

MACHINE LEARNING IN CROP YIELD PREDICTION BASED ON RNN ALGORITHM

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ABSTRACT-With global warming and increasing of extreme climate events, climate change may impose positive or negative effects on crop growth and yield. The traditional crop productivity simulations based on crop models are normally site-specific. The simulation accuracy can be improved by using the detailed field management information, such as temperature, climate, soil, location and water PH value. Crop yield estimation is of great importance to food security. Normalized Difference Vegetation Index (NDVI), as an effective crop monitoring tool, is extensively used in crop yield estimation. However, there are few studies focusing on the aspect of mixed crops grown together. The most fit regression models with extracted NDVI in the corresponding crop planting areas are determined. They work reasonably well in small regions, especially in the areas where crop types are unknown exactly. Further improvements to the regression models are possible by incorporating other physical factors such as soil types and geographical information.

1. INTRODUCTION

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 analysing 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 analysing data from different perspectives and summarizing it into useful information.

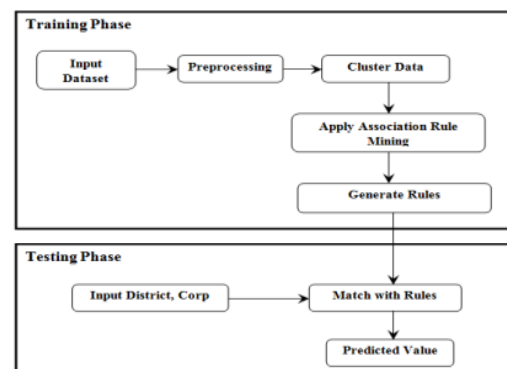


FIGURE-SYSTEM ARCHITECTURE

2. ALGORITHM

RNN ALGORITHM

Recurrent Neural Networks (RNN)

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,

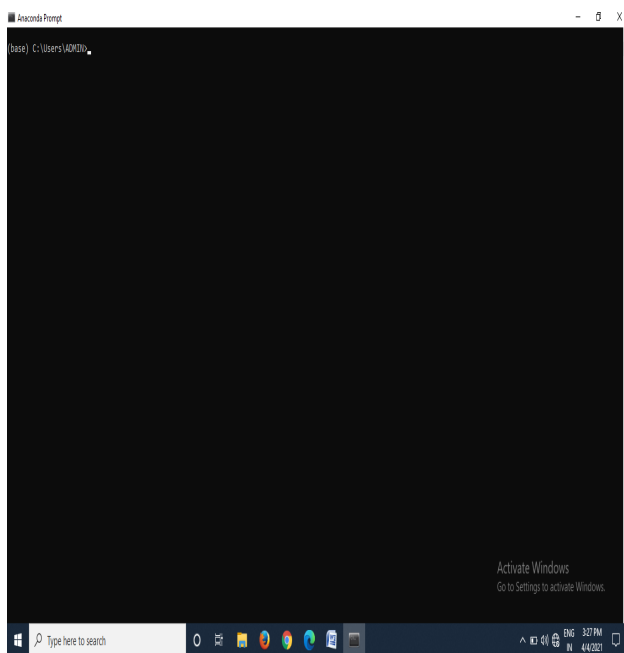
with an assumption that two successive inputs are independent of each other.

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.

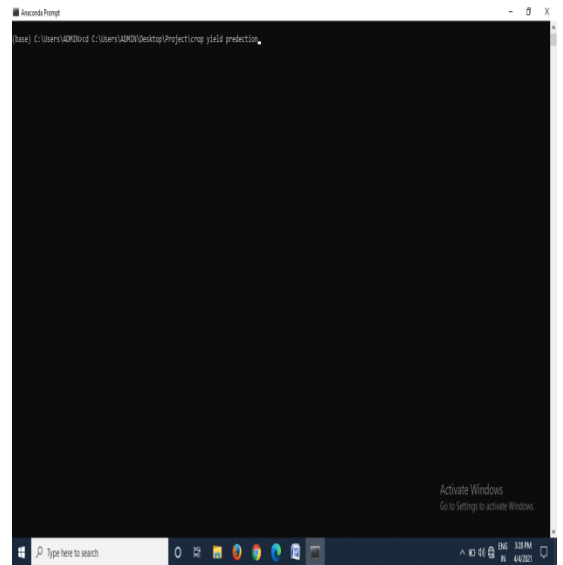
Recurrent neural networks, of which LSTMs (“long short-term memory” units) are the most powerful and well known subset, are a type of artificial neural network designed to recognize patterns in sequences of data, such as numerical times series data emanating from sensors, stock markets and government 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.

