induction machine 2, the rotor power factor value gets increased by 7.9% as compared to NSGA-II [1] and 9.9% as compared to Genetic Optimization Algorithm [2] respectively. For induction machine 3, rotor power factor value gets increased by 1.9% as compared to NSGA-II [1] and 4.3% as compared to Genetic Optimization Algorithm [2] respectively.

The Machine Learning based Gene Optimization for Induction motor 1, Induction motor 2 and Induction motor 3 are portrayed in Fig. 4 with three parameters namely, rotational speed (RPM), rotor current and power factor. The bubble graph is discussed for three induction motor to attain higher induction machine efficiency. The figure describes three parameter performance simulations in one bubble graph. The efficiency of all induction machines gets increased only when it satisfies the criterion function.

5.3 Measurement of rotor current

Rotor current is the ratio of product of slip and emf induced by the rotor to the impedance of rotor. It is measured in ampere (A).

$$I_r = \frac{\left(\frac{N - N_s}{N_s} \right) E_r}{Z_r} \quad (14)$$

From (14), ' N_s ' denotes the synchronous speed, ' N ' represents the rotational speed of rotor, ' E_r ' represents emf induced in rotor and ' Z_r ' symbolizes the rotor impedance. Rotor current is lesser, more efficient the technique is said to be.

The rotor current using proposed ML-GO technique is lesser when compared to other existing methods [1] and [2]. The rotor current of induction machine 1 is comparatively lesser than other two machines. The graphical analysis of the rotor current is shown in Fig. 5.

Fig. 5 explained the impact of rotor current versus different speed range using three methods. As described in Fig. 5, ML-GO technique provides lesser rotor current value when compared to other existing methods namely Non-dominated Sorting Genetic Algorithm (NSGA-II) [1] and Genetic Optimization Algorithm [2]. When the rotational speed gets increased, rotor current value gets reduced in all three methods. ML-GO technique produces lesser rotor current value than other techniques. This is due to the application of optimized genetic algorithm that selects the induction machine data by performing the two-

point crossover with higher efficiency. As a result in induction machine 1, the ML-GO technique reduces the rotor current value by 21.3% as compared to NSGA-II [1] and 31.9% as compared to Genetic Optimization Algorithm [2] respectively. In induction machine 2, the rotor current value gets reduced by 5.2% as compared to NSGA-II [1] and 12.1% as compared to Genetic Optimization Algorithm [2] respectively. For induction machine 3, rotor power factor value gets reduced by 6.4% as compared to NSGA-II [1] and 14.2% as compared to Genetic Optimization Algorithm [2] respectively.

5.4 Measurement of induction machine operating efficiency

Induction Machine Operating Efficiency is defined as the ratio of output power to the sum of output power and total power losses. It is measured in terms of percentage (%).

$$\text{Induction machine efficiency} = \frac{\text{Output Power}}{\text{Output Power} + \text{Total Power Loss}} \quad (15)$$

From (15), the induction machine operating efficiency is calculated. When the induction machine operating efficiency is higher, the technique is more efficient.

The induction machine operating efficiency using proposed ML-GO technique is higher when compared to other existing methods. The induction machine operating efficiency of induction machine 1 is higher than that of two machines. The graphical analysis of the induction machine operating efficiency is shown in Fig. 6.

Fig. 6 describes the induction machine operation efficiency with respect to rotational speed. From Fig. 6, ML-GO technique provides higher induction machine operation efficiency value when compared to other existing methods namely Non-dominated Sorting Genetic Algorithm (NSGA-II) [1] and Genetic Optimization Algorithm [2]. When the rotational speed gets increases, induction machine

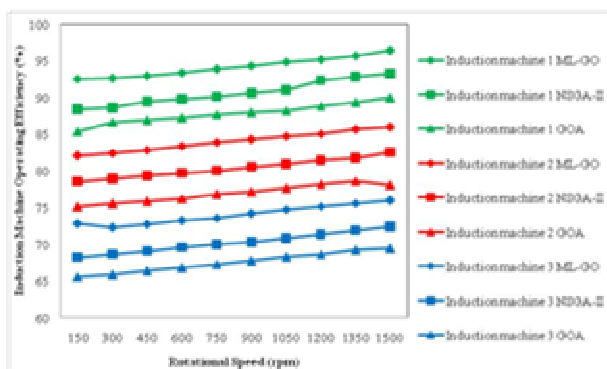


Fig. 6. Measurement of induction machine operating efficiency

operation efficiency gets increased in all three methods. ML-GO technique produces higher induction machine operation efficiency than other techniques. This is due to the application of optimized genetic algorithm that selects the induction machine data by performing the two-point crossover and Adaptive Levy Mutation. Consequently in induction machine 1, the ML-GO technique increases induction machine operation efficiency value by 3.9% as compared to NSGA-II [1] and 7.2% as compared to Genetic Optimization Algorithm [2] respectively. In induction machine 2, the induction machine operation efficiency value gets increased by 4.5% as compared to NSGA-II [1] and 9.2% as compared to Genetic Optimization Algorithm [2] respectively. For induction machine 3, induction machine operation efficiency value gets increased by 5.4% as compared to NSGA-II [1] and 9.6% as compared to Genetic Optimization Algorithm [2] respectively.

6. Conclusion

In this paper, Machine Learning based Gene Optimization (ML-GO) Technique is introduced to select the optimal solution for designing the induction machine with higher efficiency. Optimized Genetic Algorithm (OGA) is used to select the optimal induction machine data. In OGA, selection, crossover and mutation process is carried out to find the optimal electrical machine data for machine design. Fitness value is calculated for all induction machine data to find whether the criterion is satisfied or not through fitness function. When the criterion is not satisfied, annealed selection approach in OGA is used to move the selection criteria from exploration to exploitation to attain optimal solution. Then, two point crossovers are used for producing two new offspring. Finally, Adaptive Levy Mutation in OGA selects any of value in random manner and gets mutated to obtain the global optimal value. This in turn helps to increase the induction machine operation efficiency. The simulation of experiments are conducted to test the metrics such as torque, rotor power factor, rotor current and induction machine operation efficiency with respect to rotational speed. The simulation results explains that ML-GO technique presents better results with minimum rotor current and higher induction machine efficiency by 5.5%, 6.8% and 7.5% in induction machine 1, induction machine 2 and induction machine 3 respectively as compared to state-of-the-art works.

7. Conclusion

Even though a conclusion may review the main results or contributions of the paper, do not duplicate the abstract or the introduction. For a conclusion, you might elaborate on the importance of the work or suggest the potential applications and extensions.

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Analyzing the weld strength of ultrasonic polymer welding using Artificial Neural Networks ☆

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Abstract

Welding is considered as one of the most important process for the manufacturing industries. To be precise the welding process has a supreme role to play in the automobile industry for fabrication and maintenance. Ultrasonic Welding (USW) is a very commonly used welding procedure in such industries, preferred because its less processing time and versatility. In this study, three most influencing process parameters that include welding pressure (P), weld time (Tw), and amplitude (A), are considered to determine the tensile strength of welded PC/ABS blend joints. The welding process is applied on a total of 26 samples and their tensile properties are obtained in terms of experimental results. It is clearly understood that all tensile strength of the joints welded by ultrasonic method is greatly influenced by all three process parameters. Further, with the help of data obtained from the experimentation, an Artificial Neural Network (ANN) based on Back Propagation model has been developed for analyzing the tensile strength of USW joints. By comparing the real time experimental results with the ANN predicted results, it is observed that the predicted and experimental models are in accordance with each other. This novel ANN model could be further employed for identifying the tensile strength of USW joints in various joining applications. Finally, the SEM images are analyzed to predict the nature of the weld condition.

Previous

Next

Keywords

Ultrasonic welding; Tensile strength; ANN; SEM



Ultrasonically welded and non-welded polypropylene and PC-ABS blend thermal analysis

T. Chinnadurai¹ · N. Prabakaran² · N. Mohan Raj³ · M. Karthigai Pandian¹

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Abstract

Automobile industries are focusing toward the reduction in the weight of vehicle that leading to cost reduction and improving the fuel efficiency. Polymers are the main alternatives in conventional engineering materials for automobile components due to their advanced mechanical and thermal properties. This article is mainly focused on the ultrasonic welding of polypropylene and PC-ABS materials followed by thermal analysis of injection-molded and welded specimens. The materials are examined by an advanced analysis method called differential scanning calorimetry. The crystalline nature of the material is changed (area varies from 95.1 to 115.4 J g⁻¹) at injection-molded regions in polypropylene differential scanning calorimetric results. After polypropylene welding, the glass transition temperature values tend to change from 5 to 10 K min⁻¹ heating ranges. In PC-ABS blend, the glass transition temperature is changed from 126.3 to 127.0 °C in the non-welded material. From the welded PC-ABS material results, it is evident that the difference between 5 and 10 K min⁻¹ heating value is only 1.8 °C. Finally, the finite element analysis is carried out to examine the materials deformation pattern with temperature loading.

Keywords Polypropylene and PC-ABS · Ultrasonic Welding · DSC analysis · FEA analysis

Introduction

Polypropylene (PP) and polycarbonate/acrylonitrile butadiene styrene (PC-ABS) are widely used in automobile and other manufacturing industries. The automobile parts made of PP are used in cable insulation, gas cans, bumpers, carpet fibers, chemical tanks etc. [1]. PC-ABS blend has high impact strength, mechanical strength and several other properties [2], so that it is employed in various automotive components like bumpers, dashboard, interior trim and lighting [3]. Since the polymer components are constantly exposed to heating and cooling, their properties like crystallinity, morphology and mass loss of the materials change

substantially [4]. However, a slight modification in crystalline structure, glass transition temperature and mass loss of materials will mitigate the deterioration level of mechanical and thermal properties. The crystallization degree of thermoplastics is governed by the trans-crystallization phenomenon [5]. During melting, the semicrystalline material undergoes crystalline reorientations and crystalline formations. This phase develops an intermediate crystalline order, and it is different from the normal crystalline and amorphous phase. However, the elasticity of PP subjected to manufacturing process is mainly dependent on the reversible crystal-crystal phase transition that involves modification of chains. This is the primal concern in the glass transition temperature behavior of PP [6].

In PC-ABS blend, PC being an amorphous thermoplastic provides better dimensional stability, good collision strength and high heat resistance [7]. PC does not have a proper melting point, unlike the other crystalline material PP, but it has high glass transition temperature (T_g) of around 150 °C [8]. The PC has high melting viscosity which blocks the fluid flow during processing that leads to induced residual stress and fracture formations. To avoid

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Fuzzified Control of Deaerator System in Power Plant & Comparative Analysis with Pid Control Scheme

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Abstract--- Deaerator modeling is one of the utmost common difficulties in the process manufacturing. The input and output temperature are measured manually. The mathematical model of the deaerator is recognized in the laboratory circumstances using MATLAB simulations and the obtained model is used for implementing controllers like PI, PID, and Fuzzy in the simulation environment. The boiler deaerator temperature controller scheme is a non-linear, time-varying, delay control process. It can't be accomplished satisfying the effect using traditional control algorithm to control deaerator water temperature. This paper suggests a fuzzy control algorithm, which can regulate the online control constraints to familiarize the variations of the deaerator water temperature. In this manuscript we have carried out a simulation work for fuzzy control procedure and the PID control procedure in MATLAB Simulink. The simulation result shows that the system works well and has very good static and dynamic recital, strong sturdiness and self-adaptive capability.

Keywords--- Process Control, Fuzzy Logic Control, Proportional Integral Control, Proportional Integral Derivative Control, MATLAB.

I. Introduction

Thermal power plant basically works on Rankine cycle. In thermal power plant steam is generated in the boiler using the heat of the fuel burnt in the combustion chamber. The steam generated is passed through the steam turbine where part of its thermal energy is converted into the mechanical energy which is further used for generate electric power. The steam coming out of the steam turbine is condensed in the condenser and the condensate is supplied back to the boiler with the help of the feed pump and the cycle is repeated. Boiler is a closed container in which water or another liquid is heated to steam or vapor which is then superheated or into any combination, under pressure or vacuum. Thermal power plant generates more than 80% of the total electricity produced in the world. Steam is an important medium for producing mechanical energy. A thermal power plant converts energy storing fossil fuels. The thermal power stations are very much suitable where coal is available in abundance. The pressure ranges from 10kg/cm^2 to super critical pressure and temperature varies from 250°C to 650°C .

II. Process Description

Deaerators are machine-driven devices that eradicate dissolved vapors from boiler feed water. Deaeration guards the steam structure from the paraphernalia of corrosive vapors. It achieves this by reducing the concentration of dissolved O_2 and CO_2 to a level where erosion is diminished. A dissolved oxygen level of 5 parts per billion (ppb) or lower is desired to prevent corrosion in maximum high pressure (>200 PSI) boilers. While O_2 concentrations of up to 43 ppb may be endured in low-pressure boilers, apparatus life is extended at petite or no cost by restraining the O_2 concentration to 5 ppb. Dissolved CO_2 is fundamentally detached by the deaerator.

Economizer are so named because they can make use of the enthalpy in fluid steams that are hot, but not sufficient to be used in the boiler, thereby convalescing more useful enthalpy and refining the boiler's efficacy. They are aninstrument fitted to a boiler which protects energy by consuming the fluegases from the boiler to preheat the



Performance Investigation of Gate Engineered tri-Gate SOI TFETs with Different High-K Dielectric Materials for Low Power Applications

P. Vimala¹ · T. S. Arun Samuel² · M. Karthigai Pandian³

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Abstract

In this article, a three-dimensional model of Tri-gate Tunnel Filed effect transistors (TFET) with different gate materials is proposed. Analysis and comparison of various structures such as single material gate, double material gate and triple material gate of a Tri-gate TFET is performed with respect to both DC and AC characteristics. Various electrical parameters that define the performance of a semiconductor device are verified using Silvaco TCAD Simulation results. Parameters analyzed in this work include surface potential, lateral electric field, total electric field along the channel, drain current, transconductance and output conductance of single material, double material and triple material Tri-gate TFETs. The comparative performance analysis shows a better DC and AC performance for Triple Material Tri-gate TFET (TMTGTFET) in comparison to single material and double material Tri-gate devices. It could be inferred that short channel effects are considerably reduced in a gate engineered Tri-Gate TFET structure and it also shows remarkable improvement in ON current as the current increases 45% for TMTGTFET when compared to a SMTG TFET. To improve the TMTGTFET performance, different dielectric materials are employed for device characteristics.

