Comparative Study and Analysis on Hybrid Neural Network Classification

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Abstract— In order to improve the comprehensive study and analysis on Neural Classification, high efficiency, humanization of the type of the search and eliminate games, and also to improve the search performance and rule out the accuracy of the target during intelligence games running. This paper puts forward a comprehensive method that combines Genetic Algorithm, Neural Network and Back Propagation (BP) to solve the insufficiency of computing power and low efficiency by using a single algorithm in Neural Classification. In this method, Hereditary algorithm will be utilized as a part of weight preparing of Neural Network above all else. It won't quite repeating until Genetic Algorithm advance into a specific degree or system mistakes fulfill the requirements, and convey the best chromosome we get to Neural Network. At that point back Propagation prepares the information that goes through the Neural Network, which is Neural Network second preparing. At long last the paper applies the new route the Mie Clearance explore.

Key words: Neural Network, Modified Genetic Algorithm, Back Propagation

I. INTRODUCTION

The processing efficiency of Optimization in Neural Classification has always been a topic of discussion among End Users. Neural Network Is generally associated by a substantial number of neurons, framing an unpredictable system framework which can greatly handle simultaneously and store appropriated data. With a specified end goal to take care of the issue of low effectiveness brought on by single algorithm, an enhanced calculation was advanced in this paper.

A. Neural Network

Neural Network is reflection and reproduction to a few fundamental components of human brain or natural Neural Network. Neural Network is a Model to investigate and recreate the model of mind nerve framework work through displaying and coupling of the essential unit of the human cerebrum neurons, and to create simulated framework with learning, considering, remember, design acknowledgement and other information preparing capacities.

B. Genetic Algorithm

Genetic algorithm is stochastic search techniques that guide a population of solution towards an optimum using the principles of evolution and natural genetics.

In recent years, genetic algorithms have become a popular optimization tool for many areas of research, including the field of system control, control design, science and engineering. Significant research exists concerning genetic algorithm for control design and off-line controller analysis.

The aim of genetic algorithm is to use simple representations to encode complex structures and simple operation to improve these structures.
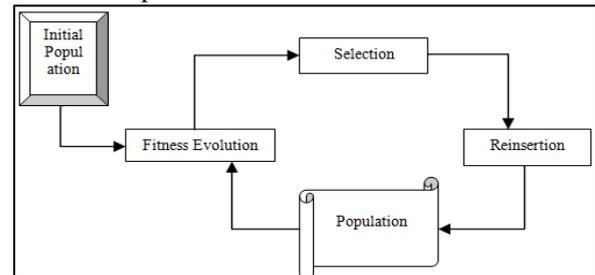

Fig. 1: Genetic Algorithm

C. Back Propagation

A Back Propagation optimized Neural Network learns by using the generalized delta rule in a two phase propagates adapt cycle.

Back Propagation is a managed learning calculation. It is a multilayer feed forward system which is made out of back spread and blunder revision. Back propagation is made out of two processes that incorporate forward proliferation of information and mistake back proliferation. It has qualities of good self-learning, self-adaption, power and speculation.

Back Propagation conforms the system weights and edges always by mistake back engendering to make the minimum mistake entirety of squares of the system to make the entirety of square mistake least.

II. RELATED WORK

Here are two classical algorithm of artificial intelligence, Neural Network and Genetic Algorithm. Application of these two algorithms is quite extensive. But Genetic algorithm cannot avoid such problems as the rough datasets [1]. At the same time, Neural Network also exists two inherent Problems: one is that it is to fall into local minimum, and the other is slow convergence speed [3]. Back Propagation is likewise with a similar issue. Another calculation was advanced in this paper integrating these three calculations with the qualities of their individual.

For the generation of new calculation, the paper chiefly has two viewpoints: Firstly, the paper consolidates the Genetic Algorithm with Neural Network. The combination mixes the Neural Network's rapid parallelism and global searching capability of Genetic Algorithm together [4]. This fathoms the irregularity of the Neural Network structure and parameter plan and the inadequacy of relying upon individual's encounter, and advances the Neural Network. In other words, trains the Neural Networks.

Furthermore, utilize Back Propagation to prepare the first preparing information of the Neural Network which makes the Neural organize get auxiliary preparing.

III. PROBLEM DEFINITION

Neural Network is reflection and reproduction some fundamental components of human cerebrum or Neural System. An imperative attributes of Neural System is that it can from nature and store the aftereffects of figuring out how to the synaptic association of the system.

