

## **A Fuzzy Improved Neural based Soft Computing Approach for Pest Disease Prediction**

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### **Abstract**

The prediction systems are having their importance in the disease prediction. There are number statistical methods suggested by different researchers to perform the disease prediction. This prediction analysis also includes the classification stage to identify the disease criticality. The presented work is a study based work to perform the Pest Disease prediction in plants. It is actually an expert system area so that it requires some authentication data as well as the expert supervision to perform the disease prediction. In this paper, the earlier work done in the area of crop prediction is studied as well a new Fuzzy Improved Neural rule based approach is suggested to perform the Pest Disease prediction.

**Keywords-**Predictive Analysis, Statistical, Learning, Pest Disease

### **1. Introduction**

The prediction based system is mainly based to identify the future prospects based on current data as well as situations. It is one of the most intelligent terminologies associated with data mining. Prediction system actually comes under the expert system to perform the intelligent analysis. This prediction process becomes more challenging when the crop area is selected as the application area. In this area, the prediction of the plant or crop disease is performed based on the symptom analysis. This work requires more accurate outcome so that it requires the supervision of some expert [1].

The prediction system is having its greater importance in the Agriculture industry and the crop organization. There are number of Agriculture care Agriculture care organization and online Agriculture care systems that response to end user effectively by performing the intelligent analysis. There are number of applications that process on crop data and perform the pattern analysis. Based on this pattern analysis, the disease prediction will be performed[2, 3]

The effectiveness of the prediction system actually affects the reliability of a crop based expert system. Actually the dataset present in crop area includes the detailed and the comprehensive records of plant or crop data. The accuracy of the system also depends on the accuracy of the dataset. An intelligent system with more effective dataset is able to produce effective results for crop system[4, 5].

Some other issues associated with Agriculture care organization include the dataset size and the possibilities. When a robust system is defined there are number of relative symptoms, diseases and the diagnostics respective to the particular disease. This kind of analysis includes the association between input and output under different stages. At the initial stage, the raw data is filtered to identify the most relevant dataset from the large data space. The filtration over the dataset is performed horizontally and vertically under different relative constraints. To perform the disease prediction some clustering and classification algorithms are suggested by different authors. Some of these classification approaches are defined here under

#### A) Neural Network

Neural network come under the soft computing approach to perform the classification by defining the intermediate layers between the input and output layers. The neural system can have multiple layers and each layer is defined with specific set of neurons with weighted values. These layers are interconnected so that the output of one layer work as the input to the next layer. In each layer, the data values are represented in the form of neurons and weightage to these neurons are applied under the conditional analysis. These neurons are performed under a classification process so that effective decision can be drawn over the values so that intelligent results can be derived from the system. The layered structure of neural network is shown in figure 1.

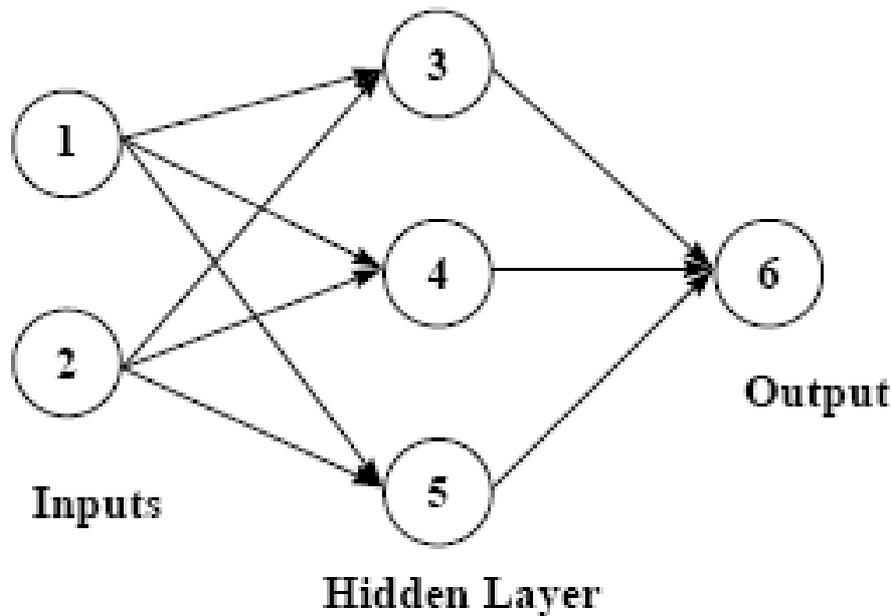


Figure 1 : Neural Network System

As shown in this figure, the complete system is defined with three layers called input layer, output layer and the hidden layer. During the learning phase, the weights on this layer are adjusted so that effective results will be drawn from the system.