Keywords Drain current · Single material · Double material · Triple material · Tri-gate TFET · TCAD

1 Introduction

For more than 30 years, miniaturization has been the primary technology governing the semiconductor industry. As transistor sizes have been considerably brought down below 100 nm in the past decade, the possibility of placing hundreds of millions of transistors in one single chip has increased, leading to improved functionality and reduced financial constraints on the devices. But the stringent power constraints of integrated circuits and non-

scalability of the sub-threshold slope in conventional MOSFETs is a major hindrance in this scaling down process of semiconductor devices [1–6]. Hence various investigations are made on new steep sub-threshold slope devices that can prove to be an alternate option for the MOSFETs in near future. Thus, Tunnel Field Effect Transistors (TFETs) are considered as good options for low power applications as they are being touted as highly energy efficient devices [7–11]. In recent times, many researchers have shown keen interest in developing models for single-gate tunnel FET to study the device physics for further improvement and scaling. However single-gate TFETs suffer from low ON-state current as compared to conventional MOSFETs [12]. This motivates researchers to develop different TFET models based on multi-gate structure which provides improved scaling capability, reduced SCEs, higher and steeper subthreshold slope [13–16]. Thus, multi-material gate device structures supersede conventional MOS devices by fulfilling the basic requirements like improved on-state current and reduced off-current. To obtain these characteristics, along with a low threshold voltage, extensive research has to be carried for selecting proper channel material with an appropriate body thickness.

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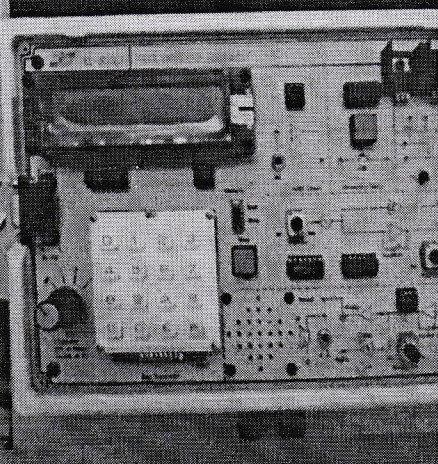
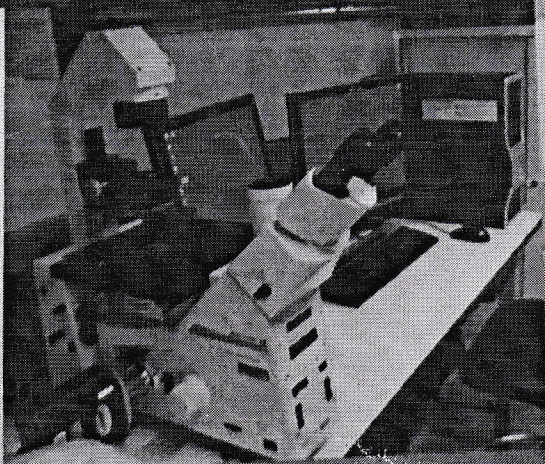
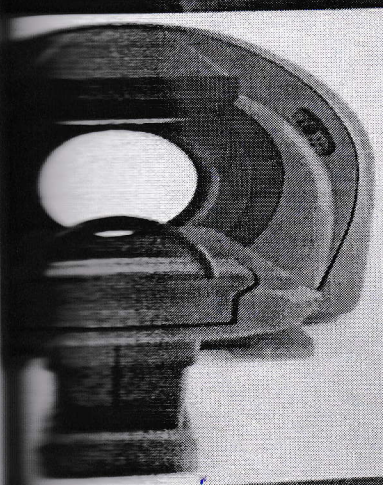
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BIOMEDICAL INSTRUMENTATION



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Diabetics Prediction using Gradient Boosted Classifier

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Abstract : *Diabetes is one of the most common disease for both adults and children. Machine Learning Techniques helps to identify the disease in earlier stage to prevent it. This work presents an effectiveness of Gradient Boosted Classifier which is unfocused in earlier existing works. It is compared with two machine learning algorithms such as Neural Networks, Radom Forest employed on benchmark Standard UCI Pima Indian Dataset. The models created are evaluated by standard measures such as AUC, Recall and Accuracy. As expected, Gradient boosted classifier outperforms other two classifiers in all performance aspects.*

Keywords: *Gradient Boosted Classifier, Pima Indian dataset, Diabetes, Evaluation measures.*

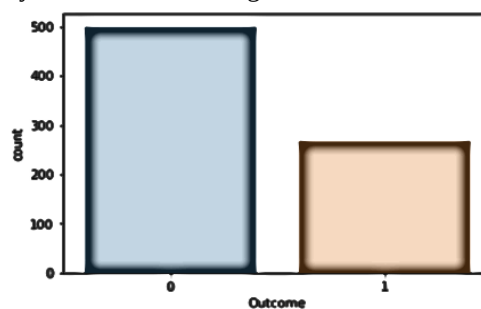
I. INTRODUCTION

Diabetes disease is mainly caused due to lack of insulin content in human blood [1]. Some symptoms of diabetes are frequent urination, thirst and hunger. The seriousness will increase if the disease is untreated at initial stage which further leads to stroke, disorder of all parts [2]. The main duty of pancreas is to secrete insulin to the human body. If it fails to secrete enough amount of insulin, Diabetes are occurred. The three types of diabetics are Type I, Type II and gestational diabetes. The cause of Type I is inadequate amount of insulin creation by pancreas. Type II is caused by malfunction of body cells due to less insulin secretion and Gestational diabetes are caused to pregnant women due to high sugar level. The recent study depicts that more than 18% of women are affected by Type III diabetes in their pregnancy times [3]. Data analysis helps medical field researches for knowledge extraction from dataset leads to take appropriate decisions that makes a good progress for health care industry [4]. Diabetes prediction using Machine Learning methods has been a striking research area due to its massive importance. Data mining methods used to predict the decisions by pattern recognitions, cluster analysis and classification techniques [14]. In existing works, the researches

focus on supervised methods than unsupervised methods for Diabetes prediction. we discussed some prominent recent and various existing research works related to diabetics' and other medical disease prediction using ML Techniques. A study was done using SOM and NN, PCA for prediction of diabetic analysis [5]. In another work, a multi model was designed by kumar et al. employing SVM method for attribute selection and eliminating unwanted attributes in data sample [6]. Similarly, hybrid work designed using NB and K-Means for clustering the data samples into groups [7]. Similar study was examined [8] diabetic analysis employing MLP, NB, Decision Tree. They proved that NB has good efficient performance compared to other methods on pima dataset. similarly, a model is developed for Heart disease using NN machine learning techniques [9]. The foundation of this article constructed as follows. We elucidated pre-processing process and dataset explanation in section 2. Next, ecosystem and framework implemented in this paper are highlighted in section 3. Section 4 carries various machine learning methods employed in this work. Finally, section 5 and 6 gives results and conclusion of the paper.

A. Pre-processing

The first step in Pre-Processing process is analysing for missing values. It is observed that nearly five features such as blood pressure, skin thickness, glucose, insulin and BMI have value as 0, which indicates the missing values in dataset. the missing values should be treated to improve the efficiency of the model. So, we replaced missing values into average values of each and every column. Next the dataset is introduced to Spearman method to evaluate the correlation between the values. We noticed that majority of the data belongs to healthy people and less amount belongs to people who suffers from diabetics. After applying Spearman method for attribute correlation, it is observed that age, pregnancy, insulin, glucose, skin thickness and BMI are correlated to target variable [15]. In that glucose and insulin are highly correlated to the target.



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Mathematical Modelling and Robust PID Controller Design for Compressed Air Pressure Control Process

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Abstract: Industrial Compressed Air Pressure Control (ICAPC) process is one of the significant and demanding tasks in all the process industries. Due to the unpredictable leakages and nonlinear behavior of the pneumatic control valve, the automatic pressure control is very difficult with respect to its various preferable operating points. In this paper mathematical modeling, robust PID controller and novel parameter optimization technique have been proposed. This paper deals with various effects of disturbances and uncertainties affecting the process dynamics. The novel robust controller yields better set-point tracking capability and survives against the sudden regulation in the load parameter changes. For mathematical modelling and parameter optimization, the robust hybrid form of fminsearch and fmincon (FSFC) technique has been used, which provides the accurate transfer function model and the model validation has been analyzed with respect to real-time pressure process. This paper also proposed PID controller optimization techniques such as Pattern Search (PS) and Fsolve (FS) for the pressure process with split-range control scheme and the closed loop performances are compared with existing Ziegler-Nichols (Z-N) and Genetic Algorithm (GA) based PID controller. The simulation and real time closed loop response have been obtained based on the Servo-problem (set point change) and Regulatory-problem (load change) operating conditions.

Keywords: Robust control, PID Controller, Model Optimization, Controller Optimization, pressure Process, Optimization, Mathematical Model

1 Introduction and Related Mechanism

Pressure is one of the important parameter to be controlled in an industrial environment such as boilers, compressing unit, molding process, hydraulic and pneumatic systems. For the analysis of pressure process, the mathematical model is required. The obtained model is Integer First Order Transfer Function (IFOTF) model consists of System gain (K), time constant (T) and transportation lag (L) will gives the complete information about the system.

1.1 Controller

The data acquired from the pressure process is considered to be a process variable of the real-time system, the process variable must be regulated and sustained even in unusual environment. It is interesting to note that most of the industrial process are utilizes PID or modified PID controllers. Because most of PID controller parameters

are adjusted in the real-time process, many types of tuning rules have been proposed in the literature. Using these tuning rules, delicate and fine tuning of PID controller can be made on-site. Also automatic tuning methods have been developed and some of the PID controllers may possess on-line automatic tuning capabilities, the sensitivity of the process parameter depends on the size of the pressure tank.

1.2 Challenges in the pressure process

The nonlinear components in the pressure process such as residual drift, transportation delay, dead zone and saturation occur in the process. These nonlinear components are due to the unpredictable leakages, turbulent variations in the centralized compressing unit and non linear variations in the field instruments installed in the real-time environment. Controlling of pressure process is difficult because of involvement of non linear components

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 Optical Fiber Technology
 Volume 50, July 2019, Pages 183–187

Effects of TiO₂ on the performance of silver coated on side-polished optical fiber for alcohol sensing applications

 R. Kanmani ^a, N.A.M. Zainuddin ^b, M.F.M. Rusdi ^c, S.W. Harun ^c, K. Ahmed ^{d, e}, I.S. Amiri ^{f, g, h}, R. Zakaria ^b
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Highlights

- Alcohol detection based on D-shape [optical fiber sensors](#).
- Optical fiber sensor is fabricated with the presence of Ag coating on an active area of [optical fiber](#) with integration of TiO₂.
- Detailed analysis on the sensor performance has also been presented.

Abstract

This work reports the experimental and numerical investigations on the effect of titanium oxide (TiO₂) integrated on the optical fiber silver (Ag) surface plasmon resonance (SPR) sensors. In this paper, the numerical simulation is also analyzed using the finite element method (FEM) which shows good agreement. Results are compared with the experimental findings, focusing on the SPR phenomena for refractive index sensing using side-polished optical fiber, where the characteristics of the Ag layer with the integration of TiO₂ are optimized. The essential parameters include the thickness of Ag namely 20 nm, 30 nm and 40 nm for optimization studies of SPR properties. TiO₂ was then coated on the Ag thin layer to sense isopropanol at different concentration. It is shown that the combination of a 30 nm thickness of Ag layer with a dielectric TiO₂ improves sensor performance in terms of sensitivity reading of 268 [nm/RIU](#) with a detection limit of 0.012. The main interest is to develop the device with cost effective, ease fabrication and less cumbersome of sensors using TiO₂ which one of an alternative material to defeat the oxidation process and avoid charge recombination. If the sensitivity increases at a higher wavelength, it indicates that the TiO₂ holds great potential in photonic applications.

[<](#) Previous

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Keywords

Surface plasmon resonance (SPR), Fiber Optic Alcohol Sensor, Finite element method (FEM)

1. Introduction

Metals such as silver (Ag) and gold (Au) have such a good role in various applications such as [surface plasmon](#) resonance (SPR) sensors. Comparing to other noble metals, Ag shows a good response towards changes of [refractive index](#) of surrounding materials; hence it is widely used in SPR sensors. The indication of good response is on its performance of its sensitivity and [detection accuracy](#) which is better than Au in various applications [1], [2], [3]. This is because silver has the largest $\left| \frac{\epsilon_r}{\epsilon_i} \right|$ ratio, where the real and [imaginary parts](#) of the [permittivity](#) can be defined by ϵ_r and ϵ_i respectively [4], [5], [6]. The only drawbacks of using Ag as a single layer is it is not chemically stable to against oxidation. The [oxide layers](#) as the low-cost material can be used as [alternatives materials](#) to protect the SPR, where these layers with a good chemical stability can be deposited on the SPR metallic layers [7], [8], [9]. Besides, for the new applications of temperature and [humidity sensors](#), the high refractive index oxide layers such as [titanium dioxide](#) (TiO₂) can significantly enhance the local E-field intensity at the interface between the oxide over-layer and the sensing medium [10], [11]. Previous research also shows the high sensitivity of using various [optical fiber sensors](#) such as PCF structure with a combination of circular layout and D-shaped [12], [13]. The titanium dioxide (TiO₂) has gained much attentions due to owning a high refractive index, a good chemical stability, and an elevated [dielectric](#) constant in [sensing applications](#) [14], [15], [16]. Several studies have been conducted on the influence of TiO₂/Pd/TiO₂ sandwich effects on the properties of [oxygen partial pressure](#) [17].

