

Survey Of Genetic Algorithm Approach In Machine Learning

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Abstract

The optimization of the proposed algorithm is nowadays mandatory to achieve the above the roof results. The Genetic algorithm is providing the elastic and versatile way to optimizing the natural parameters for the proposed system/ algorithms or already existing systems. As the technology keeps on increasing so the data volume and other various inherences also keep increasing. To achieve high accuracy level from versatile domains like computer vision, classical machine learning, deep learning, and reinforcement learning. In this research paper, the literature survey encompasses fifty research papers to analysis the previous work which is done using the genetic algorithm from the year 2014-2018. This will help us to get a broad insight into the usage of the genetic algorithm and its applications in the different domains.

Keywords: Genetic algorithm ,Machine Learning

I. Introduction

The genetic algorithm is evolved from the theory of natural evolution given by Charles Darwin. The theory pioneered most of the upcoming discoveries related to the origin of species. The adaptation of this theory in the computational world is founded by the Dr. John Holland in 1975 in which he stated that this genetic algorithm can be used for the problem-solving and optimization problems.

The life cycle of the genetic algorithm is divided into the five steps which are:

1. **Initialize Population**
2. **Evaluation**
3. **Selection**
4. **Crossover**
5. **Mutation**

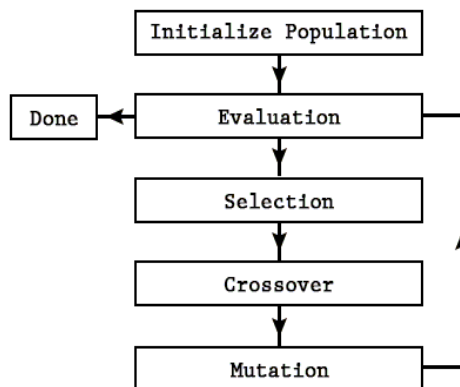


Fig 1.1 Flowchart of the Genetic Algorithm

The optimization function of the genetic algorithm for the efficient distribution of the resources which can be applied to the variety of problem-related to the scientific and non-scientific problem.

$$f(x): [x^1, x^u] \rightarrow [0,1]:$$

Where,

$$f(x) = \begin{cases} 1, & \text{if } \|x - a\| < \epsilon, \epsilon > 0 \\ -1, & \text{elsewhere} \end{cases}$$

The genetic algorithm which is iterated with the following steps which are an integral part of the traditional genetic algorithm are:

1. **Selection:** The selection of the individual / random variables from the population to fit the natural parameters for the concerned algorithm for the best fitness.
2. **Reproduction:** The new generation of the random variables/individual by introducing the reproduction concept in the whole algorithm.
3. **Evaluation:** The whole proposed algorithm will be evaluated and checked here.
4. **Replacement:** The replacement of the old individual to the generation of the new individuals will be conducted here.

II. Literature Survey

A. Table

| S.No | Title | Author And Year | Technique | Pros | Cons |
|------|---|---|--|---|--|
| 1. | A Modified Genetic Algorithm For Community Detection In Complex Networks [1] | Songran LIU and Zhe LI Year: 2017 | Modified Genetic Algorithm (MGA) | The algorithm outruns the currently used algorithms and performed accurately. | It can be implemented on a single type of system. Yet to be tested for other types of the network. |
| 2. | Hybrid Algorithm Combing Genetic Algorithm With Evolution Strategy For Antenna Design [2] | Kyung Choi, Dong-Hyeok Jang, Seong-In Kang, Jeong-Hyeok Lee, Tae-Kyung Chung, and Hyeong-Seok Kim Year: 2016 | Genetic Algorithm and The Evolution Strategy | A genetic algorithm has been used for antenna designing is used and make it more useful which reduces the time for the simulator. | Designing and implementing costing is very high. |
| 3. | Optimization of a Genetic Algorithm for Road Traffic Network Division using a Distributed/Parallel Genetic Algorithm [3] | Tomas Potuzak Year: 2016 | A distributed/Parallel Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | Human-error rate is not much included while implementing the system. |
| 4. | Genetic Algorithm based feature selection and MOE fuzzy Classification algorithm on Pima Indians Diabetes Dataset [4] | Vaishali R, Dr. R. Sasikala, S Ramasubbareddy, S Remya, and Sravani Nalluri Year: 2017 | Goldberg's Genetic Algorithm | It helps in the reduction of the number of the features in the dataset which reduces the iterations in the proposed system. | The system doesn't include everything required for the testing. |
| 5. | Energy Efficient Adaptive Clustering Protocol Based on Genetic Algorithm and Genetic Algorithm Inter-Cluster Communication for Wireless Sensor Networks [5] | R. Sujee and Dr. Kannammal K.E Year: 2017 | Genetic Algorithm and LEACH | The algorithm outruns the currently used algorithms and performed accurately. | The system architecture is complex. |
| 6. | A Data Classification Method Using Genetic Algorithm and K-Means Algorithm with Optimizing Initial Cluster Center [6] | Haobin Shi and Meng Xu Year: 2018 | Genetic Algorithm and K-Means Algorithm | It's optimized the whole proposed system natural parameters while using in the clustering. | The system architecture is complex. |
| 7. | Parkinson's Disease Detection Using Ensemble Techniques and Genetic Algorithm | Najmeh Fayyazifar and Najmeh Samadiani Year: 2018 | Genetic Algorithm and Ensemble Algorithm | The disease dataset contains too many features which are reduced and selected by using the genetic | The system is too costly and complex to implement. |

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|-----|--|--|--|---|---|
| | [7] | | | algorithm. | |
| 8. | Improved BP Neural Network Algorithm Model Based on Genetic Algorithm [8] | Qi Changxing, Bi Yimming, and Li Young Year: 2018 | Chaos Genetic Algorithm and BP Neural Network | The algorithm outruns the currently used algorithms and performed accurately. | The system architecture is complex. |
| 9. | On K-Means Data Clustering Algorithm with Genetic Algorithm [9] | Shruti Kapil, Meenu Chawla, and Mohb Dilshad Ansari Year: 2016 | Genetic Algorithm and K-Means Clustering | It uses a genetic algorithm to optimize the K-Means algorithm's tuning parameters. | Clustering takes a lot of time to implement. |
| 10. | Distributed Resource Scheduling Algorithm based on Hybrid Genetic Algorithm [10] | Sen PAN, Junfeng QIAO, Jing JLANG, Jin HUANG, and Liping ZHANG Year: 2017 | Genetic Algorithm | It works efficiently in the distributed environment make it more efficient. | The comparison shows minute advancement while implementing a new system |
| 11. | An Improved Genetic Evolutionary Algorithm for Commuter Route Optimization [11] | Xiaohang Qian and Linlin Liu Year: 2018 | Improved Genetic Evolutionary Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | Human-error rate is not much included while implementing the system. |
| 12. | Comparison of PSO Algorithm and Genetic Algorithm in WSN using NS-2 [12] | Praveen KS, Bhargavi K., and Yoeshwari K R Year: 2017 | Genetic Algorithm and Particle Swarm Optimization (PSO) | It uses a genetic algorithm | The network system is evolving the higher speed than newly proposed methods |
| 13. | Modified Genetic Algorithm for Solving n-Queens Problem [13] | Jalal Eddin Aghazadeh Heris and Mohammadreza AsgariOskoei Year: 2014 | Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | The general problem hasn't a real application. |
| 14. | Rough Set Knowledge Reduction Algorithm based on Improved Chaos Genetic Algorithm [14] | Kai Gao, Yuejun Tan, and Wei Pan Year: 2016 | Genetic Algorithm | Its uses the improved genetic algorithm for the rough knowledge reduction algorithm. | The system was too complex. |
| 15. | Predication of stability of the clusters in Manet using Genetic Algorithm [15] | V. Preetha and Dr. K. Chitra Year: 2016 | Genetic Algorithm | It's optimized the whole Manet's clusters for checking the stability and in which genetic algorithm worked perfectly. | Clustering implementation with the new proposed method took a lot of time. |
| 16. | Feature Selection For Text Classification Using Genetic Algorithm [16] | Noria Bidi and Zakaria Elberrichi Year: 2018 | Genetic Algorithm, Naïve Bayes, Nearest Neighbour (KNN) and Support Vector Machine (SVM) | The algorithm outruns the currently used algorithms and performed accurately. | Genetic algorithm worked at a basic level without any modification. |