In this paper, a study of the existing prediction and classification approaches is defined along with a Fuzzy Improved Neural based model representation. In this section, a study to the prediction system is defined along with relative prediction based approach. In section II, the work done by earlier author in this area is discussed. In section III, a Fuzzy Improved Neural based model is represented to perform the prediction for the autistic plant or crops. In section IV, the conclusion relative to the predictive analysis is defined.

## **II LITERATURE SURVEY**

Lot of work is already done in the area of autistic plant or crop prediction under different approaches. Some of the work done by earlier researchers is defined in this section. In year 2001, Aditya Sunder has defined a study on different classification approach for the disease prediction. Author defined the comparative analysis on most effective classification approaches called association based weighted classifier and the Naïve Bayes classifier. Author presented the work on heart disease prediction under different analytical vectors. The parameters considered in this work include the symptom parameters. Author performed the performance analysis along with disease prediction so that effective approach can be identified[1]. In year 2011, Chen has defined a predictive analysis approach to predict the Agriculture status of the plant or crop. Author presented the analysis under the professional concern so that the important features from the dataset can be explored. In this paper, author defined a layered approach for disease prediction. In this approach, the preprocessing is defined to perform the dataset filtration.

The another work in same direction to predict the Pest Disease is performed by Chen. The author defined a system that can help crop professionals to identify the Pest Disease status in a plant or crop. The author defined the each processing stage broadly. The author performed the work in three layers. In first layer, the important features are selected for the plant or crop. Once the features taken, the author performed the neural network based classification approach to classify the Pest Disease. At the final stage, the author defined an analytical analysis to identify the chances of Pest Disease as well its criticality respective to a particular plant or crop[2]. The another work related to the decision support system for Pest Disease prediction is performed by Mrs. G. Subalalakshmi to predict the Pest Disease. Based on the comparative analysis on obtained dataset, the related conclusions are drawn[3].

The another work performed by E. Barathi to predict the skin. The author has defined a survey based work to obtain the information about the different approaches to perform the prediction and also elaborate the work on skin classification and the prediction. The author has defined different classification approach to perform the prediction and the classification of the s. The author also suggested the related diagnose to the system[4]. Another survey based work is performed by Milan Kumari to different classification approaches in Cardiovascular s prediction.. The author has

defined the study on different classifiers such as Neural network, Support vector machine and the regression analysis. The comparative analysis is here provided to perform the performance analysis on these all approaches[5].

Another work is performed by jyoti soni in the same direction to predict the Pest Disease. The presented research paper has performed the knowledge discovery under different mining techniques related to the crop area. The author has performed the Pest Disease predication and the analysis under these all approaches and conclude the relative decision based on the prediction[6][8].

A work related to the crop predication was presented by Dheeraj Dixit. In this presented approach, the discussion is been performed on different symptoms and the disorder analysis on the crop database for the prediction. A hybrid model is defined that includes the association rule mining and the relative analysis to perform the prediction[7]. The probabilistic analysis on the Pest Disease prediction was defined by Dr, D Raghu. In this work, a decision support system is been presented for the Pest Disease prediction and the probalistic analysis is been performed by the author. The author has performed the Pest Disease prediction analysis under the defined approaches[9].

Shantakumar B. Patil defined a research work with intelligent and effective Pest Disease prediction system using neural based approachThe author has defined a multi layer perceptron based training algorithm to perform the analysis. The results obtained from the system shows the effective prediction of the Pest Disease [10].