Diabetics Prediction using Gradient Boosted Classifier

J. Beschi Raja, R. Anitha, R. Sujatha, V. Roopa, S. Sam Peter

Abstract : *Diabetes is one of the most common disease for both adults and children. Machine Learning Techniques helps to identify the disease in earlier stage to prevent it. This work presents an effectiveness of Gradient Boosted Classifier which is unfocused in earlier existing works. It is compared with two machine learning algorithms such as Neural Networks, Random Forest employed on benchmark Standard UCI Pima Indian Dataset. The models created are evaluated by standard measures such as AUC, Recall and Accuracy. As expected, Gradient boosted classifier outperforms other two classifiers in all performance aspects.*

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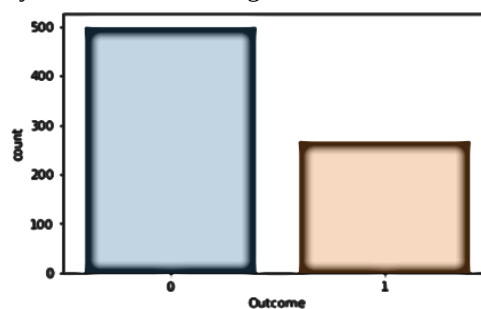
I. INTRODUCTION

Diabetes disease is mainly caused due to lack of insulin content in human blood [1]. Some symptoms of diabetes are frequent urination, thirst and hunger. The seriousness will increase if the disease is untreated at initial stage which further leads to stroke, disorder of all parts [2]. The main duty of pancreas is to secrete insulin to the human body. If it fails to secrete enough amount of insulin, Diabetes are occurred. The three types of diabetics are Type I, Type II and gestational diabetes. The cause of Type I is inadequate amount of insulin creation by pancreas. Type II is caused by malfunction of body cells due to less insulin secretion and Gestational diabetes are caused to pregnant women due to high sugar level. The recent study depicts that more than 18% of women are affected by Type III diabetes in their pregnancy times [3]. Data analysis helps medical field researches for knowledge extraction from dataset leads to take appropriate decisions that makes a good progress for health care industry [4]. Diabetes prediction using Machine Learning methods has been a striking research area due to its massive importance. Data mining methods used to predict the decisions by pattern recognitions, cluster analysis and classification techniques [14]. In existing works, the researches

focus on supervised methods than unsupervised methods for Diabetes prediction. we discussed some prominent recent and various existing research works related to diabetics' and other medical disease prediction using ML Techniques. A study was done using SOM and NN, PCA for prediction of diabetic analysis [5]. In another work, a multi model was designed by kumar et al. employing SVM method for attribute selection and eliminating unwanted attributes in data sample [6]. Similarly, hybrid work designed using NB and K-Means for clustering the data samples into groups [7]. Similar study was examined [8] diabetic analysis employing MLP, NB, Decision Tree. They proved that NB has good efficient performance compared to other methods on pima dataset. similarly, a model is developed for Heart disease using NN machine learning techniques [9]. The foundation of this article constructed as follows. We elucidated pre-processing process and dataset explanation in section 2. Next, ecosystem and framework implemented in this paper are highlighted in section 3. Section 4 carries various machine learning methods employed in this work. Finally, section 5 and 6 gives results and conclusion of the paper.

A. Pre-processing

The first step in Pre-Processing process is analysing for missing values. It is observed that nearly five features such as blood pressure, skin thickness, glucose, insulin and BMI have value as 0, which indicates the missing values in dataset. the missing values should be treated to improve the efficiency of the model. So, we replaced missing values into average values of each and every column. Next the dataset is introduced to Spearman method to evaluate the correlation between the values. We noticed that majority of the data belongs to healthy people and less amount belongs to people who suffers from diabetics. After applying Spearman method for attribute correlation, it is observed that age, pregnancy, insulin, glucose, skin thickness and BMI are correlated to target variable [15]. In that glucose and insulin are highly correlated to the target.



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Fig.1.2. Count Plot for Diabetes Vs Healthy ones

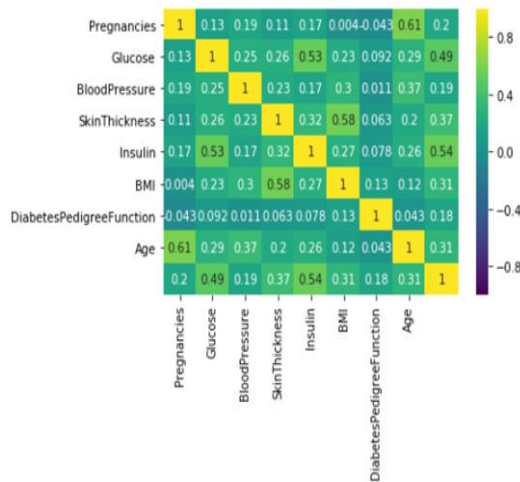


Fig.1.3. Correlation between the Attributes

a. Dataset

Pima Indian data sample for this analysis were collected from UCI database. It is one the standard 768 instances and eight various features. We observed 500 records were non diabetics and only 268 were diabetics patients [13]. The records were collected from women staying near phoenix location. The various features of pima Indian sample are depicted in fig.2.1.

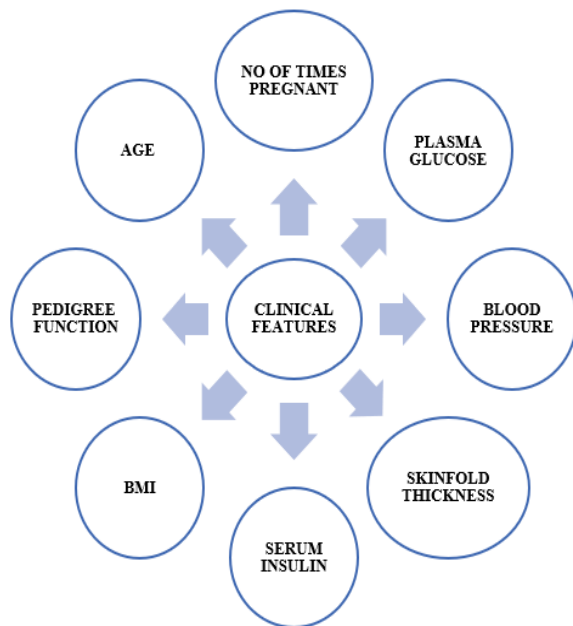


Fig.2.1. various features in pima Indian data sample

II. FRAMEWORK PROPOSED

The framework in this work consists of three phases. The first phase employs pre-processing stage which deals with missing value analysis. We used Spearman Technique for feature selection and correlation. Next stage consists of classification process. Here we employed three benchmark algorithms such as Random Forest, Neural Networks and Gradient Boosting. The last phase takes the prediction phase. We examined the dataset with these three methods and predicted Gradient Boosting algorithm performs well

among all. For evaluating the model, three standard metrics were used such as ROC, Recall and Accuracy.

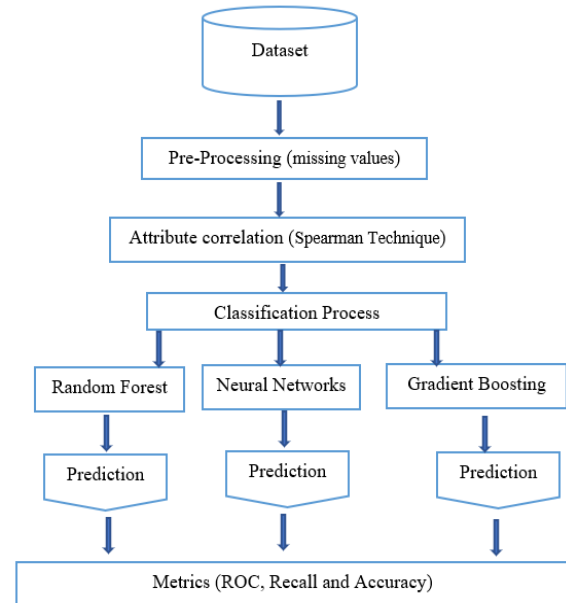


Fig.3.1. Systematic Task Flow of Work Employed

III. MACHINE LEARNING METHODS

a. Neural Networks

Multilayer perceptron is a method for designing feed-forward ANN. It integrates various perceptron to design a non-linear boundary [12]. The main role of perceptron holds on activation function, weights, processor and bias. The three main layers in Multilayer perceptron is final layer, middle layer and initial layer. The input data are feed into initial layer and perceptron parameters are passed along with layer. By modifying the parameters, the higher accuracy is obtained. The activation function is accelerated in middle intermediate layer to predict the target.

The steps for Neural network algorithm

1. For each and every layer in NN model, nodes are generated automatically,
2. Initially, target value is set as zero
3. Update the target value with weights from previous layer estimation
4. Target value+=weight* value obtained from other nodes in layer
5. Target value rate = sig (Target value rate)

b. Random Forest

Random forest method creates a forest with various number of trees. It is a supervised algorithm that is robust and produce high accuracy [11]. This algorithm is more useful for both regression and classification work. Handling missing values as well as overfitting are well performed using random forest. It creates a lot of subsets with a random value to make decisions. Random forest algorithm works as a large collection of decorrelated decision trees.

With all decision trees to create a ranking of

classifiers and make the class prediction.

The steps for random forest algorithm

1. Randomly pick “U” attributes from overall “Q” features
2. Consider $U \ll Q$
3. Evaluate the node “X” by best fragment position.
4. Daughter nodes are obtained by dividing by best fragmentation.
5. Iterate the process till desired number of nodes are obtained.
6. Finally, forest by designed by “N” trees

c. Gradient booting

Gradient boosting method creates step-wise process and increments the algorithm on basis of loss function [10]. The errors are detected and rectified to improve the accuracy. Generally, boosting checks models which decrease the loss function obtained from trained samples. From these calculations the errors are measured and analysed for optimal prediction of results. Loss function calculates the range of detected rate which compares with desired target. Onward stepwise process is most popular method for updating different with various attributes. The accuracy is optimized by reducing loss function and adding base learners at all stages.

Steps for gradient Boosting method

1. Consider a sample of target values as P
2. Estimate the error in target values
3. Update and adjust the weights to reduce error M
4. $P[x] = p[x] + \alpha M[x]$
5. Model Learners are analysed and calculated by loss function F
6. Repeat steps till desired & target result P

IV. EXPERIMENTAL ANALYSIS & RESULTS

The first model was created using Neural Network and cross validation was employed to optimize the regulation parameter. They number of hidden layers are fixed by trial and error process to increase the accuracy of model. Multi-Layer perceptron is used for designing Neural Network classifier. We fixed solver as ‘lbfgs’, activation function as relu, learning rate as ‘adaptive’, hidden layers as 10,10,10 and random state as 9. It is observed that this model works good only for healthy patients but it struggles for diabetes patients. Next, we designed random forest model using “n_estimators”. We see that, the same classification results happened in Neural Networks i.e providing good results for healthy samples alone. Finally, we created a Gradient Boosting Classifier with Max_depth parameter. It is observed that gradient boosting models outperforms other two models by producing high scores in all criteria.

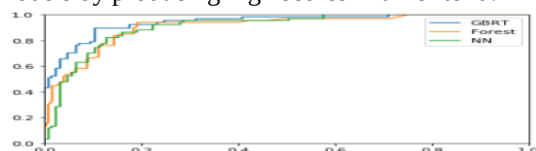


Fig.5.1. ROC Comparison

Table.1.2. Experimental Results of Machine Learning methods used in this work

	Neural Network	Random Forest	Gradient Boosted Classifier
Recall	0.701	0.656	0.761
AUC	0.907	0.907	0.942
Accuracy	0.838	0.822	0.897

V. CONCLUSION

Diabetes is one of the most common disease for humans today. Data mining methods are very helpful for detecting it in early stage. This work presents machine learning based diabetes prediction using classifier methods. The comparative experimental analysis reveals that Gradient Boosting Classifier outperforms Random forest and Neural networks. The future scope can be extended to figure out the features impacting by hybrid of feature selection methods with classifiers for real life large dataset.

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Design of high-speed 10-Gb/s wired/FSO systems for local area communication networks for maximum reach

Journal: Photonic Network Communications

Authors: A. R. Palanisamy, G. M. Tamilselvan, A. Pushparaghavan

Important notes

Abstract

This paper presents the numerical simulation studies of upgraded system for single-mode fiber (SMF wired)/free space optics (FSO wireless) under high-speed operation of 10 Gb/s. Further, the maximum reach of the system is analyzed based on various advanced modulation techniques, namely phase frequency shift keying (CPFSK), quadrature amplitude modulation, differential phase-shift keying, frequency shift keying, pulse amplitude modulation and different optical amplifiers, namely erbium-doped fiber amplifier, traveling wave semiconductor optical amplifier and parametric optical amplifier, respectively. The overall system studies are done by optiwave system software through which bit error rate and Q-factor are studied. The trade-off between different all-optical amplifiers and modulation techniques is studied to show the enhancement of upgrading system. The simulation results show that the maximum reach of distance belongs to CPFSK modulation scheme.



Cut set-based Dynamic Key frame selection and Adaptive Layer-based Background Modeling for background subtraction[☆]

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Keywords:

Cut set-based Dynamic Key frame selection
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ABSTRACT

Background subtraction has been widely discussed in video surveillance, but it still has open challenges such as dynamic background, illumination variation. To address these challenges a novel Cut set-based Dynamic Key frame selection (CDK) and Adaptive Layer-based Background Modeling (ALBM) approach for background subtraction is proposed which adaptively changes layers in the background model for each scenario such as static, dynamic background and high illumination.

The concept of key frame is used to choose representative frames from the video. In order to capture the invariant directional codes of each spatio-temporal patch symmetric operators such as line and rotational symmetry are used. The proposed method identifies highly similar static spatio-temporal patches and sets it as background there by reducing the computational complexity in the foreground detection step. Both qualitative and quantitative evaluations on challenging video sequences demonstrate that the proposed algorithm performs background subtraction more favorably than the state-of-the-art methods.

1. Introduction

In most video analytic systems, background subtraction is performed for moving foreground detection. In static cameras, background subtraction is performed by maintaining a statistical model of the background and then comparing its difference from each incoming video frame. Then, this background model is kept updated to reflect illumination variation or any structural change in the background over time [1,3].

Existing Background Subtraction (BS) techniques are reliable and produce acceptable detection results either with scenario specific parameter tuning or when scene dynamics remains stable. However, due to over-reliance on statistical observations, these techniques show unpredictable performance in dynamic unconstrained scenarios where the characteristics of the operating environment are either unknown or change abruptly [17].

In this paper, a new BS technique, called Cut set-based Dynamic Key frame selection (CDK) and Adaptive Layer-based Background Modeling (ALBM) is proposed, that shows reliable detection performance

across dynamic unconstrained scenarios without requiring any scenario-specific parameter tuning.

The contribution can be summarized as follows:

- Adaptive layer-based strategy can be used to develop an accurate background model.
- To overcome the limitation of key frame selection step at the time of cut transition, Cut set-based Dynamic Key frame selection (CDK) process is introduced which can be used to create an invariant and adaptive background model.

This is an extension to the already published work with RSDT (Rotational Symmetry Dynamic Texture) and SCD (Similar-Congruent-Dissimilar) based Scoring model [10]. In this approach symmetrical operators such as line and rotational symmetry can be used to overcome the problem in dynamic background. So, in the proposed approach, symmetrical operators are utilized to create an invariant background model. Even though it gives good results it has to overcome the limitation with key frame selection and background model creation.

[☆] This paper has been recommended for acceptance by Olivier Le Meur.

