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AGRICULTURE WITH MACHINE LEARNING

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Abstract - Agriculture is a traditional profession in India since many centuries. India is an agriculture based economy more than 70% of Indian population is dependent on agriculture for their employment. There is a direct and positive relationship with agriculture sector growth and Indian economy growth. Due to some reason many time contribution of agriculture sector is decreased in Indian GDP. In the field of agriculture there is a need to use Information Technology so that farmers or peoples associated with agriculture sectors can boost their income. Machine learning a sub field of Artificial Intelligence is an one of the approach in which computer system learn and behave like normal human being and develop learning over time in autonomous manner by entering data and information in the form of results as well as interaction with real world. There is a scope of research in agriculture field with help of machine learning. In this article model of machine learning, integration and applications of machine learning technology in the field of agriculture is describe.

Keywords: ML, KNN, ANN, CSM, CHATBOTS,ALEXA

I INTRODUCTION

Machine Learning is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect. [1] other definition of machine learning is describe like Machine learning research is part of research on artificial intelligence, seeking to provide knowledge to computers through data, observations and interacting with the world. That acquired knowledge allows computers to correctly generalize to new settings. [3] In nutshell machine learning is the technology that learn and take decision from data without any human involvement.

India is a second largest country in terms of population after china. Larger portion of Indian population are earning their livelihoods directly or indirectly from agriculture sector. Farmers do lots of hard work to improve their standard of living by earning good income from farming profession but yet they wait to achieve their dreams. There is a need to use technology in the aquiculture segment. Technology will solve many problems of farmers at much extent also it will help the government to achieve some magical growth in economy at national level. Machine learning a sub discipline of Artificial Intelligence is one of the smart technologies to conversion of some manual farming works into automatic ways. By applying different methodology of Machine learning processes it will help to reduce time, money and efforts of farmers with increasing standard of living as well as social status of all stakeholders involving with of agriculture profession.

II CHALLENGES IN TRADITIONAL FARMING

This section describes the general challenges and problems that exist in the agricultural domain which can work as a barrier in development area of agriculture field.

(A) In farming climatic factors such as rainfall, temperature and humidity play an important role in the agriculture lifecycle. Increasing deforestation and pollution result in climatic changes, so it's difficult for farmers to take decisions to prepare the soil, sow seeds, and harvest.[4]

(B) Every crop requires specific nutrition in the soil. There are 3 main nutrients nitrogen (N), phosphorous (P) and potassium (K) required in soil. The deficiency of nutrients can lead to poor quality of crops.[4]

(C) Many state of the country yet not received proper electricity, water for irrigation and other basic infrastructure which is really basic needs for development of agriculture sector.

III MACHINE LEARNING MODEL

Machine learning technology is work with programmable code and available training dataset of particular domain. Figure 1 explain the model of Machine learning.

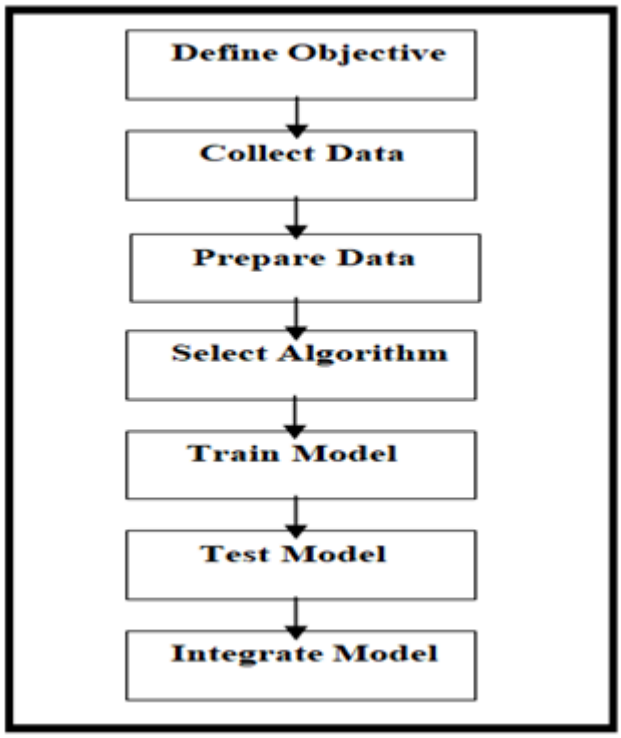

Figure 1 Model of Machine Learning

As shown in figure 1 Machine learning process starts with predefine objective. Objective must be clear, precise and realistic so that it can be achievable. Once the objective is defined the data for that particular domain or problem is need to collect. Data collected for same purpose may be unfiltered and not normalized so next step requires analysis of available large data. Keep only those data which are really important and related to already defined objective.

For effective implementation of any model it's require to define proper process. So algorithm is required to design in such a way that with proper programming language it can be implemented.

Objective of algorithm designed work is to prepare a model for training purpose, so at this step our train model is ready. We require testing our train model again available trained dataset. At the final step all different modules are integrated and tested.

IV MACHINE LEARNING APPLICATIONS IN AGRICULTURE

The various applications of machine learning techniques in agriculture have been listed in this section. These techniques will enhance the productivity of fields along with a reduction in the input efforts of the farmers.

(A) Crop Selection and Crop Yield Prediction To maximize the crop yield, selection of the appropriate crop that will be sown plays a vital role. It depends on various factors like the type of soil and its composition, climate, geography of the region, crop yield, market prices etc. Machine learning provides many effective algorithms which can identify the input and output relationship in crop selection and yield prediction. Techniques like Artificial neural networks, K-nearest neighbors(KNN) and Decision Trees have carved a niche for themselves in the context of crop selection which is based on various factors. Crop selection based on the effect of natural calamities like famines has been done by Wash based on machine learning. The use of artificial neural networks(ANN) to choose the crops based on soil and climate has been shown by researchers. A plant nutrient management system has been proposed based on machine learning methods to meet the needs of soil and maintain its fertility levels and hence improve the crop yield. A crop selection method called CSM has been proposed which helps in crop selection based on its yield prediction and other factors [4].

(B) Water management in agriculture impacts hydrological, climatological, and agronomical balance. So far, the most developed ML-based applications are connected with estimation of daily, weekly, or monthly evapotranspiration allowing for a more effective use of irrigation systems and prediction of daily dew point temperature, which helps identify expected weather phenomena and estimate evapotranspiration and evaporation. [5]

(C) Farmer's little helper is an application that can be called a bonus: imagine a farmer sitting late at night and trying to figure out the next steps in management of his crops. Whether he could sell more now to a local producer or head to a regional fair? He needs someone to talk through the various options to take a final decision. To help him, companies are now working on development specialized chatbots that would be able to converse with farmers and provide them with valuable facts and analytics. Farmers' chatbots are expected to be even smarter than consumer-oriented Alexa and similar helpers, since they would be able not only to give figures, but analyze them and consult farmers on tough matters. [5]

V CONCLUSION

Agriculture is a field that has been needed to overall implementation of Information technology and its development. Indian farmers requirement to be up to the mark with the international techniques. Machine learning is a recent concept that can be easily implemented. There are different algorithms which can helpful to improve techno farming facilities. This article describes machine learning model and scope of machine learning for various applications of agriculture field.

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