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|-----|---|--|--|---|--|
| 17. | A Genetic Algorithm for Energy Minimization Vehicle Routing Problem [17] | Shijin Wang and Yulun Wu Year: 2017 | Genetic Algorithm | It reduces the time for detecting the minimized pathway for the vehicle. | Vehicle Routing implemented in the simulation mode, not in the real-time system. |
| 18. | Consensus for Multi-agent Systems Based on Genetic Algorithms [18] | JianqiuLyu, Hoagie Wang and Shujuan Chen Year: 2016 | Genetic Algorithm | Showed great performance with 97% accuracy. | The system is complex for the implementation. |
| 19. | A multi-Objective Genetic Algorithm Based on objective-layered to solve Network Optimization [19] | Shi Lianshuan and Chen YinMei Year: 2017 | Genetic Algorithm and Multi-objective Network Optimization | The algorithm outruns the currently used algorithms and performed accurately. | The system showed high computational requirement. |
| 20. | Artificial Bee Colony Algorithm with Genetic Algorithm For Job Shop Scheduling Problem [20] | Ye Lvshan, Yuan Dongzhi, and Yu Weiyu Year: 2017 | Artificial Bee Colony-Genetic Algorithm | The accuracy was good. The prediction error rate was low. | Just implementation of the general problem without any application. |
| 21. | Application of Multi-Population Genetic Algorithm in Traffic Assignment Problem [21] | LU You-peng, Zhang Bo-Hao, and Chen Fan Year: 2017 | Genetic Algorithm | Performance of the model was good. | Vehicle Routing implemented in the simulation mode, not in the real-time system. |
| 22. | Intrusion Detection System Based on Hybrid Whale-Genetic Algorithm [22] | Riya Bilaiya and Rajeev Mohan Sharma Year: 2018 | Genetic Algorithm and Whale Optimization Algorithm | The performance was good and it is a reliable model. | Network simulator has been used for testing the proposed method. |
| 23. | Performance Analysis of Clustering Based Genetic Algorithm [23] | Athaur Rahman Najeeb, A. M. Aibinu, M. N. Nwohu, M.J.E Salami, and H Bello Salau Year: 2016 | Clustering, Evolutionary Algorithm, Function Optimization, and Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | Clustering implementation with the new proposed method took a lot of time. |
| 24. | Research on the Application of Genetic Algorithm in Logistics Location [24] | Xiaoxi Zhang and Yong Yin Year: 2017 | Genetic Algorithm | The idea was good as it focuses on our environment. | Logistic Location's proposed method implemented on the simulator only which doesn't contain any human-based error and visuals. |
| 25. | Robust Adaptive Genetic K-Means Algorithm using Greedy Selection for Clustering [25] | Abba SugandaGarang, FidelsonTanzil, and Yogi Udjaja Year: 2016 | K-Means and Genetic Algorithm | The performance was good and it is a reliable model. | A genetic algorithm is used without any modification. |

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| 26. | Prediction Model of BP Neural Network Based on Improved Genetic Algorithm Optimization for Infectious Diseases [26] | Qiufang Ma and Liqing Xiao Year: 2017 | BP Neural Network, Particle Swarm Optimization Algorithm, and Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | An improved genetic algorithm is complex. |
| 27. | A Network Anomaly Detection Method Based on Genetic Algorithm [27] | QinggangSu and Jingao Liu Year: 2017 | Genetic Algorithm | The idea was good as it focuses on our environment. | No improved genetic algorithm has been used for the proposed method. |
| 28. | Genetic Algorithms and Unsupervised Machine Learning for Predicting Robotic Manipulation Failures for Force-Sensitive Tasks [28] | Luca Parisi and Narrendar Ravichandran Year: 2018 | Genetic Algorithm | The proposed algorithm is time-saving. | The incorporation of genetic algorithm in the unsupervised algorithm is quite complex. |
| 29. | Optimization of K-Means clustering Using Genetic Algorithm [29] | Shadab Irfan, Gaurav Dwivedi, and Subhajit Ghosh Year: 2017 | Clustering, K-Means and Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | No improved genetic algorithm has been used for the proposed method. |
| 30. | Social Media Generated Big Data Clustering Using Genetic Algorithm [30] | Palak Sachar and Vikas Khullar Year: 2017 | Genetic Algorithm and Big Data Analytics | The proposed algorithm is time-saving. | No improved genetic algorithm has been used for the proposed method. |
| 31. | A New Approach Based on a Genetic Algorithm and an Agent Cluster Head to optimize energy in Wireless Sensor Networks [31] | Layla Aziz, DaidRaghay, HanaaneAznaoui, and Abdellah Jamali Year: 2016 | Genetic Algorithm | The simple and easy architecture was implemented by the authors. | The system is complex for the implementation. |
| 32. | Feature Selection and Classification of ECG Finger Movement Based on Genetic Algorithm [32] | M.L. Al Dabag, NalanOzkurt, and ShaimaMiqdad Mohamed Najeeb Year: 2018 | Genetic Algorithm, Multi-Layer Perceptron (MLP) and Support Vector Machine (SVM) | The algorithm outruns the currently used algorithms and performed accurately. | The proposed methodology is not much reliable. |
| 33. | Improved License Plate Detection Using HOG-based Features and Genetic Algorithm [33] | Jawad Muhammad and HalisAltun Year: 2016 | Genetic Algorithm | Good performance of the model. | Works perfectly for low traffic system. |
| 34. | An Efficient Stream Cipher using Genetic Algorithm [34] | Ankit Kumar and Kakali Chatterjee Year: 2016 | Genetic Algorithm | The performance was good and it is a reliable model. | Its computational cost is very much higher from previously |

