Hybrid Heuristic Optimization Model For Benchmark Dataset And Biomedical Signals

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Abstract-*This paper introduces hybridization of particle swarm optimization (PSO) which is denoted as PSO provides an efficient approach which is used to solve non linear datasets. The proposed algorithm employed in generalized regression neural network(GRNN) which is a variant of radial basic function artificial neural network (RBFANN) for finding precise value spread factor for accurate classification of non linear time series. Hybridizing of particle swarm optimization (PSO) in social learning helps collective efficiency, robustness and global effectiveness. The hybrid approached which then is resulted in the integrated framework for complete determination of spread factor with evaluation parameters. The algorithm is tested on two benchmark problems and compared the performance with arbitrary spread factor of GRNN. The results showed that the PSO based heuristic optimization algorithm outperform in terms of higher classification and prediction accuracies with short computation time.*

Keywords-Particle swarm optimization (PSO), generalized regression neural network (GRNN), benchmark, radial basic function artificial neural network (RBFANN).

I. INTRODUCTION

Classification and prediction has been the goal of many research activities in the last century is an important problem for human, arising due to the fear of unknown phenomena and calamities all around the infinitely large world with its many variables to show highly nonlinear and chaotic behavior. From the scrupulous review of the related research work, it is observed that no simple model is available for classification of chaotic time series. The work is focused on nonlinear time series classifications which have been successfully used in many applications in wide area of research. The aim of the work is to determine precise spread of the radial basic function artificial neural network (RBFANN). For this we have to know about neural network.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

In PSO, the particles are initially scattered at random positions in the search-space, moving in random directions with different velocities. The direction of a particle is then gradually changed depending on the best previous positions of itself and its best neighbor, searching in their vicinity and wishing that discovering even better positions. The inertia weight controls the amount of recurrence in the particle's velocity so that no two particles moving in the search space are at the same position at any instant. The particle previous own best position and the swarm's previous best position are the factors through which the particles communicate implicitly with one another. These particles are weighted by the stochastic variables and the user-defined behavioral parameters, both being initialized to proper values in the beginning. When the velocity is added to the particle position, the position of the particle changes in the search-space, regardless of any improvement to its fitness. Also enforcing search-space boundaries after a particle's position is update, it is also required to impose limitations on the distance update, it is also required to impose limitations on the distance the particle may move in only one step. This is done by limiting a particle's velocity to the full dynamic range of the search-space, so the particle may at most moves from 1 search-space boundary to the other in single step

III. WRITE DOWN YOUR STUDIES AND FINDINGS

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

A. Bits and Pieces together

"Pravin Kshirsagar" and "Sudhir Akojwar." "Prediction of Neurological Disorders using PSO with GRNN". Here the prediction of any neurological disorder calculating by using EEG signals are predict by using the PSO algoritm along with generalized regression neural network and the result occure by this process is very similar to output results.

"Pravin Kshirsagar" and "Sudhir Akojwar." "Novel Approach for Classification and Prediction of Non Linear Chaotic Databases". Here many unknown phenomena and calmitiees all around the world about non linear signals are not

classifiying in simple way so using some benchmark datasets like Mackey glass time series, box jenking glass furnace time series etc.

S. Jung1, B. W. Karney and M. F. Lambert," Benchmark Tests of Evolutionary Algorithms: Mathematic Evaluation and Application to Water Distribution Systems"

B. Use of Simulation software

For implementation of an algorithm the various chaotic datasets are stored in a .mat file and are arranged as training vector for input ,target vector for input training vector, the test vector for output and test target vector for output and all these vectors are loaded at the beginning of an execution of program .Work is implemented as.

1. Set the size of population denoted as N to be 30.
2. Set particles initial value randomly (spread value).
3. Calculate initial fitness value of each particle.
4. Create generalized regression neural artificial network with training input and expected output.
5. Simulate the network with test samples
6. Calculate deviation from expected output.
7. Calculate fitness value of each particle and store.
8. Sort total N particles in ascending order according to its fitness value. Top N/2 particles are called superior particles and remaining N/2 particles are called inferior particles
9. The fitness values of superior and inferior particles are real decimal four point floating number. The first two digits after decimal point are encoded into eight bit binary string, from which last four digits of superior particle is crossover into last four digits of inferior particle.
10. Next, Mutation is performed between resultant crossover fitness value of superior and inferior particle.
11. Step 8-10 is repeated upto the desired iteration to get best fitness value corresponding to best spread is saved.
12. PNN is trained with best spread; the input vector and its target vector and performance parameter are evaluated on training samples.
13. PNN is tested with the test samples and performance parameters are evaluated by comparing the actual values of tested PNN and the values of test target vector.

BENCHMARK DATASET

Mackey-Glass time series: The prediction of times series (TS) has played an important role in many science fields of practical application as engineering, biology, physics, meteorology, etc. In particular, and due to their dynamical properties, the analysis and prediction of chaotic time series have been of interest for the science community.

Box–Jenkins gas furnace time series (BJ)

The Box–Jenkins gas furnace data set was recorded from a combustion process of a methane–air mixture. There are 296 pairs data y(t), u(t), from t = 1 to t = 296. y(t) is the output CO2 concentration and u(t) is the input gas flowing rate. To test the performance of the improved model for high dimension system,
u(t−1), u(t−2),…, u(t−6), y(t−1), y(t−2), y(t−3), y(t−4)'are utilized to predict y(t).

IV.GET PEER REVIEWED

Here comes the most crucial step for your research publication. Ensure the drafted journal is critically reviewed by your peers or any subject matter experts. Always try to get maximum review comments even if you are well confident about your paper.

V. IMPROVEMENT AS PER REVIEWER COMMENTS

Analyze and understand all the provided review comments thoroughly. Now make the required amendments in your paper.

If you are not confident about any review comment, then don't forget to get clarity about that comment. And in some cases there could be chances where your paper receives number of critical remarks. In that cases don't get disheartened and try to improvise the maximum.

This completes the entire process required for widespread of research work on open front. Generally all International Journals are governed by an Intellectual body and they select the most suitable paper for publishing after a thorough analysis of submitted paper. Selected paper get published (online and printed) in their periodicals and get indexed by number of sources.

VI. CONCLUSION

Most often when a normal FFNN with Back propagation is trained for an input data, the optimal output cannot be expected due to initial weights, epochs or network architecture at the first execution. And thus any of the parameters except weights and biases need to be altered and again training is required and the same is repeated until expected outcome is not obtained. But PSO has tendency to at

least find a solution which may not be an optimum but the same can be given to the network for further training, where a normal FFNN fails to do so. Most often it is found that the PSO applied for weight and biases along with FFNN itself is sufficient to find a optimum or nearer optimum solution. For both prediction (Mackey Series ad Box Jenkins Gas Furnace Data) and classification problems, it is clear that the prediction and classification is more accurate when weights and biases are priory obtained by PSO with FFNN and then given to FFNN than what is achieved by random initialization of weights and biases with normal FFNN. Thus PSO is an optimization tool for Neural Networks.

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