MES COLLEGE OF ENGINEERING, KUTTIPPURAM
DEPARTMENT OF COMPUTER APPLICATIONS
20MCA245 – MINI PROJECT

PRO FORMA FOR THE APPROVAL OF THE THIRD SEMESTER MINI PROJECT

(Note: All entries of the pro forma for approval should be filled up with appropriate and complete information. Incomplete Pro forma of approval in any respect will be rejected.)

Mini Project Proposal No : _____ *(Filled by the Department)*	Academic Year : _____ Year of Admission : _____

1. Title of the Project : Crop Yield Prediction Using Reinforcement Learning Model
2. Name of the Guide : Ms. Priya JD
3. Number of the Student: 1
4. Student Details (in BLOCK LETTERS)

	Name	Roll Number	Signature
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Date: 02/12/2021

Approval Status : Approved / Not Approved

Signature of Committee Members

Comments of The Mini Project Guide Dated Signature

Initial Submission :

First Review :

Second Review :

Comments of The Project Coordinator Dated Signature

Initial Submission:

First Review

Second Review

Final Comments :

Dated Signature of HOD

CROP YIELD PREDICTION USING REINFORCEMENT LEARNING MODEL

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ABSTRACT:

Predicting crop yield based on the environmental, soil, water and crop parameters has been a potential research topic. Deep-learning-based models are broadly used to extract significant crop features of prediction. Though these methods could resolve the yield prediction problem there exist the following inadequacies: Unable to create a direct non-linear or linear mapping between the raw data and crop yield values and the performance of those models highly relies on the quality of the extracted features. Deep reinforcement learning provides direction and motivation for the aforementioned shortcomings. Combining the intelligence of reinforcement learning and deep learning, deep reinforcement learning builds a complete crop yield prediction framework that can map the raw data to the crop prediction values. The proposed work constructs a Deep Recurrent Q-Network model which is a Recurrent Neural Network deep learning algorithm over the Q-Learning reinforcement learning algorithm to forecast the crop yield. The sequentially stacked layers of Recurrent Neural network is fed by the data parameters. The Q- learning network constructs a crop yield prediction environment based on the input parameters. A linear layer maps the Recurrent Neural Network output values to the Q-values. The reinforcement learning agent incorporates a combination of parametric features with the threshold that assist in predicting crop yield. Finally, the agent receives an aggregate score for the actions performed by minimizing the error and maximizing the forecast accuracy. The proposed model efficiently predicts the crop yield outperforming existing models by preserving the original data distribution with an accuracy of 93.7%.

Introduction:

Agriculture is the one amongst the substantial area of interest to society since a large portion of food is produced by them. Currently, many countries still experience hunger because of the shortfall or absence of food with a growing population. Expanding food production is a compelling process to annihilate famine. Developing food security and declining hunger by 2030 are beneficial critical objectives for the United Nations. Hence crop protection; land assessment and crop yield prediction are of more considerable significance to global food production.

To get most crop yield at minimum value is one of the primary goals in agriculture. Detecting and dealing with troubles related with crop yield indicators in early stages of the rural field can give benefits in expanded yield and elevated earnings too. By reading weather styles of a specific location, massive-scale meteorological phenomena will have a completely green impact on agricultural production. The crop yield

predictions can be utilized by farmers to reduce losses when negative conditions may occur. Also, predictions may be used to maximize crop prediction while there is favorable situation for farming. Crop yield mainly depends upon climatic conditions, soil quality, landscapes, pest infestations, water quality and availability and planning of harvest activity.

Objectives:

Agriculture is the backbone of every economy. In a country like India, which has ever increasing demand of food due to rising population, advances in agriculture sector are required to meet the needs. From ancient period, agriculture is considered as the main and the foremost culture practiced in India. Ancient people cultivate the crops in their own land and so they have been accommodated to their needs. Therefore, the natural crops are cultivated and have been used by many creatures such as human beings, animals and birds. The greenish goods produced in the land which has been taken by the creature leads to a healthy and wealthy life. Since the invention of new innovative technologies and techniques the agriculture field is slowly degrading. Due to these, abundant invention people are been concentrated on cultivating artificial products that is hybrid products where there leads to an unhealthy life. Nowadays, modern people don't have awareness about the cultivation of the crops in a right time and at a right place. Because of these cultivating techniques the seasonal climatic conditions are also being changed against the fundamental assets like soil, water and air which lead to insecurity of food. By analyzing all these issues and problems like weather, temperature and several factors, there is no proper solution and technologies to overcome the situation faced by us. In India, there are several ways to increase the economical growth in the field of agriculture. There are multiple ways to increase and improve the crop yield and the quality of the crops. Data mining also useful for predicting the crop yield production. Generally, data mining is the process of analyzing data from different perspectives and summarizing it into useful information.