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| | | | | | proposed methods. |
| 35. | Application of Improved Genetic Algorithm to Unmanned Surface Vehicle path Planning [35] | Yang Long, YixinSu, Huanjun Zhang, and Ming Li Year: 2018 | Genetic Algorithm | Performance of the model was good. | It's a very costly system for the testing. |
| 36. | Optimize the software Testing Efficiency using the Genetic Algorithm and Mutation Analysis [36] | Rijwan Khan And Mohd Amjad Year: 2016 | Genetic Algorithm | The simple and easy architecture was implemented by the authors. | Complex architecture. |
| 37. | Pathway Analysis of Marker Genes for Leukaemia Cancer using Enhanced Genetic Algorithm-Neural Network (enGANN) [37] | HauCherng Wong, Christine Siew Ken Lee and Dong Ling Tong Year: 2018 | Genetic Algorithm and Neural Network | The algorithm outruns the currently used algorithms and performed accurately. | The new improved algorithm is computationally costly. |
| 38. | Multi-Objective Optimization of Operating parameters Based on Neural Network and Genetic Algorithm in the Blast Furnace [38] | Heng Zhou, Chunjie Yang, Tian Zhuang, Zelong Li, Yuxuan Li, and Lin Wang Year: 2017 | Genetic Algorithm, Neural Network, and NSGA-II | Good performance of the model. | The traditional genetic algorithm has been used for the proposed method. |
| 39. | Hybrid Electric Car Fuel Consumption Optimization Research Based on Improved Genetic Algorithm [39] | Yuanpeng Zhu Year: 2016 | Genetic Algorithm | The simple and easy architecture was implemented by the authors. | Computational cost is very high. |
| 40. | Application of Genetic Algorithm in the Machinery and Tractor park Selection [40] | Viktor V. Alt, Svetlana P.Isakova and Elena A. Lapchenko Year: 2018 | Genetic Algorithm | Good performance of the model. | It's not energy efficient and high computational power required. |
| 41. | Stock Price Prediction using Genetic Algorithms and Evolution Strategies [41] | Sonal Sable, Ankita Porwal and Upendra Singh Year: 2017 | Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | They have used the traditional genetic algorithm without any modification. |
| 42. | Learning To Rank Based on Modified Genetic Algorithm [42] | S.V. Semenikhin and L.A. Denisova Year: 2016 | Genetic Algorithm and Nelder-Mead Method | The simple and easy architecture was implemented by the authors. | The system architecture is complex. |

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| 43. | Application of SVM Based on Genetic algorithm in Classification of Cataract Fundus Images [43] | Zhiqiang Qiao, Qinyan Zhang, Yanyan Dong, and Ji-Jiang Yang Year: 2017 | Support Vector Machine (SVM) and Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | They have used the traditional genetic algorithm without any modification. |
| 44. | A dynamic Continuous Allocation Method Based on Genetic Algorithm [44] | Leilei Chen and Youfang Huang Year: 2017 | Genetic Algorithm | The simple and easy architecture was implemented by the authors. | The system architecture is complex. |
| 45. | Genetic Algorithm Based Feature Selection on Parkinson Disease via Vocal Analysis [45] | Abdulkadir Gumuscu, Kerim Karadag, Mehmet Emin Tenekeci, and Ibrahim Berkan Year: 2017 | Genetic Algorithm and Support Vector Machine (SVM) | Feature selection using the genetic algorithm worked well with disease detection using natural language processing. | It's not energy efficient and high computational power required. |
| 46. | RBF Neural Network Adaptive Sliding Mode Control Based on Genetic Algorithm Optimization [46] | Zhao Jie, Han Long, and Ren Sijing Year: 2016 | Genetic Algorithm and RBF Neural Network | The algorithm outruns the currently used algorithms and performed accurately. | The system architecture is complex. |
| 47. | Intrusion Detection System using Fuzzy Genetic Algorithm [47] | Yogita Danane and Thaksen Parvat Year: 2015 | Genetic Algorithm | The fuzzy algorithm incorporates the genetic algorithm and performed well for intrusion detection. | It's not energy efficient and high computational power required. |
| 48. | A Genetic Algorithm Inspired Task Scheduling in Cloud Computing [48] | Mohit Agarwal and Dr. Gur Mauj Saran Srivastav Year: 2016 | Genetic Algorithm | Work efficiently in the simulator in a cloud computing environment. | The system architecture is complex. |
| 49. | Using Genetic Algorithm for Load Balancing in Cloud Computing [49] | Hussain A. Makarsarwala and Prasun Hazari Year: 2016 | Genetic Algorithm | Work efficiently in the simulator in a cloud computing environment. | It's not energy efficient and high computational power required. |
| 50. | Effect of Feature Selection by Genetic Algorithm on Early Prediction Performance of PAF Attack [50] | Ali Narin, Yalcun Isler, and Mahmut Ozer Year: 2018 | Genetic Algorithm | The algorithm outruns the currently used algorithms and performed accurately. | The new improved algorithm is computationally costly. |

B. Brief Survey of the Papers

[1] A Modified Genetic Algorithm for Community Detection in Complex Networks

Author: Songran LIU and Zhe LI

Year: 2017

The authors used the genetic algorithm and modified accordingly for detecting community detection inside the complex networks. Community detection plays a vital role in processing and analytics of the data inside the networks. They broke the whole system and changed & incorporated inside the concepts of the genetic theory. For example, they have incorporated the index of the community of a particular node as the allele's of chromosomes. For assisting the system they have used modularity fitness function. They compared the efficiency of the algorithm they have used it on the fake as well as real networks. In which algorithm outruns the previously used algorithms.

[2] Hybrid Algorithm Combing Genetic Algorithm with Evolution Strategy for Antenna Design

Author: Kyung Choi, Dong-Hyeok Jang, Seong-In Kang, Jeong-Hyeok Lee, Tae-Kyung Chung, and Hyeong-Seok Kim

Year: 2016

The authors proposed the hybrid algorithms which incorporated the concepts of the genetic algorithm and evolution strategy for the designing of the antenna. They have used the genetic algorithm to reach on the apex of the optimal solution and evolution strategy has been used to find the accurate solution of the optimal problem. They have used the stochastic optimization for interchangeability between genetic algorithm and evolution strategy. They have experimented the hybrid algorithm with the classical genetic algorithm and evolution strategy. In that experiment, the hybrid algorithm performed above the other two algorithms.

[3] Optimization of a Genetic Algorithm for Road Traffic Network Division using a Distributed/Parallel Genetic Algorithm

Author: Tomas Potuzak

Year: 2016

The author has used the genetic algorithm for the division of the traffic on the roads problem as the feature selector. He has used the genetic algorithm in their system but results were not satisfactory as the standards. He tried the optimization of the classical genetic algorithm for the feature selection for the whole system. He used parallel and distributed concepts on the basic genetic algorithm for the enhancement of the basic genetic algorithm. They

have performed complex testing strategies for the assessment of the optimized genetic algorithm's efficiency and performance.