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Efficient background subtraction for thermal images using reflectional symmetry pattern (RSP)

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Abstract Nowadays, thermal image processing has gained more attention. Thermal camera's cost is decreasing, and so many real-time applications use thermal cameras since they have an ability to detect objects in darkness and track objects in the video. A background subtraction approach using Reflectional Symmetry Pattern (RSP) for thermal image background subtraction is proposed based on the assumption that the geometric reflectional symmetrical pattern of each of the objects (person) is much lower than the surrounding background. Reflectional symmetrical texture pattern can be used to create a subspace from the result of frame differencing approach. Statistical parameters such as VP (Vector Product), VD (Vector Direction) can be used to create an accurate background model. As a result, the proposed scheme can provide a high precision and less error rate to meet the requirements of object detection from real-time thermal videos.

Keywords Vector product · Vector direction · Reflectional symmetrical patterns

1 Introduction

Today, terrorism, crime, robbery, shop-lifting, and accidents are the major threat to people. Video surveillance is used to control, reduce, and identify the main reasons for these threats. But these cameras are capable of capturing the image in the visible spectrum. So, automatically this system is dependent on lighting conditions and its performance also depends on various other environmental factors. In an outdoor environment, if the electric lights are turned off, then the security is also turned off so there is no use of the surveillance system. But thermal

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PERSONALIZED TRAVEL SEQUENCE RECOMMENDATION USING LCF ALGORITHM

RECOMENDACIÓN PERSONALIZADA DE SECUENCIA DE VIAJE UTILIZANDO EL ALGORITMO LCF

RECOMENDAÇÃO DE SEQUÊNCIA DE VIAGEM PERSONALIZADA USANDO O ALGORITMO DE LCF

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Abstract

We are exposed into Big Data era due to the wide range usage of social media and mobile networks. Big data benefits both research and industrial fields. This proposed system will present personalized travel sequence using the heterogeneous data collected from travelogues, community contributed photos and tags, geo-location associated with the photos. The system proposes personalized travel sequence recommendation. The system uses data taken from travelogues and community contributed photos. Compared to other existing system, this system is not only personalized to user's interest of travel, but it can also recommend a sequence in which the user need to travel instead of individual Points of Interest. Tags, cost, visiting time and visiting season are included in the Topical package space. This is mined to connect the communication gap between user's preference and routes he need to travel. Here we make use of two kinds of social media which are travelogue and community-contributed photos. Then we will map both routes and user's textual descriptions with the topical package space in order to get user topical package model and route topical package model. Popular routes are arranged based on the similarities between user package and route package in order to give personalized POI sequence. Then the famous top ranked routes are optimized by using user's travel records. Then images which are called representative images with viewpoints and seasonal conditions of POIs are shown to the user to offer a more good impression. This is the overall idea of the proposed system which will provide more efficiency to the user travel experience.

Keywords: Topical package model, Point of interest, Social media



Blockchain Security for Internet of Things: A Literature Survey

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Abstract:

The Internet of Things (IoT) is experiencing a tremendous growth in areas of research and industry; however, still suffers from security issues. Conventional security mechanisms haven't really proven to offer optimum security. BlockChain (BC) is a new revolutionary technology that utilizes the cryptocurrency Bitcoin, which has been used recently to provide security and privacy in peer-to-peer networks. The Internet of Things (IoT), blockchain, and peer-to-peer methodologies assumes an imperative part in the improvement of decentralized information serious applications. Our objective is to understand whether the blockchain and IoT design can be utilized in the encourage of decentralized applications. As an initial phase in our examination procedure, a methodical writing survey on IoT engineering and its present issues with the countermeasures for vulnerabilities in IoT design are talked about. We discovered countermeasures that tends to the assaults in the IoT engineering. To assemble learning on the present utilization of innovation, a blockchain display is archived its present level of Honesty. We likewise found a few issues in respectability and found that the blockchain generally relies upon the trouble of the Proof-of-Work and trustworthiness of miners. We archived and considered the present employments of the blockchain and addresses the previously mentioned issues.

Keywords-Internet of Things, Blockchain, Integrity, Security, Proof-of-Work.

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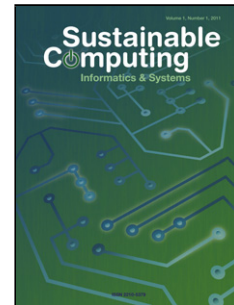
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A novel resource clustering model to develop an efficient wireless personal cloud environment

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Abstract: In the current era, cloud computing is the major focus of distributed computing and it helps in satisfying the requirements of the business world. It provides facilities on demand under all the parameters of the computing, such as infrastructure, platform, and software, across the globe. One of the major challenges in the cloud environment is to cluster the resources and schedule the jobs among the resource clusters. Many existing approaches failed to provide an optimal solution for job scheduling due to inefficient clustering of resources. In the proposed system, a novel algorithm called resource differentiation based on equivalence node potential (RDENP) is proposed for clustering the resources in a simulated wireless personal cloud environment. The performance evaluation is done among the existing and proposed approaches; as a result, the proposed RDENP algorithm produces the optimal solution for clustering the resources, which will lead to an efficient scheduling policy in a cloud environment in the future. To take this idea forward, an optimal energy consumption algorithm is to be designed to process the jobs among the resources and to minimize the infrastructure of the cloud environment by clustering the resources virtually.

Key words: Cloud computing, resource clustering, node weight, resource clustering algorithm, RDENP

1. Introduction

Cloud computing is predicted to be a great distributed technology for at least the next ten years in the business sector and economics, as it develops gradually and expands its characteristics across organizations. The future evolution of the Internet of services depends only on the cloud computing, which allows the on-demand supply of application platforms, software, and computing hardware resources [1]. Due to the enormous increase in the usage of mobile devices, cloud computing is also used in wireless mode to enrich the utilization of mobile devices in today's businesses. The structure of cloud-based wireless networks includes mobile clouds, cloud-based radio access networks, reconfigurable networks, and data centers [2]. The wireless cloud network undergoes minimum latency and well-formed communication among various users and acts as a macro relay node in the environment [3]. Many hurdles have been faced to improve the performance of the mobile environment, such as storage, bandwidth, and battery life, and these hurdles are cleared by combining a mobile environment and cloud computing [4].

This paragraph states the opportunities and challenges in cloud computing. There are many opportunities for researchers to do research in various types of resource scheduling in cloud computing such as cost-aware resource scheduling, energy-aware resource scheduling, load balancing-aware resource scheduling, efficiency-

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Identity Secured Sharing Using Blockchain

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Abstract--- Frequent cases of personal data leakage has brought back into the focus the security issues with the different identity sharing mechanisms. A customer is expected to provide his personal identity for the authentication by different agencies. The KYC procedures which are used by the banks is completely dependent on the encryption which is slow and it can lead to the loss of customer details to other their party financial institutions. This system can be efficient by using the Blockchain technology, which has the potential to automate a lot of manual process and it is also resistant to hacks of any sort. The immutable blockchain block and its distributed ledger is the perfect complement to the opaque process of KYC. With the addition of the smart contracts fraud detection can be automated. For KYC identity details storage, the banks can develop a shared private blockchain within the bank premise and the same can be used for verifying the documents. This allows the user to get control of their sensitive documents and also makes it easier for banks to obtain the documents they need for compliance.

I. INTRODUCTION

KYC (know your customer) is the common procedure which are used by the banks and the financial institutions to obtain customer information like Aadhar card, PAN card and the address proof. Current KYC procedures which are used by the leading banks and financial corporations around the world are completely dependent on the human beings. KYC rules is used for mandating every customer of the bank to prove the authenticity of their existence by submitting the proof of identity and the proof of address. As the result banks across the world spends a lot of resources on the KYC process which involves collecting, tracking and storing the huge amount of data, so that it may be reported to regulatory agencies in a timely fashion. the emergence of the digital wallets like patym means that the same KYC procedure has to be repeated several times by the various companies and stored in all of their separate databases. these databases are prone to hacks and also causes a lot of data redundancy and data theft. these KYC documents that are required to establish the customer's identity at the time of opening of savings bank account, fixed deposit, mutual funds etc. KYC documents has been made mandatory along with the photograph of the customer because of fraud accounts and money laundering. thus to reduce as much fraud as possible and as an anti money laundering parameter. the blockchain is the best platform

which enhances the security value of the information. Blockchain can enable us to storing the data on a decentralized network which makes use of the unused space on people's devices across the world to store files. this technology is effective that can help prevent data breaches in the financial sector. And it is a secure and reliable method which can be used for storing the sensitive data. the blockchain network can be public or private depending upon the use case which enhances the security of the application. the detailed description regarding the transaction is recorded and the main feature is that it is immutable. No hackers can change the data which has been recorded. this is pretty well suitable for financial applications.

II. LITERATURE SURVEY

The technology which was used before hand for storing the data is the encryption technique. Considering the openness and cross domains the identity is been stored by means of encryption. Identity based encryption is been used as the substitute to public key encryption. It is invoked by using the private key generator (PKG) throughout user revocation. the sender has access to the public parameters of the system and can encrypt a message using the value. the receiver obtains the decryption key having the trusted mechanism. the encryption schemes are currently based on the bilinear pairings. the advantage of this identity based encryption scheme is that it is better for finite numbers of users, after all users have been issued with keys the their party's secret can be destroyed. In the other method the efficient searching on encrypted data sent to the cloud with the equality test which has been identified as the better solution. the users can search on the outsourced data to determine the two ciphertexts are the encrypted version of the plaintext. Such techniques are inefficient particularly for deployment. the identity based encryption and the identity based signature are used along with the authentication protocol for the cloud computing for storing the user details which has the high scalability. the anonymous multi receiver encryption scheme can not only protect the privacy of the receiver but also ensures the security of the message. However the computational cost of this scheme is very larger. It is not suitable for the sender which has the limited source such as the mobile nodes. the sender can encrypt the message using the unique information of the user as its public key. the receiver obtains the information via the central authority.

The blockchain based techniques is been preferred nowadays for the secured sharing of the identity for the banks or the financial sectors. there are many platforms which can restrict the access for the network on public or private scale.

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PREDICTING THE HIGH-RISK PATIENT USING VIRTUAL PHYSIOLOGICAL HUMAN TECHNIQUE IN BIG DATA HEALTH CARE

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ABSTRACT

Big data plays a key function in all aspects of organization especially in health science and clinical information. In the past days every health care related data contains data in the format of hard copy. (i.e.) Drug Prescription, consultants report, radiographs, laboratory prescription etc. But, nowadays with the increasing need for ample variety of clinical data access over the internet, every data is move towards cloud in the outward appearance of digitization. The immense quantity of information collected from the various health cares, hospitals, and physicians etc. which are stored remotely on the cloud on top of the internet is called big data. This big data is in the appearance of structured (Tables in the outward appearance of rows and columns), semi- structured (XML data) and unstructured data (videos, X-rays, scan report, Images, Audios etc.). This enormous size of information needs to store, processed and retrieved in the effective manner to provide accurate and valuable information to the doctors, patients, house surgeon and medical researchers. This manuscript is mainly focused to predict and analyze the symptoms and also categorize the high-risk patients. Here the association rule is applied in the VPH (Virtual Physiological Human) method. VPH technique is used for collecting, analyzing, observing, categorizing and indexing the data which are observed from various hospitals, Patient record, primary health care, Insurance Firms etc. Here the experts from various fields are analyze and verify the data. Associate rule is used for uncovering the association among the symptoms in the database. From the data collected, we apply Apriori algorithm to the data base and also gives the risk priority category and highest risk patient.

Key words: Big data, VPH Technique, Associate Rule, Apriori Algorithm, HDFS, Map Reduce.

INTRODUCTION

Big data is the addition of vast quantity of information stored and processed on cloud by means of internet connection. Even a little quantity of data can also be represented as big data depending on the environment being used. This enormous quantity of data may be in the size of GB (Giga Bytes), TB (Terabytes), PB (Peta Bytes), EB(Exabyte). Multi-disciplinary information is processed in big data (Abinaya, 2015, Chitra et al., 2016) For e.g. Business, Media, Government Agencies and in addition to health care. Nowadays, Health care information has been dramatically increased which becomes additional difficult and expensive. But the present issue is to manage the huge number of information in the health science such as pharmaceutical information, clinical information, data from patient's sensors in the hospital, Medical imaging such as X-Ray, Scan Report, Genomic Information, Historic Data of the patient, Public Health report, Government and private Hospital Health report, Disease Analysis about several diseases such as Respiratory disorder (Asthma), Diabetics, Heart Related diseases, etc. Electronic Health Record (EHR) is the term used in big data for health care (Sudharan et al., 2015, Haritha et al., 2015). In 2012, according to the report generated by the Common

Wealth of Australia it has been analyzed that 500 Peta Bytes (PB) of data is all about Health care data. In 2020, this healthcare data will be estimated to 25,000 PB of data. The data which comes from U.S fitness care system alone reached 150 Exa bytes of data in 2011. In U.S every hospital system has the account of each patient history. Even if the patients switch physicians, the fitness care insurance firms 3 in the U.S have the proof of all the patients. In today's world 90% of the information was created in the most modern years according to the data reported by Common Wealth of Australia in 2013. It has been predicted that the size of data will be generated in 2020 is 45 times superior than the present scenario. Every Day, 2.5 quintillion bytes of data has been generated. This brings about massive amount of high variety and velocity of data Kiyana et al., 2013; Matthew et al., 2013; Haritha et al., 2015; Dantanarayana et al. 2015; Nina et al., 2015; Harsh et al., 2014; Jasleen Kaur Bains, 2016)

CHARACTERISTICS OF BIG DATA

Volume, Velocity, Variety, Variability and Value are the 5 main characteristics of big data.

Volume: It represents the amount of data to be generated per second. Today, each society produce peta bytes of information each second

DESIGN OF SMART VILLAGE USING INTERNET OF THINGS AND CLOUD COMPUTING

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ABSTRACT

This paper concentrates on implementing smart village through Internet of Things (IoT) and Artificial Intelligence (AI). IOT is used to control the working of great things with our free hands. It enables the path to connect anytime, anywhere, with everything and everyone can use. Meaning of "Smart" represents useful information which is analyzed through sensors used with the Internet Technologies. To improve the agriculture and to create the world optimization in all the fields, anything can be connected through internet. This in turn connects to smart irrigation as smart farming and converging into a Smart Village through IOT. Sensors related to moisture of soil and humidity of temperature are used to record the values. The data stored can be retrieved using cloud technology. The proposed result of the project is to make the village wholly connected through internet.

KEYWORDS: IOT, GSM, Soil moisture sensor, Temperature and humidity sensor, cloud computing, Artificial intelligence.