The another work based on association mining is been proposed by Jabbar to discover the Pest Disease on an authenticated dataset. The obtained results from the system shows the reliability of the work[11]

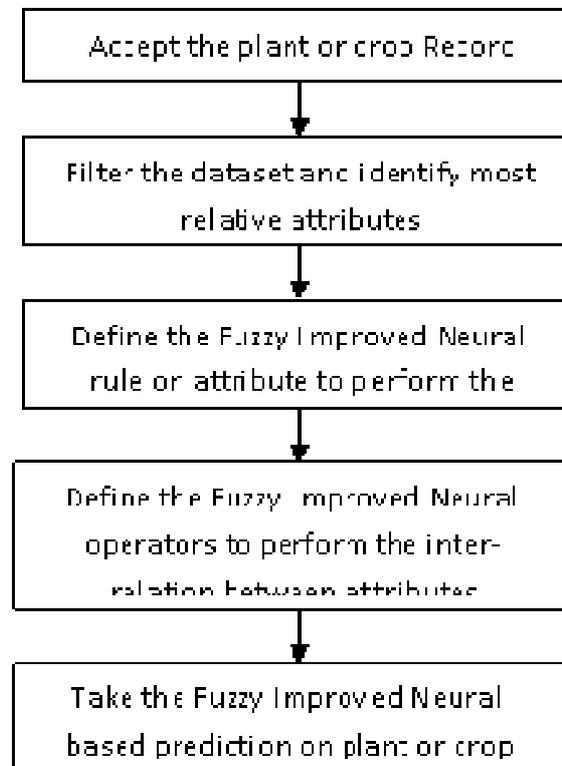
### **III Fuzzy Improved Neural based Analytical Model**

In this section, a Fuzzy Improved Neural based predictive model is suggested to perform the Pest Disease prediction in plants. This crop analysis is an application of expert system under the reliability analysis so that the Fuzzy Improved Neural based expert system was designed and relative predictive analysis was performed. This analysis includes the supervision of the area experts so that more accurate decision will be derived. In this work, a Fuzzy Improved Neural model is suggested to identify the chances of the decision under the probabilistic analysis so that the predictive results will be obtained from the system. This kind of system is effective on any authenticated dataset with small variations. The analysis is performed on the data set attributes that are considered either by taking the expert concern or obtain from the secondary source. So that the analytical results driven from the system will be more accurate. The work is also robust in terms of dataset size. As the decision is statistical so that in can performed on single record as well as on whole dataset. The effectiveness of the system depends on the Fuzzy Improved Neural rules defined for the system. More accurate the rules, more effective the system will be.

Fuzzy Improved Neural logic is an intelligent analytical approach that will perform the decision making on the plant or crop symptoms and generate a rule based framework so that effective estimation of the plant or crop will be performed. The

rules are defined for individual attribute as well as the integration of two or more attributes. Based on this inter-related analysis, the intelligent rule based decision can be drawn. These rules are defined under the Fuzzy Improved Neural restrictions. These restriction are defined in terms of Fuzzy Improved Neural operators.

This is the general Fuzzy Improved Neural model that can be implemented for any disease prediction by setting up the relative attribute as well as conditional constraints. This model is divided in three main stages. In first stage, the filtration of the dataset is performed. The filtration is defined at two level called horizontal and vertical filtration. The horizontal filtration perform the dataset partitioning to reduce the dataset size. The vertical filtration is used to reduce the number of attributes in the search. The reduction in attribute set will also reduce the Fuzzy Improved Neural rules and operators so that overall efficiency of the system.



**Figure 2 : Proposed Model**

Once the filtration stage is over, the next work is the implementation of Fuzzy Improved Neural rule over the dataset. These rules will be applied on individual attributes so the indivial attribute based classification can be performed. Once the individual attributes are filtered, in next stage, the integration of two or more attributes is done. Here the rules on combined attributes are performed. In the final stage, the Fuzzy Improved Neural operators are implemented on combined dataset to obtain the final decision.

**A) Fuzzy Improved Neural Logic**

The Fuzzy Improved Neural logic is suggested in this work to perform the prediction of the disease over the dataset. This prediction is defined based on two main attribute set called Feature analysis and Disease Analysis (F, D). The feature analysis set is defined as the symptom dataset based on which the disease can be predicted. Such as the symptom attribute. Once the feature of the plant or crops is obtained, the next work is to test on different rules. These rule vectors are defined by D vector.

To obtain more accurate results, integrated attribute analysis is performed. This analysis is defined with the association of two or more attributes. These attribute set is then considered as the single attribute and the condition over the attribute is applied for the analysis. The Fuzzy Improved Neural operators are used to combine the results of the attributes to collect the final decision.

**IV. CONCLUSION**

The present work is the analysis on the plant or crop symptom information based a prelevel decision is taken about to identify the chances of a Pest Disease. The work is under the intelligent system that can be adapted by a doctor. In this work we have taken a parameter based fuzzification that will perform the analysis based on some parameters.

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