[4] Genetic Algorithm based feature selection and MOE fuzzy Classification algorithm on Pima Indians Diabetes Dataset

Author: Vaishali R, Dr. R. Sasikala, S Ramasubbareddy, S Remya, and Sravani Nalluri

Year: 2017

The authors proposed the new algorithm for the classification of the Diabetes Mellitus i.e., Type 2 Diabetes. The multi-objective evolutionary fuzzy algorithm has been used for the classification of type 2 diabetes. They have used the Pima Indians datasets of the diabetes patient. The genetic algorithm they have used for the dataset pre-processing in which it is used for the feature selection in the dataset. They have reduced the number of features from 8 to 4 using the genetic algorithm. Due to this feature selection working with multi-objective evolutionary fuzzy classifier has reached to the 83.045% of classification rate.

[5] Energy Efficient Adaptive Clustering Protocol Based on Genetic Algorithm and Genetic Algorithm Inter-Cluster Communication for Wireless Sensor Networks

Author: R. Sujee and Dr. Kannammal K.E

Year: 2017

Sensors which is present in distributed fashion inside the Wireless Sensor Network (WSN) to provide information and data about the environmental conditions. So, sensors are playing a vital role in the whole process of the data-retrieval from the remote locations using sensors via networks to the database. The lifetime of the sensors is directly proportional to battery power. For the proper distribution of the energy efficiently, Low Energy Adaptive Clustering Hierarchy (LEACH) is used. The authors tried to improve the LEACH algorithm using a genetic algorithm and inter-cluster communication with LEACH algorithm. None of the single algorithms won all the experiments. Sometimes genetic-LEACH performed well other time classical LEACH or sometimes inter-cluster communication LEACH.

[6] A Data Classification Method Using Genetic Algorithm and K-Means Algorithm with Optimizing Initial Cluster Center

Author: Haobin Shi and Meng Xu

Year: 2018

The authors of this paper used genetic and k-means algorithms for data classification modeling. The sole working of this algorithm leads to working together

with this algorithm along with the initial cluster center optimization. The k-means algorithms have been used for providing the clusters in which it uses the sorted neighbor method (SNM). Whereas genetic algorithm for the optimizing of the initial cluster center and reducing the dimensions of the data. They work when experimented then it showed groundbreaking results and surpassed the classical classification algorithms marginally.

[7] Parkinson's Disease Detection Using Ensemble Techniques and Genetic Algorithm

Author: NajmehFayyazifar and NajmehSamadiani

Year: 2017

Parkinson's disease is a disorder related to the neurological working of the brain. It grows with the time due to the less production of the dopamine in the brain cells. The person shows various symptoms of the Parkinson's disease-like slowness of movements etc. Scientists in all of the world are trying hard to make early detection of Parkinson's disease. In this case, the authors tried to accomplish this with the machine-learning algorithms. In the dataset, there were 22 features and to reduce them they have used the genetic algorithm which reduced it down to the 6 features only. Then on the selected features, they have implemented the two classification algorithms first AdaBoost and Bagging Algorithms. Bagging algorithm classified more precisely than the AdaBoost Algorithm.

[8] Improved BP Neural Network Algorithm Model Based on Genetic Algorithm

Author: Qi Changxing, Bi Yimming, and Li Young

Year: 2017

The authors used the chaotic version of the genetic algorithm for the optimization of the Back-Propagation (BP) Neural Network for the high accuracy and strong convergence. A genetic algorithm has optimized the weights on the neurons and also the thresholds of the neural network. For drawing the conclusions the authors used the basic BP neural network and Genetic Algorithm BP neural network. In that experiment, the genetic algorithm based BP neural network performed better than basic BP neural network.

[9] On K-Means Data Clustering Algorithm with Genetic Algorithm

Author: Shruti Kapil, Meenu Chawla, and Mohd Dilshad Ansari

Year: 2016

The authors trying to implement the basic K-means algorithms with a genetic algorithm in the hybrid

manner. The clustering has always been an important algorithm when it comes to the problems related to unsupervised learning. Clustering is playing vital roles in the respective domains like data mining, machine learning, image analysis, and other various domains. The basic K-Means algorithm has some issues related to the sum squared errors and clustered instances. When they produced the new genetic-based k-Means algorithm it totally outperforms the basic K-Means algorithm on the above-mentioned issues.

[10] Distributed Resource Scheduling Algorithm based on Hybrid Genetic Algorithm

Author: Sen PAN, Junfeng QIAO, Jing JLANG, Jin HUANG, and Liping ZHANG

Year: 2017

The authors provided the new algorithm i.e., hybrid genetic algorithm for the distributed resource scheduling. Resource scheduling is very much important phase in the distributed systems to computing environments. The resources availability is important for the distributed computing environments' because it will affect the performance and efficiency of the systems. The authors experimented the hybrid genetic algorithm with classical algorithms. The hybrid genetic algorithm performed above all classical algorithms used previously in the resource allocation.

[11] An Improved Genetic Evolutionary Algorithm for Commuter Route Optimization

Author: Xiaohang Qian and Linlin Liu

Year: 2018

The authors of this paper are also used the improved version of the genetic algorithm and name it the improved genetic evolutionary algorithm (IGEA). They have used the improved version of the genetic algorithm to solve the commuter's routes selection and optimization to use the full capacity with maximum efficiency. They have used an improved genetic algorithm for various optimization of the various problems they were facing in the convergence to improving the quality of responses for the whole systems. They simulated the whole application and they observed that the solutions and optimizations which simulated by the improved genetic evolutionary algorithm were better than the basic genetic algorithms.

[12] Comparison of PSO Algorithm and Genetic Algorithm in WSN using NS-2

Author: Praveen KS, Bhargavi K., and Yoeshwari K R

Year: 2017

The authors did the comparison between two important algorithms i.e., Particle Swarm Optimization (PSO) and Genetic Algorithm (GA) which are popularly used in wireless sensor networks which also a type of the wireless networks. The sensors which they have used inside the wireless sensor networks for the checking faults which usually occurs over the period of time. They have simulated the genetic algorithm and particle swarm algorithm on the network simulator version 2 for checking the performance and efficiency. They also introduced the concept of reduced energy consumptions for the reduction of the rate of data loss.

[13] Modified Genetic Algorithm for Solving n-Queens Problem

Author: Jalal Eddin Aghazadeh Heris and Mohammadreza Asgari Oskoei

Year: 2014

The authors introduced the hybrid genetic algorithm which is made from the two algorithms i.e., basic genetic algorithm and minimal conflicts algorithm for solving the n-queens problem. They made the modified genetic algorithm because of the limitations of the genetic and minimal conflict algorithms like its searching scope were limited if they were using the minimal conflict algorithm alone and if they were using genetic algorithm alone then it was taking a long time to provide the solution for the n-queens problem. So, they decided to use both the algorithms and when they applied it they found out that they were getting the far better results in comparison to the other algorithms which they were using single headedly.