INTRODUCTION

Internet of Things (IoT) is the technology to share information and to produce new information through which anyone can analyze with the previous data. IoT gains its potential by using the Smart objects which use sensors and devices to aware of the data, and also they can form a network through which data must shared securely, access the open source Internet services and connect with the human world. Smart Village is an advanced and efficient technology used in agriculture for solving many technical hurdles in information technology for wide area, secured with reliable data transmission under integrated system. It used to convert the tradition farming to modern farming in an efficient way. The architecture of this approach consists of subsystem GSM module and sensors.

OVERVIEW

The system revolves around the technologies of IoT, Cloud and Artificial intelligence. First module of this system represents the prediction of irrigation using different sensors. In second module, cloud storage is used to preserve the predicted data. In third module the automatic system will respond to the field based on predicted data.

IRRIGATION SYSTEM

This paper deals with implementation of smart village use IoT, AI and cloud computing. Smart Irrigation System: Smart irrigation (Damodar, 2015) system consists of sensors associated to soil and temperature. Soil wetness is important for agricultural applications to support farmers to manage their irrigation.

1. Detecting the nearby local agricultural conditions.

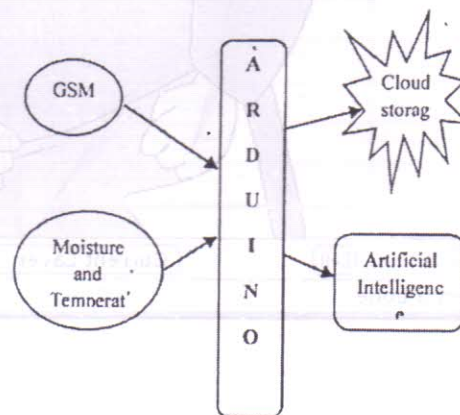


Figure-1: Overview

2. Spotting the location of data gaining.
3. Transmitting the data to the corresponding control system manager.
4. Depending on obtained local data, decisions are made.

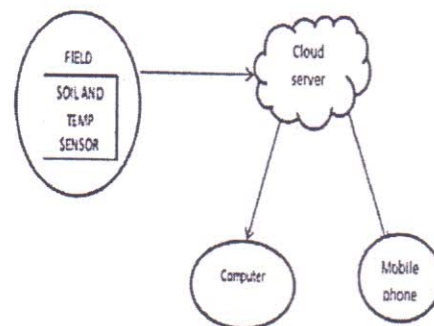


Figure-2. Irrigation System Architecture



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journal homepage: www.elsevier.com/locate/compelecengAn Erlang Factor Integrated Channel Allocation Method for Boosting Quality of Services in mobile ad hoc networks[☆]R. Suganya^{a,*}, L.S. Jayashree^b^a Department of Information Technology, Sri Krishna College of Technology, Coimbatore, India^b Department of Computer Science and Engineering, PSG College of Technology, Coimbatore, India

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ABSTRACT

The choice of using the channel efficiently in mobile Ad hoc Networks is improved by creating multiple channel accessibility for attaining improved system functionality that depends on the metrics such as point to point delay, throughput and overhead. Most probably delivery of QoS (quality of service) hugely complicated in multiple channel ad hoc networks and the available adaptation and signaling methods for QoS, exist in literature survey primarily helps static-width channels or dynamic-width channels that limit the performance of a network. This Erlang Factor Integrated Channel Allocation Mechanism (EFICAM) model analyzes to improve ad hoc network's system functionality. EFICAM utilizes a combined scheme of availability and performance of the existing channel conditions through Erlang Factor that computes the rejection rate of the network. The decision on user request rejection rate depends upon the transmission delay and queueing delay by two thresholds like Channel Allocation Verge (CAV) and Estimated Channel Allocation Verge (ECAV). The QoS adjustments are achieved by EFICAM by calculating the delay in queue which helps in splitting the packet into smaller fragments for improving the level of QoS. This distributed approach refines the QoS by altering the channel sizes in a multiple channel ad-hoc networks that is constructed upon the ETT (Expected Transmission Time) routing parameter to meet the need of adaptability of bandwidth. The outcome investigation of EFICAM is done in an NS-2 simulator and the expected mechanism provides an enhancement of 17% and 21% with respect to throughput and packet delivery ratio respectively than the current QoS adaptation mechanisms exists in the literature.

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1. Introduction

In the multiple channel networks, by permitting the numerous transmission on moving nodes upon its common transmission range, will improve effective utilization of available bandwidth [1]. When the several channels are used, the mobile nodes should do transmission and reception concurrently for reducing the transmission delay and for boosting the throughput. So in realistic networks, almost all the channels are used to make best use of throughput. Further, to minimize the cost, a best-effort transmission which is burst in nature with minimum bandwidth and delay necessities is used. In order to enhance the system performance, quality of service is mandatory [2,3].

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ARTICLE IN PRESS

AN OPTIMAL SOLUTION TO TRACK AN EMPLOYEE USING INTREGRATED MODULE

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Abstract. It is difficult for an organization to track the employee who goes for fieldwork. There is a possibility that field employees cheat the organization by doing their personal work during their work hours. The goal of the research is to design a hardware module to track the employee and the total distance travelled by the employee and stores the data in the cloud. This will help the senior officer supervise the employee and use the company's resources appropriately.

Keyword: tracking, field employee, organization, cloud computing.

INTRODUCTION

The duties of a field team manager or small business owner almost always include reviewing the work your team has done and feedback based on those results. In an Office environment, managers and team leaders are free to walk and register with employees, both to ensure that they are focused on their tasks and to offer advice and help if necessary. When the duties of the employees require that they work outside the office, in a field environment, these luxuries are lost, and a great deal of efficiency can leave them if the transition is not handled correctly.

The metrics that must be monitored include the location of the employees, the hours worked, the mileage of the vehicle and more tools are needed to monitor these metrics include mobile devices,

applications, and software are all possible solutions.

While the legal landscape is always changing, the overwhelming majority of judicial decisions in the United States and around the world have decided that, in fact, it is legal to use GPS tracking technology to monitor the location of employees.

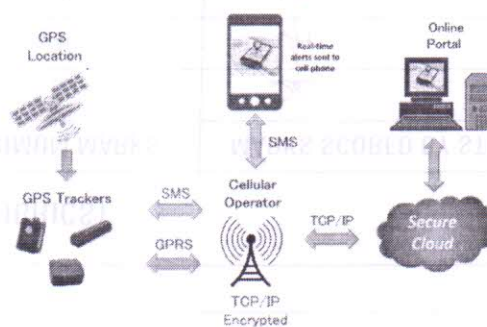


Figure 1. Basic tracking pattern

Each company is unique and will have its own metrics to monitor, but there are certain characteristics of representatives working in a field environment that are virtually universal.

The employees who work in the field will be on the move most of their day and make sure that they visit customers at the right time and place are incredibly important. More importantly, location



SECURE COMMUNICATION USING LIGHT-WEIGHT CRYPTOGRAPHY AND 2-FACTOR VERIFICATION FOR IOT DEVICES

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ABSTRACT

Internet of Things (IoT) is an ecosystem of physical objects connected to each other that are accessible through the internet. The concept of IoT involves the characteristics of Big data and cloud computing for the transmission and storage of data, which naturally implies several threats to the data. The Internet of things(IoT) security is the domain involved in defending the connected devices and networks from unauthorized access. In this paper, we propose a light-weight cryptography technique, SHA-256 algorithm which is used for encrypting the data as it provides high level of security to the data. Two-factor verification is a very efficient security mechanism and an excellent alternative to other security mechanisms as it provides an extra layer of security to the data. It is also known as multi-factor authentication, which requires not only the two correct passwords but also the temporary security PIN sent to the authorized user.

KEYWORDS: IOT, Security, SHA 256, Two factor verification.

INTRODUCTION

The Internet or World Wide Web (WWW) as it is known is a network of computers (nodes) connected to each other throughout the world which permitted the sharing of data and resources. It was the birth of IoT (H Chen et al, 2011) which made the Internet users realize that it was powerful enough to control devices connected to the grid. IoT stands for Internet of Things and can be technically defined as a collection of isolated Intranet of Things, which really cannot communicate with each other. In simple words, it can be defined as the vast network of "Things" connected to the World Wide Web. Here, "Things" refers to all devices with a sensor (N Mitton et al, 2012) attached to it. For example, say cars, house doors, lights, fans, oil drills, etc. IoT involves the usage of sensors, actuators, micro-controllers, communication devices and network protocols. The main aim of IoT is to connect all the devices or 'Things' to the Internet such that they can be controlled and monitored by electronic devices. Although it is considered impossible to build a single network where all the globally connected devices can be accessed by a single user, the main aim of IoT has definitely raised many security concerns among users. The users are worried over the confidentiality, integrity and availability of the data being sent to and/or being accessed from the cloud. An Probability distribution based job scheduling had been performed in cloud (Kowsigan, et al 2017).

Raspberry Pi (SarthakJain et al., 2014) has proven to be a very efficient micro-controller. To make RPi (Santhosh, et al, 2016) portable in this paper wireless USB Wi-Fi adapter is used.

One of the powerful features of the Raspberry Pi is the row of GPIO pins along the edge of the board. These pins are a physical interface between the Pi and the outside world. It is not very expensive yet delivers excellent services when connected to the sensors and the Internet, thus providing IoT and Machine-to-Machine(M2M) communication as well. Biometrics has been considered to be a better security alternative to the conventional password protected data system, as the passwords when known by many users, can be misused. Examples of biometric modalities are finger-print recognition, hand geometry, facial recognition, iris scan etc. However, any implemented biometric security has to be very efficient enough to provide a high level of accuracy in order to be practical and secure enough to use it in various applications. It must have a genuine accept rate (Zhang and Kong, 2003) as well as a false accept rate (Avione, 2009). Nowadays, it is possible to hack such biometric passwords by acquiring the finger-prints of the authorized user (Liu and Silverman, 2001). Such an intrusion will never be detected by the security system and hence the authorized user will be unaware of such a data breach. Unlike passwords and cryptographic keys, which are known only to the user, biometrics such as face and finger-prints can be easily recorded and misused by hackers without the consent of the user. Heart disease prediction has been performed by using fuzzy logic (Kowsigan, et al., 2017). Also, biometrics is associated with the users and is permanent. They cannot be changed like passwords or PINs. A two-factor authentication system (Manik eLal., 2009) like the one used in Gmail can also be implemented for security which

An Enhanced IRIS Pattern for Human Tracking in Large scale Biometric Environment

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Abstract—Iris technology is used in various fields especially for security purposes like for as in military, data centers and airports because of its eccentricity and firmness. Among all other data from biometric such as fingerprint, voice-pattern and various data from soft biometric, iris proves it is the most efficient and unreplicable easily. This proposed approach is a concept of tracking every citizens of the nation all stages through his life from birth to death. Iris pattern of the person is captured and saved in the government database and the additional details has also been added corresponding to it. Once a person is registered, it gets automatically updated throughout all stages of his life until death. Till now for demographic analysis the government officials takes the census once in every five years. This system reduces the complexity by avoiding periodic updating of database and he effort that the government takes for this analysis. Daughman's algorithm is utilized in this project for its high percentage of accuracy. Hence, this project proposes the method of caching the population statistics with security and effective maintenance.

IndexTerms —Iris recognition, Image processing, Daughman's algorithm, Pattern recognition, Security

I. INTRODUCTION

The latest technology which depends on security has been concentrating more on the authentication and validation using biometric data. With this tracking system, a person need not carry his identification cards, he can identify himself using his iris. Recognition system of iris provides immense levels of security, accuracy and flexibility. The government can remind the person of his rights and roles when he comes to those stages Biometric authentication systems will help in improving the infrastructure that are to be secured against various security threats. After all, physical characteristics don't get lost, forgotten or passed from one person to another and it remains as an element of the person. They are tremendously hard to be cracked and reduces the possibilities of criminal activities involving biostatistics [1]. In this project, Daughman's Algorithm is used. These algorithms perform mathematical

calculations over the recognised pattern for iris recognition. Iris recognition is an automation system that recognises the biometric credentials using mathematical pattern-identification procedures on either of the irises of an individual's eyes, whose complex patterns are distinctive, firmness, and will be recognised from a limited distance. Iris forms the outer segment of the vascular tunic of the eyeball. Vascular tunic is a circular covering with an opening at the centre called as pupil. The pupil behaves like an adjustable diaphragm by correcting the size of the pupil to formulate the capacity of light that enters the eye. The blood vessels and loose connective tissues containing the pigment cells combine together to form the stroma which is the main sector of the eyeball [3]. Iris is formed in the human before birth at the 3rd month of fecundation by the process of contraction and compression of the tissue membrane. By the 8th month of fecundation, their unique pattern structure gets completely formed. But the pigmentation continues till its 10th month of human birth [2]. The iris' colour is determined by the rate of pigment cells in its connective tissues [3].

Biostatistics refers to the measurement of the human characteristics. Biostatistics is a concept that performs recognition and controlling the access or viewing the data. It can also be used to recognize the discrete entities in crowds that are under surveillance [4]. A biometric sensor converts the obtained biometric input into an electric signal. Consider B as a biometrics of a real-world and s as the transmission function of a sensor or a device, then the output signal will be $B' = s(B)$ and $B' \neq B$ [5].

II. LITERATURE REVIEW

Iris is an interior organ that is well secured from the surroundings and always remains constant. It is a planar object, its image is relatively obtuse to the angle of illumination and varies from its viewing angle but both minor transformations and distinct pattern misrepresentation caused by pupillary expansion can be modified. Consistent and accurate

A Compendium on Routing Algorithms in Mobile Adhoc Network

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ABSTRACT

Routing algorithms are used widely in Mobile ad-hoc Network which determines the specific choice of route to transfer the packets to the destination. A number of routing protocols are available for this purpose. It is actually difficult to find out the appropriate routing protocol for a specific application. In this paper a compendium is done between the different types of routing protocols and have concluded based on its functionality and uniqueness for better selection of the protocols. This study will assist the researchers to get a detailed view of the existing protocols and their drawbacks.

KEYWORDS

Mobile ad-hoc Network; Routing protocol; classification of protocol.

I. INTRODUCTION

MANETs is usually a routable networking environment present at the top of a Link Layer ad hoc network and it is a kind of wireless ad hoc network. It has self-forming, peer-to-peer, self-healing network. It is used to facilitate the collection of sensor data which is used for data mining. The nearby sensor nodes will typically register similar values for monitoring environment. The data redundancy formed due to the spatial correlation between sensor observations makes it a successful technique for data aggregation and mining. Each node in a MANET is free to move independently in any direction, and it will change its links frequently. Each must act as a router and should forward traffic unrelated to its own use. The challenge behind MANET is to maintain the information required to route traffic. Such networks may operate by

connecting them to internet or they operate themselves. They may contain multiple and different transceivers between nodes and it results in a highly dynamic, autonomous topology [1][2].