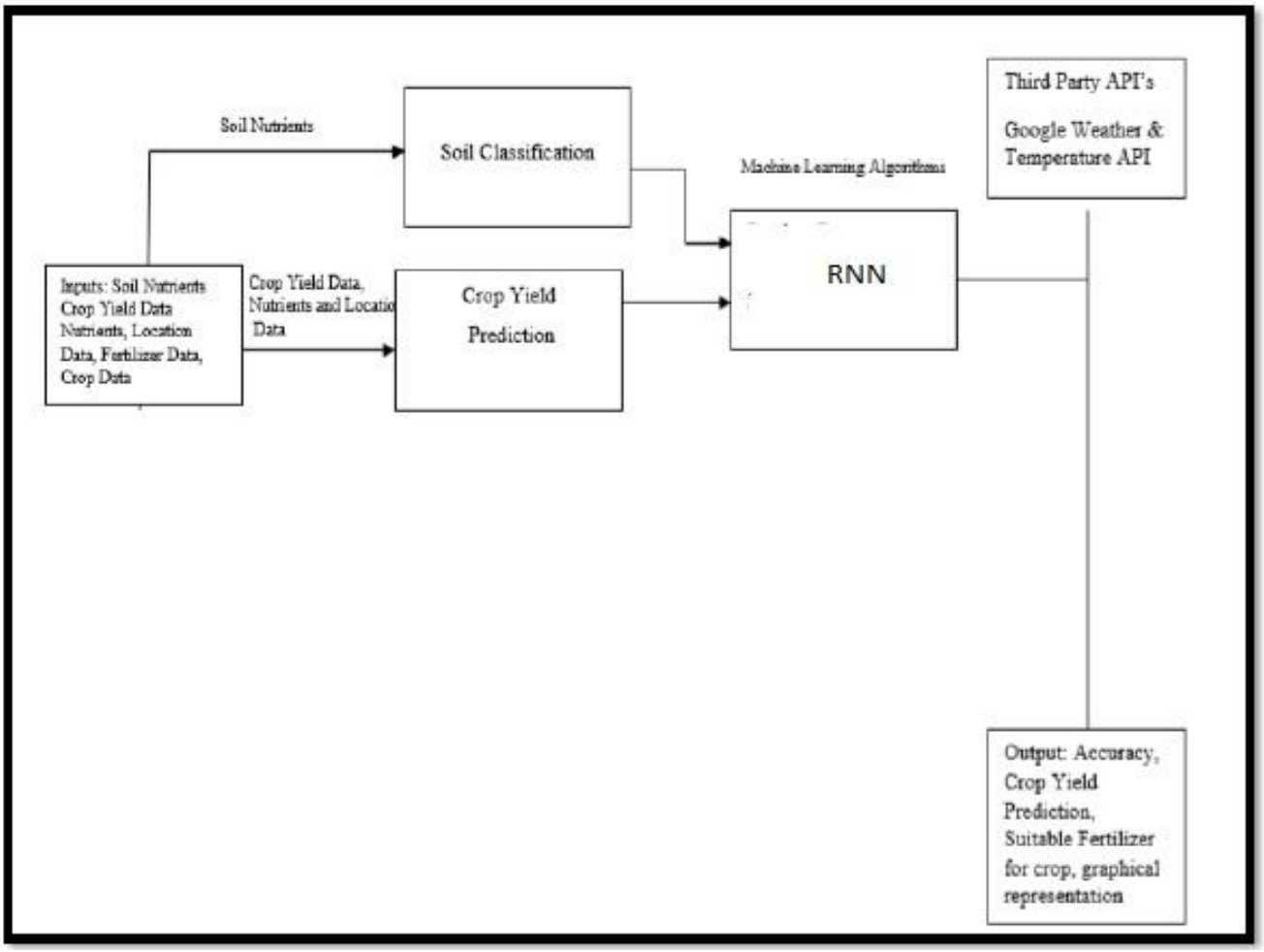
Problem Definition:

Manual agricultural systems are terribly advanced and agitated to use as a result of it deals with an enormous dataset and large quantity of knowledge process. several techniques and approaches are made to predict the crop and crop yield. The neural network is employed to predict such styles of advanced system with large quantity of dataset in it. During this survey paper a review on the utilization of the substitute neural network (Reinforcement Learning) for the prediction of the crop yield is projected. This contains some basic information of RNN. The utilization of parameters like pH scale, Nitrogen, carbon, Rainfall, Temperature, soil, phosphate is employed. Artificial Neural Network is employed for prediction of the crop yield. This paper shows the necessity of this kind of the system techniques like RNN.

Basic functionalities:

The system uses Reinforcement based RNN algorithm for its prediction. Recurrent Neural Networks or RNN as they are called in short, are a very important variant of neural networks heavily used in Natural Language Processing. In a general neural network, an input is processed through a number of layers and an output is produced with an assumption that two successive inputs are independent of each other. This assumption is however not true in a number of real life scenarios. For instance, if one wants to predict the price of a stock at a given time or wants to predict the next word in a sequence it is imperative that dependence on previous observations is considered. Recurrent neural networks, of which LSTMs ("long short-term memory" units) are the most powerful and well known subset, are a type of artificial neural network designed to recognize patterns in sequences of data, such as numerical times series data emanating from sensors, stock markets and government agencies (but also including text, genomes, handwriting and the spoken word). What differentiates RNNs and LSTMs from other neural networks is that they take time and sequence into account, they have a temporal dimension.

Basic Architecture:



Tools / Platform, Hardware and Software Requirements:

- **Software requirement:**
  - ✓ Technology used : Python
  - ✓ IDE : Anaconda
  - ✓ Framework : Django
  - ✓ Database : MySQL
  - ✓ Dataset : Indian crop yield dataset from kaggle website
  - ✓ Algorithm : RNN
  - ✓ IDE : Visual Studio Code
  - ✓ OS : Windows/Linux

- **Hardware requirement:**
  - ✓ Processor : i3 or above
  - ✓ CPU : 1.70 GB
  - ✓ Ram : 4.00GB
  - ✓ Hard Disk : 500 GB