[14] Rough Set Knowledge Reduction Algorithm based on Improved Chaos Genetic Algorithm

Author: Kai Gao, Yuejun Tan, and Wei Pan

Year: 2016

In this research paper, the authors introduced the advanced version of the genetic algorithm for the reduction of the rough set of knowledge. The algorithm which they have modified uses the chaotic variables to conduct the search and distribute the small disturbances across the whole process. The new algorithm is when simulated it showed improved search along the local area. These results have been verified by using two estimating methodologies like the accuracy of the reduction and average operations of the algebra.

[15] Predication of stability of the clusters in Manet using Genetic Algorithm

Author: V. Preetha and Dr. K. Chitra

Year: 2016

In this research paper, the authors used the genetic algorithm for making the original Manet algorithm more accurate. They were doing the clusters stability checking for the networks for making the networks more stable for the heavy loading of the data. While using the Manet algorithm alone they were facing issues like lack of stability and cluster re-affiliation. They have used the genetic algorithm to find the stability point in the network to pass in the Manet algorithm for its accurate functioning. Genetic algorithm played an optimizer role for maximizing the clusters stability over the networking by introducing the various parameters over the transmission in the network.

[16] Feature Selection for Text Classification Using Genetic Algorithm

Author: Noria Bidi and Zakaria Elberichi

Year: 2016

In this research paper, the authors were doing the text classification on the various newspapers and information. They have stated that feature selection is very important for their experiment because it will help the classifier to work on fewer features so it will classify more accurately. For the classification, they have used algorithms like Naïve Bayes (NB), Nearest Neighbours (KNN) and Support Vector Machines (SVMs). For measuring the classification results they have used various statistical measures like F-measures etc. Support Vector Machine (SVM) performed best among all the other algorithms with 94.6 % classification accuracy.

[17] A Genetic Algorithm for Energy Minimization Vehicle Routing Problem

Author: Shijin Wang and Yulun Wu

Year: 2017

In this research paper, the authors were dealing with the issues related to the vehicle route problems because as we are also seeing there is a surge in the air pollution as well as the amount of the traffic. To cope up with this issue authors suggested the new improved version of the genetic algorithm. This model is made for the heterogeneous vehicle types so it increases its versatility as it can work for the various types of vehicle types. They have simulated the algorithm with the CPLEX. The results generated were quite astonishing in comparison to other algorithms. It amplifies the efficiency and reduces the computation time.

[18] Consensus for Multi-agent Systems Based on Genetic Algorithms

Author: JianqiuLyu, Hoagie Wang and Shujuan Chen

Year: 2016

In this research paper, the authors were dealing with problems related to the multi-agent system like consensus. They have used the genetic algorithm for the optimization of its two other algorithms like velocity-free consensus algorithm and Lyapunov stability algorithm for the accomplishment of the various tasks in the multi-agent systems. The genetic algorithm optimized the various control parameters and another control system. They have used some numerical simulation for producing the results and seeking for the performance of the genetic algorithms in the multi-agent system.

[19] A multi-Objective Genetic Algorithm based on objective-layered to solve Network Optimization

Author: Shi Lianshuan and Chen YinMei

Year: 2017

The authors introduced the new modified version of the genetic algorithm for the optimizations of the problem's solution in the subject of the multi-objective genetic algorithm. This modified genetic algorithm will be used to make a surge in computational efficiency. They have used this algorithm in keeping the multiple objectives in the mind like delay and cost of the network. While simulating the algorithm for producing the outputs they found out that the algorithm is also becoming successful in finding the Pareto solutions along the side with higher computational efficiency.

[20] Artificial Bee Colony Algorithm with Genetic Algorithm for Job Shop Scheduling Problem

Author: Ye Ivshan, Yuan Dongzhi, and Yu Weiyou

Year: 2017

The job shop scheduling problem (JSSP) is used to modeling the scheduling of production. This modeling is important because as the limitation over the resources increases the problem will rise in the scheduling of the order and time of the various products with various performances. In this research paper, the authors have used the hybrid algorithm made up of the following algorithms i.e., Artificial Bee Colony and Genetic Algorithm. There were some limitations with the Artificial Bee Colony and Genetic Algorithm like the searching in the global and searching in the local space respectively. When the authors combined them together for an experimental basis they were quite surprised by the results and performance of both algorithms.

[21] Application of Multi-Population Genetic Algorithm in Traffic Assignment Problem

Author: LU You-peng, Zhang Bo-Hao, and Chen Fan

Year: 2017

In this research paper, the authors were trying to dealing with the traffic issues in large population as we can see there is a drastic change in the traffic flows in the cities. As the population keeps rising the traffic system is keep choking day by day. Due to this, there is a large amount of pollution and environmental issues arising continuously. To dealing with this problem, authors have suggested the multi-population based genetic algorithm. There were some limitations with a basic genetic algorithm like the convergence of the algorithm etc. They also simulated the algorithm and they were successful effectively.

[22] Intrusion Detection System Based on Hybrid Whale-Genetic Algorithm

Author: Riya Bilaiya and Rajeev Mohan Sharma

Year: 2018

As technology increases the reliability with the network and cloud system is also increasing. When the people started using the cloud for a daily basis and market prices to avail the services at the cheap cost. There is also a large susceptibility that the unwanted interference inside the data without the authorization. The authors in this research paper have discussed the Intrusion Detection System (IDS) build using the two important algorithms like genetic algorithm and whale optimization algorithm. This is both are used for the detection of the various unwanted network set patterns, traffic etc. in order to damage the system. The hybrid algorithm worked properly with the network and detected unwanted malicious network traffics inside the system

[23] Performance Analysis of Clustering Based Genetic Algorithm

Author: Athaur Rahman Najeeb, A. M. Aibinu, M. N. Nwohu, M.J.E Salami, and H Bello Salau

Year: 2016

In this research paper, the authors did the analysis of the performance of the new algorithm based on the genetic algorithm i.e., Clustering based Genetic Algorithm. They did the survey of the previously done work by the other researchers. They have used the other type of clustering inside it. They have done the work using the two centroids used in clustering technique. They have taken the account of all the concepts of the genetic theory and tried to infuse in the algorithm which they were analyzing. They found out that after using the clustering based genetic

algorithm worked properly in regions' of the finding global solutions with the technique using the optimization of the genetic algorithm.

[24] Research on the Application of Genetic Algorithm in Logistics Location

Author: Xiaoxi Zhang and Yong Yin

Year: 2017

The authors of this research paper have used the genetic algorithm for getting optimized locations in order to succeed in the whole procedure of the logistics system. They have used this optimization algorithm to find the logistics center location. The genetic algorithm used to find the global optimization point. For conducting the experiment the researchers used the MATLAB for simulation and getting the detailed performance analysis. The main issues related to this type of models is to bringing the real-time factors and checking the feasibility for the whole proposed system. After the simulation completed the researchers analyzed that the proposed system was showing some vital and exceptional results. While the whole simulation system was acting simply, efficiently and easily to understand.