II. LITERATURE REVIEW

There are different pieces of ideas from the key literature in MANET routing protocols has been showed Maghsoudlou A. et al. [2001] surveyed on the different types of routing algorithms. They are unlike face routing algorithms, dissimilar face routing strategies, greedy routing algorithms by using geographical routing protocol in MANET. Authors experienced sometimes the data could be tarnished, if there is no foreigner node near to the target. Because geographic routing protocols are working on the greedy forwarding in which the data is sent to the closest node of the target. Author concluded that the most common strategy to recover from the state of the void is faced routing algorithm which uses the planner graphs.

Mittal P. et al. [2013] represented the comparison of MANET routing protocols i.e. AODV, GRP, DSR and OLSR on the basis of network load, retransmission attempts, end-to-end delay and throughput by using simulation tool OPNET modeler. Authors accomplished that DSR and AODV perform better than other protocols. The throughput of AODV and DSR is more than other protocols and delay of AODV is minor than as that of other protocols.

Wadhwa D. et al. [2014] compared different geographic routing protocol such as Greedy



Markovian model based indoor location tracking for Internet of Things (IoT) applications

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Abstract

The monitoring of personnel movements, package tracking and other constructional material based tracking is a top concern in pervasive smart environment. Wireless sensor network (WSN) has given its own individuality in tracking scenario. The challenges faced in this paper deals about an effective 2-dimensional movable system tracking and finding the possible prediction of its exact location of the object in the sensing area. An indoor based WSN with wireless sensor nodes has been created, in which RSSI based location sensing methodology is used. The sensing area is classified as shells and the movement of the node is judged with markov model. The proposed algorithm is tested with various speed conditions suitable for IoT applications. Real study shows the effectiveness of the proposed two dimensional algorithms. The obtained results show minimal location error and accurate location of the object. The proposed methodology serves as the better solution for IoT applications. The proposed algorithm outperforms the existing algorithm with reduced error rate and computing iterations or complexity. A cloud enabled IoT based application is developed to location the elderly and post-surgical people. The developed application serves as a better solution for monitoring the elderly people inside the smart home environment without disturbing their privacy.

Keywords Pervasive computing · Wireless sensor network(WSN) · Location sensing · Receiver signal strength indicator (RSSI)

1 Introduction

Wireless sensor network (WSN) has got the unique identity in location sensing and has a major role in pervasive computing. Providing service to the user, without intervening in their day to day activities is a major concern in smart home environment. Improvement in the field of medical facility and out of hospital monitoring system has increased the lifespan of the

people. In connection with IoT and WSN pervasive context aware applications are growing rapidly [1]. The evolvement in the field of autonomous robotics and smart environment increased the sophistication of elderly people. The location of target is detected by two or more sensor nodes. The target location is determined by averaging the coordinates with respect to the target location. The angulation and lateration based target location determination is in vision so far. Increasing the number of nodes for location tracking does not achieve high accuracy rather; the methodology of location tracking achieves fine grained location tracking. There are many location tracking algorithms available for both indoor based location tracking and outdoor based location tracking. The indoor based location tracking [2] with high accuracy is immensely necessary for applications involving Internet of Things (IoT). An effective indoor based location tracking technique [3] could make the life of elderly and post-surgical patients smarter. Internet of things is an extension of internet with small embedded devices to provide smart services. The intelligence requires smart devices to give context knowledge to the architecture. The location of the subject is very

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CALIBRATION - FREE FINGERPRINT BASED SUPPORT VECTOR REGRESSION FOR INDOOR POSITION SYSTEM

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ABSTRACT

Indoor positioning system uses wireless devices or other communication technologies to locate the position of a movable object within an indoor environment for providing various emergency services as well as business interest services. WLAN (802.11b Wireless LANs) based techniques are broadly utilized and additional hardware installation is not necessary for user location determination. The measured signal strength values from various WiFi access points (AP) are measured and fingerprint data base is constructed by a crowd sourcing technique. This avoids calibration (site survey) cost for recording the received signal strength value from various access points. The measured signal strength property will differ in each point as it depends on the distance, the type of mobile device and signal attenuation. The location can be found by mapping the current signal strength with already collected radio-maps. Statistical measurement, like support vector regression with multiple output, will be used as an approach to optimise the accuracy of localization algorithm.

KEYWORDS: Pervasive Computing, Received Signal Strength, Indoor Positioning, Support Vector Regression

INTRODUCTION

Recent advancements in mobile devices increases the availability of Wi-Fi devices and ensures accurate positioning system in the indoor for providing healthcare related emergency services. Nowadays, the most developed positioning systems, namely the Global Navigation Satellite Systems (GNSS), are intended for outdoor use. GPS will not work properly in indoor environment, as the signals from satellites are attenuated by buildings. Of late, latest techniques are proposed in recent years for Indoor Location Tracking. Location awareness in indoor, promises a new business market and it encompasses emergency services, security, monitoring, tracking, logistics, etc. Because of the multifaceted nature of signals in indoor environments, the development of an indoor positioning system always faces challenges like reduced dimension, signal attenuation by obstacles like buildings, furniture and doors. Many methodologies are used in location tracking system, such as Bluetooth technique (Bruno and Delmastro 2003). Bluetooth technique makes use of Bluetooth signals, Radio signal Infrared Ray uses Infrared rays and Cellular network uses radio waves. (Liu, et al., 2007). All the above systems are able to provide precise output; but additional hardware is installed in indoor infrastructure.

Location computing in indoor rely upon many different choices of measurements such as Time-of arrival (TOA), Time difference of arrival (TDOA), Angle of arrival (AOA), signal strength value from Wi-Fi access points (RSS), etc. Fig. 2 shows

the various techniques proposed for indoor positioning algorithms based on the signal type.

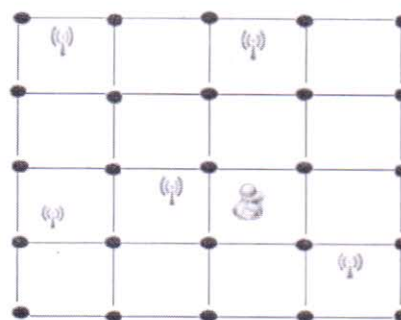


Figure-1: Region Of Interest and Access Points

As the IEEE 802.11 (Wi-Fi) is industry standard for communication in indoor campus, the WLAN RSS techniques are widely used. The WLAN RSS techniques are providing economical solutions as many indoor environment areas are usually provided with a Wi-Fi access points. These Wi-Fi networks act as a component of the communication technique already available, avoiding unnecessary and time-consuming deployment of other infrastructure. In recent years, all mobile devices are smart and equipped with WLAN accessibility so that they are easily connected to WLAN communication. Hence, the RSS measurements observed from WLAN take advantage on flexibility, mobility and easy deployment. WLAN RSSI techniques are working based on fingerprinting or signal propagation modelling. In the indoor location tracking system target location of object is calculated from the data collected by the communicating devices or by the signals from sensors. A

Security in Data and Dissemination of Distributed Data in Wireless Sensor Network

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ABSTRACT

A data dissemination protocol is considered as one of the most effective and efficient protocol that has been employed in wireless sensor networks for performing some modifications by configuring fields and circulating management controls over the mote. Priorly, a data dissemination protocol undergoes a couple of consequences. First, they focus on sink based model, because only sink can be employed for circulating data items to other motes. However, this system model proposed can be employed over a large user WSNs. Secondly, this protocols cannot be employed with any security and this makes the network vulnerable and mislead the system for misuse of networks through intruders. Additionally, seDrip protocol ache also been employed. This mechanism is highly helpful for the network mentors in providing authorization over multiple networks, which is used with various permissions simultaneously and are directly distributed data items to the mote. A laboratory of network restricted resources mote employs seDrip for depleting over its huge capability.

Index Terms: capability, seDrip, data security.

I. INTRODUCTION

Wireless Sensor Network is essential for changing fields storing over the wireless mote and for changing of small codes. These can be gained by employing data dissemination protocol, which facilities a sender in inserting a smaller unit codes, commands and configuration fields over the network mote. Code dissemination protocol is not similar to that of WSN. Large binals are circulated within the sensor nodes of the overall network can also be done. Examples for this

kind of network, a binl files of kilobytes are required from a code disseminating protocol. While disseminating variety of two-byte configuration fields which requires data dissemination protocol.

Considering over the network mote, this would be helping to circulate over an environment, remotely passing such considerably small amount of data to the network mote through the wireless communication is preferably accepted and an efficient visual approach can be implemented than a manual implementation. Functional requirement of such protocol can be used for design objective. Vulnerability issues have been spotted over authenticating in existing data dissemination protocol.

II. A BRIEF LITERATURE REVIEW

It has been seen an enormous amount of research over various WSNs in the literature. In the following overview, research issues and vulnerabilities have been actively figured by the researchers.

Secured timing synchronization(STS) using pairing in HSN(Heterogeneous sensor networks): These researches are considered over HSNs as a model for our proposed novel time synchronization protocol(TCP) which is dependent on the process of IBC and pairing. The foremost approach employed in synchronization protocol is by the usage of pairing based cryptography over HSNs. The proposed system is employed reducing the key space over mote as well as it is used in preventing and securing from all security attacks.

MRI Brain Image Segmentation using Fuzzy C Means Cluster Algorithm for Tumor Area Measurement

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Abstract: The structure segmentation and analysis of MRI brain images is the primary objective. The proposed method is to segment normal tissues and abnormal tissues from MR images automatically. These MR brain images are found to be corrupted with Intensity in homogeneity artefacts that cause unwanted intensity variation and noise that affects the performance of analysing the brain image. Due to this type of artefacts and noises, one type of normal tissues in MRI is misclassified as a different normal tissue and it leads to error during diagnosis. The proposed method consists of pre-processing using wrapping based curvelet transform to remove noise and modified spatial fuzzy C means considers the spatial information and segments the normal tissues because the nearby pixels are highly correlated and also construct initial membership matrix randomly. The system also segments the tumor cells. It is used to improve the search effectiveness of identifying the tumor cells and increases the quality of segmented MRI brain images. The proposed method is found to be 85% accurate in finding the tumor cell and reducing the time complexity.

Keywords: Fuzzy C Means Clustering, Wrapping based curvelet Transform, Membership Matrix, Image Segmentation, Dual Tree Complex Wavelet Transform

I. INTRODUCTION

The imaging technology has advanced, it has turn out to be a vital device for image diagnosing in medicine today. In medical imaging field, image is captured, digitized and processed for doing segmentation and for extracting important information (MasroorAhmed, et al., 2011). Many imaging modalities like XRA are implemented vastly in clinical practice. The complementary information can be got from those images. The volume and size of images in medical has increased and it required the diagnosis automation, the developments in computer technology and reduced costs have provided a method to develop Brain tumor detection (Natarajan, et al., 2012) on medical snapshots forms an essential step in solving several practical applications such as diagnosis of the tumors and registration at different time for patient images are obtained. The medical snapshots applications have formed the essence of division algorithms.

For the radiological diagnostic systems, Tumor division algorithms are the key elements. Based on the imaging modality, application domain, method being automatic or semi-automatic, and other specific factors, the division algorithm may vary. There is no single division method that can extract vasculature the systems. It can be applied for an evidence-based medical verdict provision system. The focal precise knack of cognitive system is diagnosing and classifying images (Rajesh kumar, et al., 2016)

Unlike thresholding followed by connected element analysis that engage unmixed intensity-based sequence recognition techniques, some methods extracts the tumor contours by applying explicit tumor models (MasroorAhmed, et al., 2011) Based on the image quality and the general image artefacts, prior image processing might be required by some segmentation methods.

AN INTEGRATED DENSITY BASED TRAFFIC LOAD BALANCING SYSTEM IN A CLOUD ENVIRONMENT

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ABSTRACT

Density of road traffic is a severe problem in the present world. The objective of this work is to manage the traffic lights and to provide importance in emergency cases using cloud. Traffic control system is a density based system that can determine the density of the vehicles at each side of the junction road when vehicles are nearer to that junction and transfer the information to the cloud. The presented system works based on a PIC16F8 series microcontroller. Density of vehicles is detected using Infrared sensors, which are placed within a fixed distance. Priority is provided to the overcrowded side of the road in traffic.

Keywords: PIC, IR sensors, Wi-Fi router, Vehicles counting, Traffic control system

1. INTRODUCTION

Controlling the traffic becomes the challenging task due to increased usage of the vehicles by the people. Sometimes green light is given for junctions with less density also. To correct the above-mentioned issue in the system handling the traffic for vehicles is implemented. Presently in different directions the traffic lights with fixed time delay are set according to a specific cycle while switching from one signal to other. This creates unnecessary traffic during rush hours. This project can apply using IR sensors, PIC microcontroller and with the service of cloud.

The cloud technology provides the reckoning services such as storage spaces, back end databases and the servers over the Internet. Cloud providers are the ones which offer the above services based on some usage amount for the utilization of the provided services. The proposed work gives out the solution to control the traffic over the road by using PIC controller. PIC is very efficient microcontroller. We collect the signal information and store it in cloud which merges all the signal points and work accordingly in emergency cases.

II. PROBLEM STATEMENT

Traffic congestion is a main problem with foremost cities. In India the traffic lights are founded on timing system i.e. whether the vehicles are present or not the timing will remain constant which makes people to wait unnecessarily for longer time. The key characteristic of the traffic in cities particularly for developing the geographies is that even if the geographies are explicitly mentioned/marked on the roads it doesn't move through the lanes (Vivek Tyagi, *et al.*, 2012).

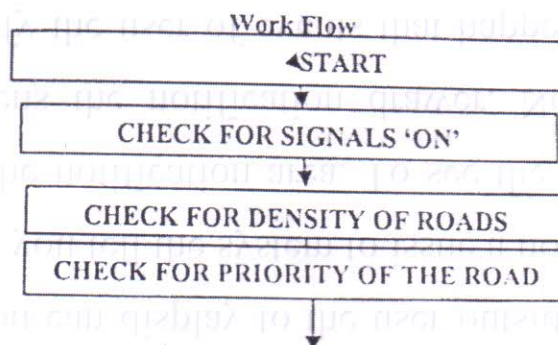
In Emergency cases (VIP's) the signals are precise manually, which is a hard-hitting task and can't be executed successfully. Due to this manpower is required in large amount and is a waste of time.