In order to solve the problem of low efficiency caused by Neural Network the algorithm optimizes Neural Network through the Modified Genetic Algorithm.

IV. METHODOLOGY

The Genetic Algorithm is a random search algorithm that simulates natural selection and evolution. It looks the add up to arrangement space and can locate the ideal arrangement all around over an area.

The population involves a gathering of chromosomes from which hopeful can be chosen for the arrangement of an issue. At first, a population is generated randomly. The wellness estimations of the all chromosomes are assessed by ascertaining the goal work. A specific gathering of chromosomes is chosen from the populace to create the posterity by the characterized hereditary operations. The wellness of the posterity is assessed in a comparable manner to their folks. The chromosomes in the present populace are then supplanted by their posterity, in view of a specific substitution technique.
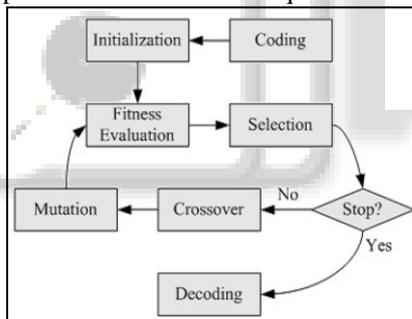

Fig. 2: Work flow for optimization using Genetic Algorithm
It searches the total solution space and can find the optimal solution globally over a domain. Three basic operation of a genetic Algorithm is as follows:

− Choosing Operation: The choosing operation intends to pick the individual from the old gathering and add them to the new gathering in a certain probability. The probability of the individual chosen is pertinent to the wellness esteem: the better wellness estimation of the individual, the more noteworthy probability of being chosen.
− Crossover Operation: The hybrid operation intends to choose two individual from the current individual and create another better individual through the trade and mix of two chromosomes.
− Mutation Operation: The change operation is to pick one individual from the gathering and afterward select state of chromosomes for variety operation to create better people.

A. Using a Hybrid Neural Network Forecast Model

This model uses a combination of MGF, OSR, and neural networks to build a new hybrid MGF-OSR-BP forecast model. This new figure demonstrate considers both the demonstrate and the learning network development, sets show parameters, decides an ideal concealed hub number and uses OSR to choose a worldwide ideal subset as a learning lattice, which beats the shortcoming of MGF in selecting a nearby subset. Our exploratory outcomes demonstrate that the MGF-OSR-BP model is unmistakably better at fitting noteworthy specimens and anticipating free examples than the MGF-OSR display and the MGF stepwise numerous relapse demonstrate [5].

B. Fitting and Forecast Result Analysis

We used the MGF stepwise multiple regression method and the MGF-OSR method to process the precipitation data sample and we compared and analyzed the respective fitted values with those from the original sample data.

To compare the fitting results of the three models in a quantitative approach, the following 4 indices are defined [6].

MODEL	MAPE	MSE	MAE	PR
MGF-OSR-BP NN model	0.23	3.59	4.93	0.99
MGF-OSR model	6.10	114.97	92.34	0.86
MGF stepwise Multiple Regression Model	6.68	124.62	99.96	0.83

Table 1: Comparison of the fitting accuracy of the three models

Table 1 likewise demonstrates that every one of the three models have great precipitation fitting outcomes, while the MGF-OSR-BP neural system demonstrate gives a superior fit than the other two models, with a flawless outcome. The MGF stepwise numerous relapse shows has the most minimal fitting exactness, and the MGF-OSR demonstrate fitting precision is in the middle of those of the other two models.

C. Hybrid Neural Network Architecture for On-Line Learning

The proposed half breed framework can be connected to a wide scope of utilizations for example, work estimate, time arrangement forecast, and example order. Each of these ranges normally covers numerous particular applications. For instance, Time arrangement expectation might be connected to money related or flag information, and example acknowledgment incorporates application to building, military, or restorative frameworks. In this area, we portray the general structure of the proposed half and half framework engineering that empowers quick and precise on-line learning of a period shifting framework.
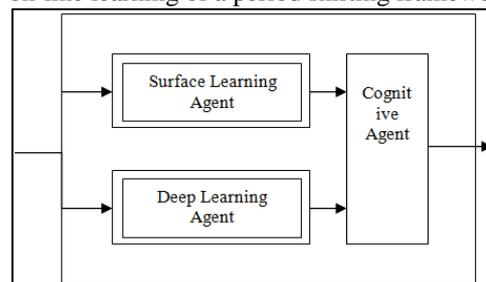