[25] Robust Adaptive Genetic K-Means Algorithm using Greedy Selection for Clustering

Author: Abba SugandaGisrang, FidelsonTanzil, and Yogi Udjaja

Year: 2016

In this research paper, the authors discussed the clustering in data mining. Clustering is an important way to categorize things in the places where there is no association between the features is presented in the dataset. They have used the various algorithms in the whole process of the clustering in order to get succeed. The algorithm incorporated the following algorithms like Adaptive Genetic Algorithm, K-Means Algorithm and greedy algorithm for making a hybrid algorithm to perform a set of objectives/tasks for the proposed system. The new modified algorithm worked closed with the whole system executing the set of work/ process/ task in ordinal fashion to reach the endpoint of the experiment.

[26] Prediction Model of BP Neural Network Based on Improved Genetic Algorithm Optimization for Infectious Diseases

Author: Qiufang Ma and Liqing Xiao

Year: 2017

The authors used the chaotic version of the genetic algorithm for the optimization of the Back-Proportion (BP) Neural Network for the high accuracy and strong convergence. A genetic algorithm has optimized the weights on the neurons and also the

thresholds of the neural network. For drawing the conclusions the authors used the basic BP neural network and Genetic Algorithm BP neural network. In that experiment, the genetic algorithm based BP neural network performed better than basic BP neural network.

[27] A Network Anomaly Detection Method Based on Genetic Algorithm

Author: QinggangSu and Jingao Liu

Year: 2017

The network security is nowadays is the utmost concern for the IT professionals especially network engineers and security providing organization. The anomaly detection is a really important task for network security because it will give an idea of what is really happening inside your network. In this research paper, the authors proposed the method/system for the detection of the anomaly in the network using the genetic algorithm. They have used the genetic algorithm incorporating with various other methodologies like if-then rules etc. they have also incorporated the genetic algorithms at the microscopic level to provide boosting to the system to work mercurial level. They also simulated the whole algorithm on the big data to check its performance and efficiency to make it more efficient.

[28] Genetic Algorithms and Unsupervised Machine Learning for Predicting Robotic Manipulation Failures for Force-Sensitive Tasks

Author: Luca Parisi and Narrendar Ravichandran

Year: 2018

The robotics industry is growing rapidly as the new innovation continuously breaking the ground day by day. The amount of investment is also increasing and also providing the amazing platform to make the manual things into autonomous. In this research paper, the authors are discussing the issues related to the force-sensitive tasks executed by the robots. The reduction of the failure in these type of task is really important. The authors proposed the new methodology to assist the whole process of reduction of failure in the force sensitive tasks. They have used the genetic algorithm and unsupervised learning algorithms to cope up with these issues. They have used the genetic algorithm to found the optimization points of the parameters of the unsupervised algorithms. They executed the task successfully and also earned worldwide appreciation regarding this.

[29] Optimization of K-Means clustering Using Genetic Algorithm

Author: Shadab Irfan, Gaurav Dwivedi, and Subhajit Ghosh

Year: 2017

In this research paper, the authors did a comparison of the various optimization algorithms for the specific task of the clustering. Clustering is one of the important parts of the unsupervised methodology to get insights about the dataset to do the classification or prediction. There are various unsupervised algorithms in this paper authors selected the K-Means algorithm and doing the experiments with various optimization algorithm with respect to the K-Means algorithm. Like ACO, PSO and genetic algorithm and Genetic Algorithm provided the most accurate results for the whole experiment.

[30] Social Media Generated Big Data Clustering Using Genetic Algorithm

Author: Palak Sachar and Vikas Khullar

Year: 2017

In this research paper, the authors were discussing the amount of data is generating by the social media which crosses the petabytes mark. They have analyzed the major share of data generating by the means of the audio-visual files by the users. Nowadays the companies trying the big-data file systems like Hadoop, Google file system etc. for strong and analyzing the data for their own use. They have proposed the genetic algorithm for generating the association in the data associating with the clustering algorithm. They used the genetic algorithm with the Map Reduce using the Java programming language. They also evaluated the performance with various statistical parameters like F-measures etc.

[31] A New Approach based on a Genetic Algorithm and an Agent Cluster Head to optimize energy in Wireless Sensor Networks

Author: Layla Aziz, Daid Raghay, Hanaane Aznaoui, and Abdellah Jamali

Year: 2016

The authors introduced the new modified version of the genetic algorithm for the optimizations for finding the optimal distance in the network to reduce the energy consumption and increasing the efficiency of the network while transferring the services from one location to the others. This modified genetic algorithm will be used to make a surge in computational efficiency. They have used this algorithm in keeping the multiple objectives in the mind like delay and cost of the network. While simulating the algorithm for producing the outputs they found out that the algorithm is also becoming

successful in finding the Pareto solutions along the side with higher computational efficiency.

[32] Feature Selection and Classification of ECG Finger Movement Based on Genetic Algorithm

Author: M.L. Al Dabag, Nalan Ozkurt, and Shaima Miqdad Mohamed Najeeb

Year: 2018

In this research paper, the authors have discussed the concept of Electroencephalography for knowing the brain activity for the various tasks related to the brain and making a pattern of electromagnetic waves in the brain. This study will help the medical sciences in the various field for the understanding of the various stimuli and waves travel pattern of the controlled tasks. They have used the genetic algorithm for the feature selection from the dataset for making the classification more efficient. They have taken the Support Vector Machine (SVM) and MLP algorithm for the classification. They have done the experiment in two phases' one with a genetic algorithm and another one without it. In the first one, they got extraordinary results for it.

[33] Improved License Plate Detection Using HOG-based Features and Genetic Algorithm

Author: Jawad Muhammad and Halis Altun

Year: 2016

As technology is advancing day by day, people are trying to use it in various areas to ease the work and provide an automated system in a more efficient way to do the tasks. In this research paper, the authors introduced the genetic algorithm in the area of the number plate detection system in real time. They have proposed the model for detecting the number of plates for the traffic system to make the automated system for imposing the fine on the rule breakers. They have used the deep learning model for the training and testing of the proposed system. They have used the genetic algorithm for the optimization of the input variables to increase the detection speed of the proposed system. They also have evaluated the model and estimated the efficiency of more than 98% during the detection of the number of plates on the car.

[34] An Efficient Stream Cipher using Genetic Algorithm

Author: Ankit Kumar and Kakali Chatterjee

Year: 2016

The security of the system whether it is a personal system or public system becoming more and more vulnerable from the cyber-attacks which is increasing with the time. In this research paper, the authors have discussed the idea of a generation of cryptic keys for

the security of the stream ciphers. The keys in the cryptography are generated through the random number generation from the algorithms. They have used the genetic algorithms for generating the random keys for the cipher because of the following reasons like it will be more randomly generated, keys will be repeated in the model and it will be generated through the highest fit method in which, that key will be selected whom having the highest value of the fitness function.

