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Expert System For Yield Prediction

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Abstract:

The ability of expert system technology to be used for the approximation and prediction of crop yields at rural district and federal state scales in different climate zones based on reported daily weather data. This research is to develop a farmer prediction system to identify crop suitable for particular soil. Neural Network should be trained to perform correct prediction for farmers. Previous research has established that large-scale climatological phenomena influence local weather conditions in various parts of the world. These weather conditions have a direct effect on crop yield. Consequently, much research has been done exploring the connections between large-scale climatological phenomena and crop yield. Artificial neural networks have been demonstrated to be powerful tools for modeling and prediction, to increase their effectiveness. In this research work Crop prediction methodology is used to predict the suitable crop by sensing various parameter of soil and also parameter related to atmosphere. Parameters like type of soil, PH, nitrogen, phosphate, potassium, organic carbon, calcium, magnesium, Sulphur, manganese, copper, iron, depth, temperature, rainfall, humidity. For this purpose, we are going to proposed this system based on back propagation feed forward neural networks was best suited for effective crop prediction.

Keywords: Back Propagation, Crop prediction, Learning algorithm, Neural Network

I. INTRODUCTION

Achieving maximum crop yield at minimum cost is one of the goals of agricultural production. Early detection and management of problems associated with crop yield indicators can help increase yield and subsequent profit. By influencing regional weather patterns, large-scale meteorological phenomena can have a significant impact on agricultural production. Large-scale weather patterns such as the El Niño Southern Oscillation (ENSO) and the Pacific-North American pattern have been linked by research to local weather patterns in various locations around the world. In turn, specific climatic conditions such as fluctuations in precipitation have been shown to have strong influences on crop failures, demonstrating that weather patterns may be valuable for modeling and predicting crop yield. Such predictions could be used by crop managers to minimize losses when unfavorable conditions may occur. Additionally, these predictions could be used to maximize crop prediction when potential exists for favorable growing conditions.

Prediction of crop yield mainly strategic plants such as wheat, corn, rice has always been an interesting research area to agriculture meteorologists, as it is important in national and international economic programming. Dry farming crop production, apart from relationship to the genetic of cultivator, adaptive terms, effect of pests and pathology and weeds, the management and control quality during the growing season and etc. is severely depend to climatic events. Therefore, it is not beyond the possibility to acquire relations or systems which can predict the more accuracy using meteorological data. Nowadays, there are a lot of yield prediction models, that more of them have been generally classified in two group: a) Statistical Models, b) Crop Simulation Models (e.g. CERES). Recently, application of Expert system has shown more efficiency in dissolving the problem. Application of them can make models easier and more accuracy from complex natural systems with many inputs. In this research it has been tried to develop a wheat yield prediction model using ANNs.

II. MATERIALS AND METHODOLOGY

In this research work we shall examine one of the most common neural network architectures, the feed forward neural network with back propagation algorithm . This neural network architecture is very popular, because it can be applied to many different tasks.

The first term, “feed forward” neural network with backpropagation algorithm describes how this neural network processes and recalls patterns. The ANN is train with following training parameters Artificial Neural Network (ANN) has been train to perform complex function. In mathematical terms we may describe a neuron K by writing the following pair of equitation.

$$Uk = \sum_{j=1}^{m} Wkj\ Xj$$

$$Yk = \Psi\ (\ Uk + Bk)$$

Backpropagation algorithm is implemented with following values of training parameters:
df = Frequency of progress displays (in epochs) = 100,
me = Maximum number of epochs to train = 2000,
Mse = Mean squared error goal = 0.001
lr = Learning rate = 0.00001
Two non-linear activation functions namely, Tan-Sigmoid, Purelin are chosen to train neural network.

In soil there are many types of nutrients are nitrogen(N), phosphorus(P), potassium(K), Zinc (Zn), Boron(B), Iron(Fe), Copper(Cu), Manganese(Mn), Molybdenum(Mo),Calcium,

Phosphorous, Sulphur. In this project we first sense these nutrients in the soil and according to that we will provide the required amount of these nutrients to that particular crop. All these nutrients are used for the prediction of crop. The different applications are it is used for research work for easily predict the suitable crop. It is also used for analyzing crop productivity for different soil. This system is mobile and can carry in rural areas also where progress is yet to develop.

QUANTITY OF NUTRIENT FOR PLANT

TABLE I

Crop	**PH**	**N**	**P**	**K**	**Organic Carbon**	**Zn**	**B**	**Mo**	**Depth**	**Temp.**	**Rainfall**
Chilly	7.5-8.0	60	20	20	0.41-0.60	4 to 8	2.4	1	20-25cm	25-30	450-700mm
Sunflower	6.5-8.5	35	25	25	0.41-0.60	4 to 8	2.4	1	15-20cm	25-33	700-1000mm
Bajara	7.0-8.5	25	15	5	0.41-0.60	4 to 8	2.4	1	15cm	28-32	400-750mm
Corn	7.5-8.5	50	25	12	0.41-0.60	4 to 8	2.4	1	5cm	13-30	500-600mm
Groundnut	6.0-7.5	10	30	12	0.41-0.60	4 to 8	2.4	1	20cm	24-27	500-1250mm

III. CONCLUSION

The goal of yield prediction is the models were developed and tested for at the province regional and local spatial levels. This research also verified the utility of ANN using backpropagation algorithm application and data transfer technique as tools for crop yield prediction with high accuracies. Prediction is making claims about something that will happens, often based on

information from past and from current state. By influencing regional weather patterns large scale meteorological phenomena can have a significant impact on agriculture production.

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