Fig. 3: Hybrid System Architecture

Figure 3 shows the proposed hybrid system architecture, which consists of a surface learning agent, a deep learning agent, and a cognitive agent. In the crossover framework design, the surface learning operator and the profound learning specialist work in parallel in reacting to the progressions of the earth. In specific, the surface learning specialist grabs the transient structure of the data flag, and performs fast examination to react to the jolt. The profound learning specialist searches out long haul structure of the data, and abstracts longer relationships display inside the framework. The abnormal state subjective specialist screens nature, and the choices made by the surface what's more, profound realizing specialists, and naturally creates the most alluring framework yield in view of the circumstance [7].

The execution of the half breed design has been contrasted and that of multi-layer perceptron with back-engendering and the CC and FC systems for disordered time-arrangement forecast, the CATS benchmark test, and smooth capacity estimate. It has been demonstrated that the cross breed engineering gives a prevalent execution in light of a RMS mistake rule. We expect the applications of our hybrid neural network architecture to problems in finance, control, time-series prediction, and economic forecasting.

D. Hybrid Classification Method using ANN

In this paper we propose another arrangement strategy for programmed rest scoring utilizing a simulated neural system based choice tree. Using decision trees for classification is a reasoning process. The trees comprise of hubs, branches, and leaves, with every leaf speaking to one class, and every hub containing some move rules. Choice trees can be utilized as a part of taking care of issues in which occurrences are communicated by characteristic esteem sets, and the yield of target capacity is discrete.

ANN classifiers break down information pieces starting from the upper choice hub, and settle on a choice. As per these choices, information pieces are either sent to the leaf hub or to the choice hub of the following layer. The technique of arrangement is not completed until all information pieces are part to a leaf hub [8].

At the point when utilizing this strategy is lessened, in addition to both choice tree and ANN can function admirably with uproarious information, it's very possible that this strategy is fitting for examination of rest EEG information as it frequently contains solid and complex clamor. The consequences of the prep-try demonstrates that in this technique, as each ANN was set to concentrate on just a single particular rest organize, the obstruction created by frail elements in preparing and ordering continue of ANNs were adequately decreased.

E. Study of Hybrid Genetic Algorithm Using ANN

This strategy starts with all sources of info and it works by evacuating one contribution at every progression. At every progression, the calculation finds an info that slightest falls apart the system execution and turns into the contender for expulsion from the information set.

In this neuro-hereditary approach all the 20 side effects are considered. GA streamlines the 20 contributions to 14. The genotype is spoken to by a succession of indications. The quantity of individual in the underlying populace is 20. The wellness capacity is spoken to by

method for root mean square mistake. The most extreme number of eras is settled at 20 [9].

Search Method	Genetic Algorithm
Population size	20
Number of generations	20
Probability of crossover	0.6
Probability of mutation	0.033
Random number seed	1

Table 2: Parameters used in GA

In this work, the probability of crossover is 0.6 and the probability of mutation is 0.033. These probabilities are chosen by trial and error through experiments for good performance. The data is partitioned are done randomly and the following table shows the no of records in the training set, validation set and test set.

V. RESULT

The result shows clearly that our new hybrid neuro-genetic method provides better accuracy and faster convergence due to the complexity of the network. We integrate modified Genetic Algorithm and Neural Network by the way of using modified Genetic Algorithm to optimize the initial weight of Neural Network, which achieves complementary advantages and solve the problem of low efficiency. The new algorithm takes advantage of the characteristics of each algorithm effectively, which improves the running efficiency of the network.

VI. CONCLUSION & FUTURE WORK

Another cross breed neuro hereditary approach has been utilized for the determination of information elements for the neural system. comes about demonstrated the execution of ANN can be enhanced by selecting great mix of information factors from the outcomes; GA-NN approach gives preferable normal expectation precision over the conventional ANN.

In this work, the first BP Neural System is anything but difficult to fall into neighborhood least. To conquer the weakness, the paper consolidated the hereditary calculation with slope plunge. The proposed calculation in this paper can completely take the favorable circumstances of two algorithm, successfully stay away from the neighborhood least and have the capacity to accomplish the coveted weights of the Back Propagation organize rapidly.

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