[35] Application of Improved Genetic Algorithm to Unmanned Surface Vehicle path Planning

Author: Yang Long, YixinSu, Huanjun Zhang, and Ming Li

Year: 2017

In this research paper, the authors have proposed the improved version of the genetic algorithm for the self-driving vehicle which is also called as the unmanned surface vehicle. They were using the traditional genetic algorithm for their proposed system but they were facing issues for detecting the shorter and not-collectible path for their vehicle. They have tuned the traditional genetic algorithm according to their proposed system in order to maximize the efficiency of the algorithm. They have used this vehicle in the lake environment for automating the vehicle activities in the lake for making the environment more cleaner and pollution free. They also have simulated the proposed genetic algorithm in the vehicle and evaluated it on the all available parameters to get an idea of the efficiency and performance of the changes which they have made for it. The results were quite good in comparison to the traditional genetic algorithm.

[36] optimize the software Testing Efficiency using the Genetic Algorithm and Mutation Analysis

Author: Rizwan Khan and Mohd Amjad

Year: 2016

In this research paper, the authors have proposed the genetic algorithm for the checking of the testing efficiency of software testing tool. They have used the genetic algorithm for finding the critical paths and also optimizing the test cases generating while testing the programs. They also infused the concept of the mutation analysis to analyze where the test cases generating the errors. This way they have evolved the whole concept of the genetic algorithms using in the domain of the software testing which shows the versatility of the genetic algorithm and how it can be used as an optimization algorithm in various domains.

[37] Pathway Analysis of Marker Genes for Leukaemia Cancer using Enhanced Genetic Algorithm-Neural Network (enGANN)

Author: HauCherng Wong, Christine Siew Ken Lee, and Dong Ling Tong

Year: 2018

In this research paper, they proposed a computational model to find a significant way to investigate the interaction between genes of the disease called Leukaemia. This model basically works on the centroid computation of the hybrid genetic algorithm and neural networks. The results of this model have shown the effectiveness of centroid in finding the significant interaction of genes. A panel of 37 leukemia associated candidate genes was extracted by GANN. The modeled interaction was further visualized using Cytoscape and the further possible paths were validated by STRING online protein interaction dataset. They believe that their approach is in the right direction to infer gene interactions, In future work, they will try to conduct the same experiment with different datasets. They also look forward to using the correlation coefficient approach to strengthen the interaction model.

[38] Multi-Objective Optimization of operating parameters Based on Neural Network and Genetic Algorithm in the Blast Furnace

Author: Heng Zhou, Chunjie Yang, Tian Zhuang, Zelong Li, Yuxuan Li, and Lin Wang

Year: 2017

In this research paper, they proposed an optimized model for operation point within the blast furnace, In order to optimize the iron making process, the proposed model is successful in finding proper operation parameters using Neural Network and Genetic Algorithm. The model is based on two theories BP neural network which defines the mapping rules for multiple input and multiple outputs and the other one is genetic algorithm whose core content is NSGA-II algorithm and Pareto optimality algorithm which fits for multi-objective optimization goals. By using this model the process of iron making plant is feasible and simultaneously stable. This model still has some defects which need to be fixed in the future with more optimization techniques.

[39] Hybrid Electric Car Fuel Consumption Optimization Research Based on Improved Genetic Algorithm

Author: Yuanpeng Zhu

Year: 2016

As the hybrid electric car is widely accepted by many countries it becomes the hot topic for research in universities, In this research paper, they proposed a

methodology using an improved genetic algorithm for optimization of fuel consumption in a hybrid electric car which shows better results if it is compared with a simple genetic algorithm. According to genetic algorithm theory, the fuel consumption and emission are taken as an objective function and fitness function is determined by the weighting method. They had used the decimal coding method to simplify the coding method for genetic operation process, then this control strategy method of the improved genetic algorithm is imported into a vehicle for simulation, which shows it's more optimized results than a simple genetic algorithm. This methodology is used for offline optimization to achieve the goal of optimized fuel consumption and emissions.

[40] Application of Genetic Algorithm in the Machinery and Tractor Park Selection

Author: Viktor V. Alt, Svetlana P.Isakova and Elena A. Lapchenko

Year: 2018

In this research paper, they are trying to predict whether the highest price of the stock is going to increase or decrease on the next day. Where they are taking the stock prices of eight different companies and for each company, they predict their highest price of the next day. Mainly it's a classification problem and they are using the genetic algorithm and evolution strategies for this purpose. Using this algorithm they are finding the connection between weights of six attributes from each dataset. Which help them in predicting the stock. They are using a sigmoid function which takes input for each attribute and amplified it on the basis of its connection weight. In this paper, they proved that the genetic algorithm is a more promising and novel method than revolutionary strategies for predicting stock prices and the results are accurate up to 70.00. For future work, other machine learning algorithms can be used as Neural Networks and Support Vector Machines and instead of using the sigmoid function we can try different activation functions or some other functions for classification.

[41] Stock Price Prediction using Genetic Algorithms and Evolution Strategies

Author: Sonal Sable, Ankita Porwal and Upendra Singh

Year: 2017

In this research paper, a proposed model shows the variants selection in the task of machinery and tractor park selection. In general Evaluation of variants, the selection is quite complex, these tasks are divided into sub-tasks and the minimal cost of each task is sort separately. The sum of the minimum costs of each subtask tasks will be equal to the whole task. In

this paper genetic algorithm is used to reduce the solution set. It helps in reducing the number of variants of machinery and tractor park selection in the process of calculation and also to accelerate the calculations. They introduce an application based on the genetic algorithm called PIKAT which is used for decision making support and operating control of agricultural enterprises.

[42] Learning to Rank Based on Modified Genetic Algorithm

Author: S.V. Semenikhin and L.A. Denisova

Year: 2016

In this paper, learning to the rank problem is being optimized using the modified Genetic algorithm which is a hybrid based on Genetic Algorithm and Nelder-Mead Algorithm. This approach is using for optimizing the graded matrix of nDCG and using this approach they noticed that that the value of ranking quality measures was significantly increased. This modified algorithm also reduces the time for learning to rank if we compare it with the traditional genetic algorithm. The efficiency of the modified genetic algorithm was proved on the LETOR dataset by the researchers. On the basis of the results of this the nDCG matrix has a significant boost after learning to rank process but it's not the same for other metrics, So, In the future work, we should take care of all the metrics that everyone get a significant boost after learning process, for that purpose we can build an objective function based on linear convolution of ranking metrics.

[43] Application of SVM Based on Genetic algorithm in Classification of Cataract Fundus Images

Author: Zhiqiang Qiao, Qinyan Zhang, Yanyan Dong and Ji-Jiang Yang

Year: 2017

In this research paper, they proposed a more efficient Support Vector Machine classifier which is based on a genetic algorithm for finding the cataract in human eye, it's a practical approach which gives quite good results if we compare it with the traditional methods or earlier researches, which includes preprocessing fundus images, extract and calculates the features from original image directly. In this Support Vector Machine Classifier a whole fundus image is divided into 17 images and then features are extracted features from sub-images, then the extracted feature vectors are weighted with the genetic algorithm and finally SVM (Support Vector Machines) is used to train and classify the fundus image, this approach gives the results up to 87.52%, In this paper calculating the optimal weight is time-consuming and iterative period is long, which become a problem for further research.