I. EXISTING SOLUTION

Nowadays people are very much interested in automating their needs. Most of them focus on the estimation of the traffic flow. The rate is calculated for the vehicles based on the throughput at a particular fixed point. Loop detectors and pneumatic sensors are used to measure the traffic flow using which rate is calculated. And image processing technique also has used. However; this technique is very costly and in developing countries maintenance is mandatory.

The traffic in metropolitan city includes various vehicles such as personal vehicle, public and emergency vehicle may be a VIP vehicle. At some junction points these transport waits for long period of time. Due to this lot of time is merely wasted in waiting for the signal to turn green particularly for emergency cases (Ashwini Sawant *et al.*, 2015). The vision based technique using video processing for traffic light control also yields the interest in many researchers. This system will minimize the traffic in many situations and optimize the traffic rate. It also can be interconnected with all other signals through a Wifi router, continuous density control will be achieved all over the city. The concept of cloud computing provides dynamically scalable resources as a service over the Internet (Shrividhya, *et al.*, 2017).

III. METHODOLOGY



A REVIEW ON ANDROID APPICATION FOR DIABETIC ANALYSIS USING SVM CLASSIFIERS

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Abstract

Edge detection is one of the most frequently used techniques in digital image processing. An Edge in an image is a significant local change in the image intensity, usually associated with a discontinuity in either the image intensity. Edges detection is a problem of fundamental importance in object extraction as it reduces image data and detects the object which is required. Edges identify object boundaries and are detected through changes in gray level above a particular threshold. A Diabetic retinopathy is a very recent method of finding the level of acid secretion in the eye while the person having diabetes in their body. The edge detection is mainly applicable in case of data transmission; in that case the detected edge data reduce the amount of data to be transmitted. The experimental results show that our method achieves 91% in sensitivity and 92% in positive prediction value (PPV), which both outperform the state of the art methods significantly. **Keywords** – Retinopathy, Diabetics, Android, SVM Classifiers, Digital Image Processing.

1. Introduction:

Retinopathy is a condition profound in diabetic patients, which contributes to 5% of the total blindness globally [1]. If the exudates are not diagnosed earlier, it may lead to complete blindness by the accumulation of exudates in the fundus oculi. Frequent screening procedure is necessary to detect early condition of DR [2]. A major limitation faced by the clinicians is screening a large number of images, which is very expensive and also open to human error. In order to solve this problem a

Computer Aided Diagnosis (CAD) is necessary to identify the stages of DR. The aim of this work is to develop CAD system to differentiate the abnormal images from the normal fundus images and also grade the abnormal images as mild moderate and severe.

1.1 Eye and Retina

The eye is located in the orbit, a cavity in the skull. It is connected to the brain via nerve fibres, which join in the optic nerve as shown in fig.1. The fundus of the eye is composed of three layers: sclera, choroid and retina. The retina is located in the inner surface of the eye. It is a transparent and thin layer (less than 0.5mm of thickness) but it is the most complex structure in the eye. It contains millions of photoreceptors that capture light rays and convert them into electrical impulses. These impulses travel along the optic nerve to the brain where they are converted into images.



Fig.1. Retinal image with Exudate occurrence

There are two types of photoreceptors in the retina: rods and cones, named after their shape [3]. Many retinal blood vessels supply the nutrients (oxygen and other components) to the inner and outer layer of the retina. The inner layer accounts for a smaller portion of the vessels (~ 35%), which are visible from the vitreous humour in common fundus images. The vessels in the outer layer are the source of ~

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Abstract. It is common exploitation of Internet, in this online world every entity are on the web. Cloud computing model is for endowing cooperative and needed network access to a mutual consortium of configurable computing possessions which can be closely discharged and gratify with least administration aim. So we develop software as a service like online compiler with plagiarism checker. This research ultimate target is we can easily write programs, compile and check plagiarism in online. So that it's a most apt tool to compile the code and check plagiarism in it. These online compilers are compiler service (SaaS) where downloading and installation of separate compiler on every machine is evaded. Thus cloud application access its compiler online. So that we can obtain the more codes, analysis of time complexity of different code and check plagiarism in it.

INTRODUCTION

Cloud computing [1] states that utilizing resources online. Everyone can use a service online. Instead of storing data on your hard disk or update applications at a different location. It is the distribution of IT services by the Internet. By using intermediate at remote locations, Cloud computing services profession to afford hardware and software that are managed. Cloud computing is a prototype for empowering most interested, apt net connection to a mutual consortium of design cloud computing [2] assets which can be promptly discharged and gratify with rudimentary effort or management maintenance. Cloud computing prototype markets accessibility and collective of five vital characteristics, four models of deployment and three models of service.

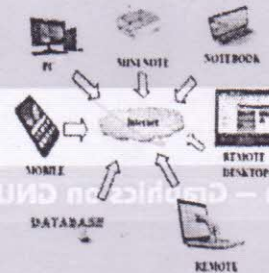


FIGURE 1. Applications of cloud computing

OVERVIEW OF CLOUD COMPUTING

Cloud Computing is mainly known for the applications for the services over the hardware and the systems software and Internet in data Centers that provide these services to applications. There are mainly four cloud computing delivery models, they are

A. Private Cloud

Private cloud is given to the private organization and the cloud are managed by

A Survey on Twitter as a Corpus for Sentimental Analysis and Opinion Mining.

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Abstract - Today, Microblogging is the most popular statement tool among Internet users. Every day people share their opinions on different aspects of life. Therefore, these websites have become rich sources of data for opinion mining and sentiment analysis. Because microblogging has appeared comparatively, there are few research works that were dedicated to this topic. In our paper, we focus on using Twitter, the most popular platform, for the task of sentiment analysis. It shows how we group a corpus for sentiment analysis and opinion mining which discovers phenomena of the corpus by linguistic analyzing. Using corpus, we build a sentiment classifier that is able to determine positive, negative and neutral sentiments for a document. Experimental evaluations show that our proposed techniques are efficient and perform better than previously proposed methods. In our research, we worked with English, however, the proposed technique can be used with any other language.

Keywords: Microblogging, Sentimental Analysis, Corpus.

1. INTRODUCTION

Microblogging today has become a very popular communication device among Internet users. Millions of messages are appearing day by day in popular websites that offer services for microblogging such as Twitter¹, Face-book³. Authors of those messages write about their life, share opinions on the variety of topics and chat about present issues. Because of a free format of messages and an easy accessibility of microblogging platforms, Internet users be likely to shift from traditional communication tools to microblogging services. Those data can be efficiently used for marketing or social studies etc.

We use a dataset created of collected messages from Twitter. The contents of the messages show a discrepancy from personal thoughts to public statements. Table 1 shows examples of distinctive posts from Twitter. Data from Opinion mining and sentiment analysis tasks grows rapidly from microblogging platform point of view. For example, industrialized companies may be interested in the following questions:

- What do people think about our product?
- How positive (or negative) are people about our product?
- What would people prefer our product to be like?

Political parties may be concerned to know if people bear their program or not. Public organizations may ask people's opinion on existing debates. Microblogging services provide information by regular users who post what they like or dislike, their opinions on various aspects.

In our paper, we show how to use Twitter as a corpus for sentiment analysis and opinion mining. We use

microblogging and we use Twitter more predominantly for the following reasons:

- The diverse community of people uses microblogging platforms to get their opinion on different topics which is the expensive source
- Twitter contains a vast number of text posts and it grows every day. The collected corpus can be subjectively large.
- Twitters viewers vary from regular users to celebrity, company representatives, politicians^[4] and even country presidents. Therefore, it is possible to collect text posts of users from different social and welfare groups.
- Twitters audience is represented by users from many countries^[5].

We collected corpus text posts from Twitter evenly split automatically between three sets of texts:

1. texts containing optimistic emotions, such as happiness, fun or joy.
2. texts containing negative emotions, such as sadness, anger or distress.
3. objective texts that only state a reality or do not put across any emotions.

1.1 Contributions

1. We present a method to group a corpus with happy and sad sentiments and with intention texts. Our technique allows us to gather negative and positive sentiments so that no individual effort will be needed for classifying the documents. Objective texts were also collected without human intervention. The size of the collected corpora can be randomly huge.

2. We perform a linguistic investigation of the collected corpus statistically.

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Abstract:

Steganography is derived from Greek word, 'steganos' which refers to covered writing of messages. It is a mechanism of hiding messages or data by embedding them into some other data. Through this mechanism, the secured message can be completely hidden from unauthorized access. In existence, Steganography along with SPIHT compression is done using asymmetric cryptographic algorithm. In this model, Steganography is being employed with SPIHT compression where wavelet transformation of image takes place and AES cryptographic algorithm along Diffie-Hellman key exchange mechanism is used for providing additional security and processing speed. In the proposed system, the secret image is compressed using SPIHT compression and encrypted using cover image. Hence, the encrypted stego image with cover image and secret image is obtained. To perform decryption over the stego-image which, the key is to be exchanged using Diffie-Hellman technique. After decrypting, the image is subjected into SPIHT decompression process which is employed to retrieve the original secret image.

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Abstract: On a survey that has been done recently, said that nearly 70% of road accidents occur due to drunken drive, with a range of 44% to 67% in small cities. They also conveyed that overall of 56 accidents and 14 to 15 deaths occur on our roads per day due to not wearing the seat belts. In the already available system, the alcohol sensor is kept on the car steering and thereby controls the vehicle according to the presence of alcohol. But road safety is indeed important in other aspect that is the reason we are controlling the system based on the seatbelt wearing.

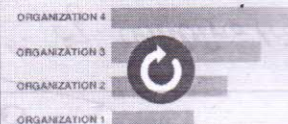
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[Contents](#)[I. Introduction](#)

Autonomous Navigation and Obstacle Avoidance of a Microbus

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Abstract — At present the self-operating vehicles are one of the revolutionizing researches in the field of automobile. The use of autonomous bus in public transportation can improvise the safety and standard of transportation by reducing the traffic congestion and can make it friendlier in reducing pollution. In this paper we have detailed how an autonomous bus works detecting its surrounding, avoiding obstacles and planning its path accordingly to the destined area to implement artificial intelligence using smart technologies for decision making and path finding using efficient algorithm.

I. INTRODUCTION

Artificial Intelligence (AI) is an intelligence manifested by machines (i.e.) a machine is capable of analyzing and solving problems independently. AI is one of the most rising technology in the field of computer science in recent years and has started creating revolution in many fields [1]. According to experts artificial intelligence is defined as "Making impossible the possible". These developments have been influenced by the recent advancements in the sensing and the computing technology together with the transformative impact on the automotive industry and the perceived societal benefit. During the year 2014 there were about 2.3 million injuries, 6.1 million collisions and 32,675 traffic fatalities [2]. Autonomous vehicles can navigate without human guidelines by sensing and detecting the objects that are presented in environment. The approach towards transportation have been revolutionized by the autonomous vehicle [3]. Now a days automobile industries have more automated technology which could guide the drivers such as lane departure, adaptive cruise control, warning system etc. but the industries are emerging in the development of automated cars [4]. These cars are able to sense their environment, plan their path and are able to move accordingly avoiding the obstacles and leaving way

for the pedestrians without any human guidance [5]. According to which the Google has successfully completed its test drives over 200 miles in the city streets. [6]. But more likely when compared to other self-driving vehicles, if the large vehicles such as bus move towards driverless system it would influence the economy more efficiently [7].

(DYC) the direct yaw moment control, the active wheel steering (AWS), (ABS) The anti-lock brake system, (ESC) electronic stability control and active front/rear steering (AFS/ARS) technologies are developed and also commercially put to practice over the last 20 years.[8]. The control center can collectively manage and optimize the routes of a fleet of AVs to achieve certain social objectives, such as reducing traffic congestion. In addition, one important function of ITS is to handle the so-called "last-mile" delivery, which refers to the process of conveying goods from transportation hubs to final destinations [10]. With the adoption of AVs in the modern transportation system, they can be employed to construct a new logistic system with high efficiency, flexibility, and capacity. The future sustainable smart city project will incorporate lots of renewable generations into the power grid [9].

In industries, transportation of objects and goods are carried by automated vehicles. Artificial markers are generally used for guiding the autonomous vehicles on dedicated platform and working environment. The use of private vehicles in large cities leads increase in consumption of energy and thereby leads to environmental pollution. The new generation vehicles are environmentally friendly and also public transportation has been rising with newer technologies. These vehicles, powered by electric engines, are silent and clean. Autonomous bus can navigate to its destination sensing their environment "without aid from a human". These vehicles are becoming popular in public transportation systems because they provide reductions in congestion and

UPLOADS AND DOWNLOADS

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Abstract-Many dynamic clients all around the globe are utilizing on the web informal community, for example, Facebook, Twitter and LinkedIn. The dominant parts of interpersonal organizations have feeble client to client verification technique, which depends on some essential data like showed name, photograph. In this proposed framework, data hiding techniques to hide some data in profile pictures keeping in mind the end goal to identify botnets and fake profiles lastly will propose a robotized model to distinguish fake profiles and botnets rather than current manual strategy. In this paper, discrete wavelet transform algorithm is proposed for information stowing away. Additionally when clients transfer the profile picture or photographs it would be watermarked and overhauled. For watermarking strategy Java static watermarking frameworks and calculations is been utilized. Any fake users overhauling a similar profile picture can be distinguished and their particular IP would be followed and blocked. Likewise in our venture to give secure confirmation we have conjured certain properties which can be asked to the clients amid enrolment.

1 INTRODUCTION

The main objective of this project is developing a new application to avoid clones over the social media[2]. This project displays a grouping and investigation of location instruments of clone assaults on online interpersonal organization, in view of trait likeness, companion arrange

comparability, profile examination for a period in term and record of Internet Protocol successions[5]. If any user tries to upload an existing photo that is the data owner uploaded photo the system will notify the data owner then if the owner allows the second user the photo will be uploaded automatically. The a great many dynamic clients all around the globe are utilizing on the web informal community, for example, Facebook, Twitter and LinkedIn. In this project, discrete wavelet transform algorithm is proposed for information stowing away[3]. Along these lines this would keep the clone assaults and giving complete client information security protecting. Additionally when clients transfer the profile picture or photographs it would be watermarked and overhauled. For watermarking strategy Java static watermarking frameworks and calculations is been utilized[15]. The dominant parts of interpersonal organizations have feeble client to client verification technique, which depends on some essential data like showed name, photograph[7]. These shortcomings make it easy to abuse client's data and do character cloning assault to frame fake profile[6]. In this proposed framework, data hiding techniques to hide some data in profile pictures keeping in mind the end goal to identify botnets and fake profiles lastly will propose a robotized model to distinguish fake profiles and botnets rather than current manual strategy which is exorbitant and work concentrated[15]. This paper displays a grouping and investigation of location instruments of clone assaults on online interpersonal organization, in view of trait likeness, companion arrange comparability, profile examination for a period interim and record of Internet Protocol successions.