3. RESULT

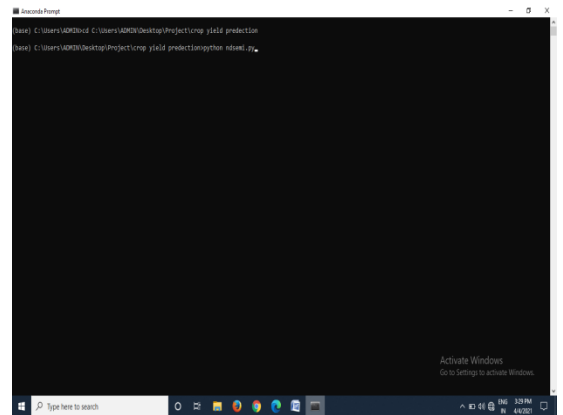
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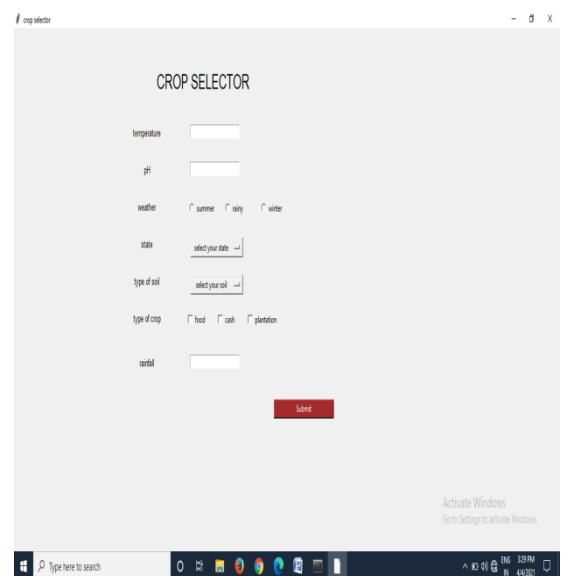
b) COMMAND



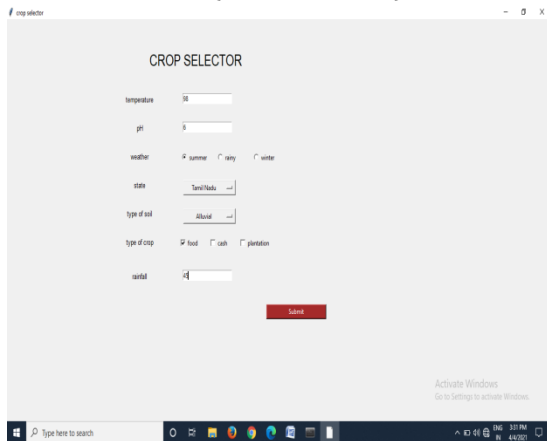
c) CROP YIELD COMMAND



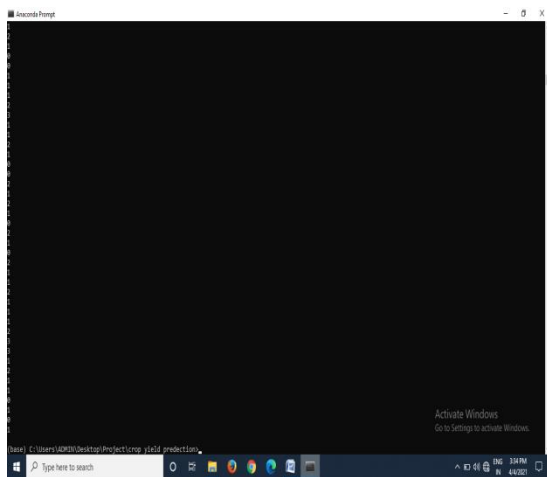
d) CROP SELECTOR



d) CROP SELECTOR (WITH VALUES)



e) CROP PREDICTION VALUE COMMAND



f) CROP PREDICTION VALE COMMAND



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