[44] A dynamic Continuous Allocation Method Based on Genetic Algorithm

Author: Leilei Chen and Youfang Huang

Year: 2017

The authors have been proposed the genetic algorithm for network optimization. They have used the traditional genetic algorithm for the optimization of the natural parameters for the continuous allocation of the resources which is used for the sliding mode control system.

[45] Genetic Algorithm Based Feature Selection on Parkinson Disease via Vocal Analysis

Author: Abdulkadir Gumuscu, Kerim Karadag, Mehmet Emin Tenekeci, and Ibrahim Berkan

Year: 2017

A neurological disorder named as 'Parkinson' which affects the patient's life unfavorably, it finds mainly in elder people, it starts slowly and can be shown in movements of muscles. This disease is diagnosed with gait analysis and vocal analysis. In this paper, we are using vocal analysis using a genetic algorithm, SVM (Support Vector Machine) and LOOCV method. This paper shows the feature selection based on genetic algorithm and further classification using SVM and validation by LOOCV is more successful than the previous studies with the same classification and validation method. Classification success rates are high when features are selected using a Genetic Algorithm.

[46] RBF Neural Network Adaptive Sliding Mode Control Based on Genetic Algorithm Optimization

Author: Zhao Jie, Han Long, and Ren Sijing

Year: 2016

The authors have been proposed the genetic algorithm for network optimization. They have used the traditional genetic algorithm for the optimization of the natural parameters for the RBF Neural Network which is used for the sliding mode control system.

[47] Intrusion Detection System using Fuzzy Genetic Algorithm

Author: Yogita Danane and Thaksen Parvat

Year: 2015

Computer security is a very important part for organizations, and now it comes to a bunch of computers connected in a network, which require secure network to transfer and retrieval of data from one system to another system, In this research paper, a new and efficient Intrusion Detection system (IDS) is introduced, which shows a more optimized system

in term of time, space and speed. This paper presents the fuzzy genetic algorithm to find the intrusion over the network, to implement this system KDD99 dataset is used. The proposed system is more efficient from the existing system in terms of accuracy, execution time and memory allocation. Genetic algorithm uses a chromosome like a data-structure and develops the chromosome using selection, crossover and mutation operators and further fuzzy logic sort network attack data.

[48] A Genetic Algorithm Inspired Task Scheduling in Cloud Computing

Author: Mohit Agarwal and Dr. Gur Mauj Saran Srivastav

Year: 2016

Cloud Computing is quite popular nowadays and it's cost efficient for organizations as well, earlier it's quite tough for service provider to manage the resources like virtual machines, network, and bandwidth so that performance of the device should not be under-utilization or over-utilization, In this research paper, this problem is solved using a task scheduling for dynamic allocation of the task using genetic algorithm. Which distribute the load among the virtual machines so that the QoS time can be minimal. They are using CloudSim for the comparison of task scheduling using a genetic algorithm and another existing algorithm like greedy based and FCFS (first-come-first-serve) techniques, in this comparison task scheduling based on genetic algorithm out-perform the existing techniques. In future work, they mention that the genetic algorithm can be applied to resource scheduling also.

[49] Using Genetic Algorithm for Load Balancing in Cloud Computing

Author: Hussain A. Makarsarwala and Prasun Hazari

Year: 2016

Usage of cloud is increasing rapidly nowadays, due to which load balancing on cloud is also increases which is one of the major issues in cloud computing, It is termed as the NP-hard problem because as the user request for services increases balancing the load become more tougher, In this paper, they are using genetic algorithm to balancing the load of user requests and provide them the service in minimal time as possible. A genetic-based approach is effective when it compares to the existing load balancing techniques, the comparison takes place on cloud analyst simulator. In proposed method priority of the request is the deciding factor which gives better results, but there can be many other parameters as a deciding factor, moreover, permutation encoding also used to increase the range of request ID's (Cloudlets).

[50] Effect of Feature Selection by Genetic Algorithm on Early Prediction Performance of PAF Attack

Author: Ali Narin, Yalcun Isler, and Mahmut Ozer

Year: 2018

In this research paper, they mention a heart disease called Atrial fibrillation(AF), this disease is a disturbance caused by excitation occur outside of the sinoatrial nodes which are inside the heart, and the first stage of this disease is Paroxysmal Atrial Fibrillation(PAF), which is predicted in the initial stage of this disease, time domain measurement and Poincare plot measurement were obtained over the data, prediction of the disease gives good result , the feature selection for the prediction process was done using a genetic algorithm. In this paper, the feature selection plays a vital role in predicting the good results, which shows the effectiveness of a genetic algorithm in selecting the most appropriate features for the prediction. The results of the proposed work can predict the PAF 7.5 minutes before the attack and it's due to the feature selection.

III. Domains in which Genetic Algorithms used widely

The domains for which the genetic algorithm used extensively is given after surveying the above mentioned previously published research papers. It provided a broad insight into the areas or domains in which a genetic algorithm is implementing predominantly. I have mentioned the domains in the tabular form to provide the information more easily. The domains like a wireless network, cloud computing and distributed system topping this list due to the need of the optimization algorithm more than the other domains.

| S. No. | Domain |
|--------|------------------------|
| 1. | Wireless Network |
| 2. | Cloud Computing |
| 3. | Distributed System |
| 4. | Clustering (Big Data) |
| 5. | Healthcare |
| 6. | General Problems |
| 7. | Image Recognition |
| 8. | Transportation |

The above showed table illustrated the domains where the genetic algorithm and its hybrid or improved version has been using extensively.

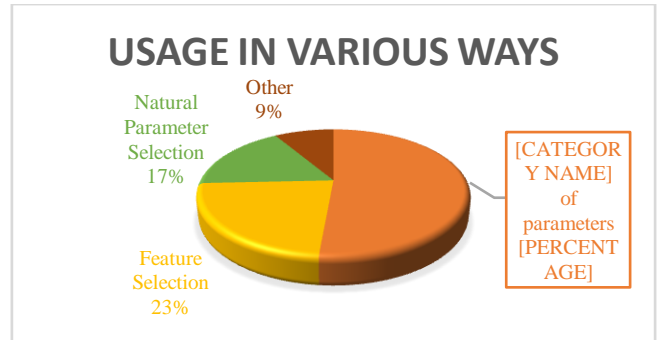


Fig 3.1. Bar-plot showing usage percentage of the genetic algorithm in the various context

Figure 3.1 illustrating the rough idea about for which kind of the problem for which the genetic algorithm has been using by the researches and incorporating it into their algorithm make it more useful.

IV. Conclusion

The genetic algorithm showed its presence in the wide area of the domains. The traditional genetic algorithm is very powerful but in some special areas it can be used by incorporating with some of the classical machine learning algorithms. The genetic algorithm is used for the other types of various internal system.

The way the genetic algorithm is using by the researchers which are making it one of the best algorithm for the problem related to the optimization, regularization to normalization of the algorithm to find out the optimal values of the research parameters related to the designed machine learning algorithm.

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