IDENTIFICATION OF RUMOUR SOURCE IN SOCIAL NETWORKS

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Abstract— In large social networks, rumour source identification have received significant attention lately. The spread of false rumors can jeopardize the well-being of citizens as they are monitoring the stream of news from social media to stay abreast of the latest updates. In this project, instead of following traditional techniques for inspecting every individual, we adapt reverse dissemination strategy to specify a set of suspects. Then, a microscopic rumour spreading model is employed for each suspect to determine the real source, where it calculates the maximum likelihood (ML) for each node and the node with the largest ML estimate is considered as the real source. In this paper we use Secure Trust-OLSR (STOLSR) where the behavior of each node is directly evaluated by their immediate neighbor's to detect the malicious node.

Keywords—rumour spreading, maximum likelihood, malicious nodes, secured trust olsr.

I. INTRODUCTION

In today's social networks rumours spreading have been a major threat to our society. It can cause great damage to our business and life. At present, with the development of mobile devices and wireless techniques, the secular nature of social networks (time-varying social networks) has a great impact on vital information spreading processes occurring on top of them. The ubiquity and easy access of social networks not only promote the efficiency of information sharing but also spectacularly accelerate the speed of rumor spreading. In time-varying social networks with the dynamic connections between individuals the rumours spread the scheme with the characteristics of the "word-of-mouth". For either theoretical or protective purposes, identifying the rumour source as well as the malicious source in time-varying social networks is always been a significant one. The identification of rumour sources in social networks will play a critical role by limiting the damage caused by them through the timely quarantine of the sources. However, the temporal variation in the topology of social networks and the ongoing dynamic processes challenge our traditional source identification techniques that are considered in static networks.

In this system, and to overcome the challenges an idea from criminology has been borrowed to propose a novel method. First, the time-varying networks are reduced to a series of static networks and instead of following traditional techniques for inspecting every individual, we adapt reverse dissemination strategy to specify a set of suspects to identify real rumor source. This process addresses the scalability issue of source identification problems, and therefore spectacularly promotes the rumor source identification efficiency. Second,

to determine the real source from the suspects, to calculate the maximum likelihood (ML) for each suspect we employ a novel microscopic rumor spreading model. The one node which has the largest ML estimate is considered as the real source. The evaluations are carried out on social networks with time-varying topology.

II. OBJECTIVE

The objective of the project is,

- To identify rumor sources in a social network and limit the damage caused by them.
- To overcome the challenge of "connection-always-changing" in time-varying social networks.
- To enhance the security feature by detecting the attacker node.
- To promote the efficiency and scalability of source identification

A. Existing Work

A novel reverse dissemination method is used to narrow down the scale of suspicious sources in [1]. Each individual are assigned a node centrality where the maximum centrality value of the node is considered to be the rumour source within the network. The drawback of this paper will be, it lacks in its security features where it does not provide security for the detection of the misbehaving nodes. In case of paper [2], it is not scalable where the problem of estimation of the rumor source and the infectious regions (subsets of nodes infected by each source) in a network is typical and is difficult to find in case of additional nodes in a network. It works better for a limited number of nodes in a network. A simple infection model is adopted which identifies the number of source nodes. Based on which, the source node which is infected is identified. It lacks in its accuracy in estimation the infected nodes and their network connections. In paper [3], the missing information is estimated using Doubly Non-negative (DN) matrix completion and compressed sensing techniques. This technique is used to identify the actual source by non-maximum likelihood estimator developed on large data sets. The drawback of using this matrix is that it provides less estimation when the percentage of missing entries is more. The methodology of collecting and sampling of conversational threads is used in paper [5], as well as a tool has been developed to facilitate the annotation of these threads to identify the rumor nodes. Then, an annotation scheme

OBFUSCATING SOFTWARE PUZZLE FOR DENIAL-OF-SERVICE ATTACK MITIGATION

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Abstract. Many security primitives are based on complex problems in the field of maths. The use of artificial intelligence problems for security emerges as an exciting new paradigm, but it has not been sufficiently explored. We present a security primitive which is based on complex AI problems, that will be a new family of graphic password systems built on the Puzzle technology, which we call Puzzle as graphic passwords (CaPRP). CaPRP is a puzzle and also a graphic password scheme. CaPRP points out a number of security issues such as, relay attacks, online guessing attacks and, if combined with double vision technologies, shoulder-to-navigation attacks. It should be noted that a CaPRP password can only be found in the probabilistically by automatic line. Guess attacks if the password is in the search set. CaPRP also offers a novel-to-an approach to address the well-known image access point problem in popular graphic password systems, such as PassPoints, which often leads to weak password options. CaPRP offers reasonable security and seems to suite well with some real applications to increase security.

Keyword: denial of service, service attack, AES, Security key, FIPS, DRA.

INTRODUCTION

The Advanced Encryption Standard (AES) is a calculation for securing touchy and, as a feasible outcome. In January of 1997, a procedure was begun by the NIST, a unit of the U.S. Trade Department, to locate a more vigorous swap for the DES and to a lesser degree Triple DES. The particular required a symmetric calculation utilizing square encryption (see piece figure) of 128 bits in estimate, supporting key sizes of 128, 192 and 256 bits. The calculation is free for utilize worldwide and offer security of an adequate level to ensure information. It was to be anything but difficult to actualize in equipment and programming, and additionally in limited situations incredible barriers against assault strategies. The determination procedure was available to open and remark, it being chosen that full perceivability would guarantee the most ideal investigation of the outlines. The NIST at that point chose 15 possibility for the AES, which were then subject to preparatory investigation by the National Security

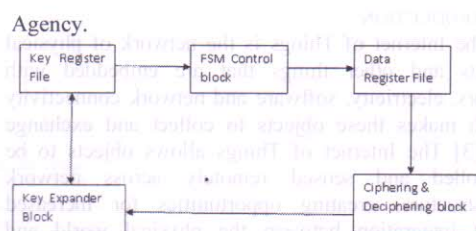


Figure 1.Process diagram

Usage of the majority of the above were tried broadly in ANSI C and Java dialects for speed and unwavering quality in such measures as encryption and decoding rates, key and calculation set-up time and protection from different assaults, both in equipment and programming driven frameworks. By and by, definite investigation was given by the worldwide cryptographic group (counting a few groups attempting to break their own entries). The final product was that on October 2, 2000, NIST reported that Rijndael had been chosen as the proposed standard. Also see cryptography, information recuperation specialist (DRA)RELATED GLOSSARY TERMS: RSA calculation (Rivest-Shamir-Adleman), information key, greynet (or graynet), spam mixed drink (or hostile to spam mixed drink), fingerscanning (unique mark scanning),munging, insider danger, verification server, resistance top to bottom, nonrepudiation.

AES depends on an outline guideline known as a Substitution change arrange. It is quick in both programming and equipment. Not at all like its antecedent, DES, AES does not utilize a Feistel network.AES has a settled piece size of 128 bits and a key size of 128, 192, or 256 bits, while Rijndael can be indicated with square and key sizes in any numerous of 32 bits, with at least 128 bits. The blocksize has a most extreme of 256 bits, however the keysize has no hypothetical maximum.AES works on a 4×4 segment real request grid of bytes, named the state (adaptations of Rijndael with a bigger square size have extra

INERTIAL MEASUREMENT SENSOR FOR ACCURATE DETECTION AND NOTIFICATION USING INTERNET OF THINGS

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Abstract

If vehicle accident information could be intimated to an emergency service or a rescue center automatically by tracking the accurate location valuable human lives could have been saved. This paper focuses on determining the exact location of the targeted accident vehicle. The accident is detected by the data fusion of drift, deceleration, vibration, speed strength of a vehicle with the Timing Inertial Measurement Unit device which senses all the possible ways for an accident to occur and gives input to arduino for intimating the nearest emergency center.

Keyword -TIMU, deceleration, GPS, Arduino, Satellite.

I. INTRODUCTION

The Internet of Things is the network of physical objects and other things that are embedded with sensors, electricity, software and network connectivity which makes these objects to collect and exchange data.[3] The Internet of Things allows objects to be controlled and sensed remotely across network infrastructure, creating opportunities for increased direct integration between the physical world and computer-based systems which results in improved efficiency, accuracy and economic benefit.

The term 'Things' refers to, devices and everyday objects, from small objects like wrist watches and medical sensors to really big objects like robots, cars and buildings. Every object contain devices that interact with users by generating and retrieving information about and from the environment. They also contain hardware that allows them to control. The core concept behind all IoT technology and implementation is the same: devices are integrated with the virtual world of the Internet and interact with it by sensing, monitoring, tracking objects and their environment.[5] Users and developers of IoT based software or hardware add components for sensing and networking capabilities and are programmed to perform the assigned tasks and build Web applications that interact with the devices. This paper which proposes a mechanism for sensing the accident and intimating it automatically uses hardware which is embedded with sensors for predicting the vehicle accident and uses arduino for intimating the targeted system (i.e. emergency service) thereby forming an internet for objects which interacts by itself.

II. ARCHITECTURE OF IoT

The following are the examples which elaborately explains about the architecture and working of IoT based systems.

A)Collecting and transmitting data

The device can sense the environment like ones home, human body and collect information related to it like temperature of a place and light intensities and transmit it to a different device like mobile phones or laptop which is located in a different place or to the Internet.

B)Activate devices based on triggering

It can be programmed to activate other devices like turning on the street lights when it becomes dark by sensing which reduces the labor work. and turning off the heat when the temperature reaches a certain level which if not turned off may lead to danger.

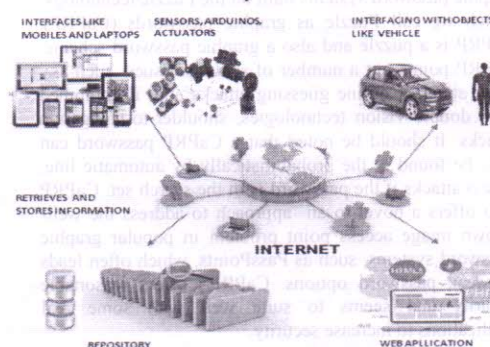


Fig. 2.1 Interaction using IoT technology

C)Receive information

Unique characteristic for IoT devices is that they are designed in a way to receive information from other devices in the same network or through the Internet for instance, information from targeted source, new triggers, status of an operation and addition of new functionality).[2]

Having all these functionalities an IoT based system interacts efficiently with the targeted devices and thereby receives and shares information with those devices. Sends information when at the appropriate time for instance when the sensors predict a change in temperature it will intimate automatically.

Many accidents are not being detected and it is no intimation is given to the emergency service even though it is detected. The existing accident detection and location system is done by determining the deceleration and data fusion from accelerometers, IMU and GPS. The bias, drift and noise errors of accelerometers and GPS outage limitation are overcome by integrating with Kalman filter. The test result shows the correct deceleration for accident

Performance Analysis of Wireless OCDMA Systems Using OOC, PC and EPC Codes

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Abstract: To analyze and improve the wireless OCDMA systems performance characteristics such as BER, Q factor and Eye Diagram three distinguishable works have been carried out in this study. Different coding techniques such as OOC, PC and EPC are implemented. The results show that the average BER of EPC, PC, OOC are 7.01×10^{-12} , 4.64×10^{-10} and 2.74×10^{-6} and the average Q factor for EPC, PC, OOC are 22.12, 21.254 and 19.606. From the observed values, it was inferred that EPC is 4% better than PC and 12% better than OOC. Several variations of two dimensional wavelength hopping/time spreading including PC/PC, PC/OOC and PC/EPC OCDMA system codes are implemented and the performance characteristics were analyzed for a user range of 2-20. It was observed that the average BER for PC/EPC, PC/OOC, PC/PC are 1.01×10^{-12} , 6.06×10^{-8} and 9.20×10^{-6} and the average Q factor are 22.63, 21.268 and 20.11. From the observed values, it was concluded that PC/EPC performs better than PC/OOC and PC/PC 2D coding techniques. It is proved that using a distance based power allocation algorithm the transmitted power can be saved by 7.85 mW when considered over the distance range of 100-1000 m under high atmospheric turbulence environment.

Key words: OCDMA, prime codes, extended prime codes, optical orthogonal codes, India

INTRODUCTION

Optical Code Division Multiple Access (CDMA) communication systems consolidates immense favorable circumstances, for example, rapid transmission, backing to substantial number of clients when contrasted and Time Division Multiple Access (TDMA) and Wavelength Division Multiple Access (WDMA), adaptability in networking and soft capacity (Chung *et al.*, 1989; Stok and Sargent, 2002). The various channel coding techniques in OCDMA such as Optical Orthogonal Code (OOC), Prime Code (PC) and Extended Prime Code (EPC) have their own benefits in different communication scenarios (Yin and Richardson, 2008; Kannani and Sankaranarayanan 2011, 2012, 2013).

Furthermore, the 2D OCDMA codes exhibits unique compensation like increase in number of users, improved Bit Error Rate (BER) parameter and is secure in nature. However, the wireless OCDMA systems which is under-explored possesses additional profit such as reduced Multiple Access Interference (MAI), accessibility of license free communication channel, high speed transmission with increased bit rate, no multipath fading, electromagnetic compatibility and limited multipath distortion (Ghaffari *et al.*, 2008). On the other hand, RF use is limited in sensible environments where high data security and high immunity against interference with other existing RF and electronic devices are required (e.g., Healthcare environments) (Ghaffari *et al.*, 2009).

Given the observation in the communication systems especially in wireless optical communication, this research work is motivated and focused towards exploring the benefits of OCDMA systems under various coding schemes and 2D environments (Ghaffari and Karbassian, 2012; Salehi, 2007). Also, the optimization of transmission power remains a challenge in the free space system due to the eye safety requirements and efficiency of the transmission system. To address this issue, a power optimization algorithm is also devised in this research. In optical wireless communication, channel displaying and the connection execution examination are the key points of interest keeping on pulling in innovative work in the type of principal hypothetical examination and practical and also practical execution. The main aim of this study is as follows:

- To examine the performance of the wireless OCDMA systems under OOC, PC and EPC environment
- To design the 2 Dimensional PC/PC, PC/EPC and EPC/EPC codes in wireless OCDMA system
- To analysis PC/PC, PC/EPC and EPC/EPC coding techniques is carried out with respect to BER, Q factor and eye diagram
- To examine OCDMA systems with and without power control algorithms

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