International Journal of Pharmacy and Biological Sciences
ISSN: 2321-3272 (Print), ISSN: 2230-7605 (Online)
IJPBS | Volume 9 | Special Issue 2| 57-59
Proceedings of National Seminar on "Health, Hygiene, and Sanitation"
Held at Little Flower Degree College, Uppal, Hyderabad, India, 26th and 27th April 2019
| Research Article | Biological Sciences |Open Access |MCI Approved|
|UGC Approved Journal|

Digitalization of Agriculture using Machine Learning Techniques

Raman R.K.[1] and Sandhya Arya[2]
[1]Faculty, Dept. Of Computer Science,[2]Faculty, Dept. Of Commerce
[1, 2]Little Flower Degree College, Uppal

Received: 15 Apr 2019 / Accepted: 20 Apr 2019 / Published online: 01 May 2019
Corresponding Author Email: amir.mulla@fergusson.edu

Abstract
India is a hugely populated agricultural nation and the global population is also expected to reach more than nine billion by 2050(Anon, 2019). The above stats indicate that the agriculture production has to increase more. Mostly the forecast is done manually which might not be accurate; in order to forecast the crop production accurately the technology can play a huge role in making the farming activity more efficient. This paper mainly focuses to reassess the possibilities to improve the crop production mainly in urban areas using the vertical farming approach. Since the plants are grown in an artificial environment, the adequate care has to be taken by using the Machine Learning (ML) and Internet of Things (IoT). Using ML and IOT, there is huge analysis can be done on yield prediction, weed detection, water management etc.
Keywords:

Keywords
Agriculture, Vertical Farming, Machine Learning, IoT, Technology.

*****

INTRODUCTION
As we know India is more importantly known for its agriculture and it acts as a backbone for all the businesses in India. Agriculture in our country is affected by various factors such as climate, topography, historical, geographical, biological, and political and socio-economic factors. The yield in agriculture is required to a greater extent as the population grows to a greater extent and it is expected to reach more than nine billion by 2050. So, in order to solve this issue, the government has to take necessary steps to enhance smart farming or precision farming. This will enable farmers to minimise the loses and produce more yield of crops. The technology needs to be used more widely in development of agriculture as they can gather the information from various sources such as satellite imaging, remote sensors etc. Using this information, we can analyse and extract the patterns which are useful in the crop production with various climatic conditions.

MACHINE LEARNING – AN AERIAL VIEW
Normally machines will perform some task which is assigned by the user and will not do more than that. But Machine Learning (ML) is a part of Artificial Intelligence (AI). The mechanism to make the computer to learn by itself by constructing some algorithms is said to be Machine Learning. Here the machines can learn based on the inputs provided and have the ability to predict the values which we may overcome in mere future. We may just think for a moment that statistics will also predict the data, but these will rely on the user's data. Whereas these machine learning techniques will not rely on the user defined parameters and they improvise on existing

data provided. The machine learning can be classified into three major categories:

a) Supervised Learning:

A mechanism to train the model based on the providing both inputs and outputs. So, in a nutshell, if we provide the output variables then the learning becomes supervised. Algorithms like Regression, Decision Trees, K-Means Clustering etc.

b) Unsupervised Learning:

A mechanism to train the model based on the providing only inputs without providing outputs then the learning becomes unsupervised.

c) Reinforcement Learning:

A mechanism to train the model by providing feedback to the algorithm. So based on the feedback the algorithm modifies accordingly.

IMPACT OF ML IN AGRICULTURE

The field of Agriculture is looking forward for adapting Artificial Intelligence (AI) and Machine Learning (ML). The models required in order to mimic the human thoughts which can be implemented using Cognitive Computing. The method of cognitive computing provides a huge step in development of agriculture by understanding, learning and adapting to different scenarios. There are many challenges that are faced throughout the period of agriculture (i.e.) the crops are not supervised properly. In order to supervise them, the classification analysis helps in finding the right area for the right crop to be sowed. The cognitive computing can benefit the agriculture in following ways:

- Implementing Proximity sensors very close to the soil and remote sensors which normally be airborne or satellite.
- Images of the field are captured through drone.
- Disease detection by classifying the images into diseased part and the other. The diseased part is sent to the labs for further tests.
- Health monitoring of plants by using 3D laser technology.
- Automation in Irrigation helps farmers to manage most of their problems related to water management.

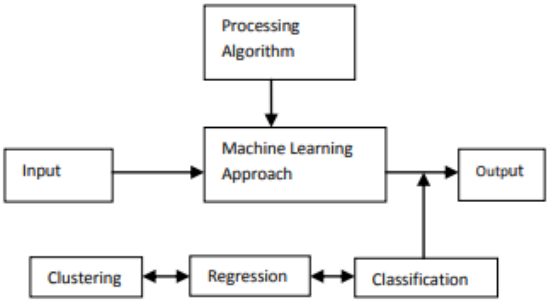

Fig 1: Machine Learning Process (Mokaya, V. (2019))

DEVELOPMENT OF DIGITAL FARMING MOVEMENT

Crop Selection & yield

The selection of crop plays a vital role in maximizing the yield of the crop. It usually depends on various factors like the soil type, climate etc. Using ML, many algorithms such as provides many effective algorithms artificial neural networks, K-nearest neighbours and Decision Trees which help the user in selecting the crop very accurately.

Smart Irrigation

India consumes huge water for the farming activities by which the ground water is moving towards scarcity. In order to solve this issue, the sensor-based technology must be used in order to implement smart farming.

Crop Disease Prediction

There are several factors which can lead to poor health and diseases in crops. Disease detection using images of crop leaves has been implemented using pattern recognition.

Random Forest Classifier

The Random Forest Classifier is one of the most famous and powerful classification algorithms, which is mainly used to accurately predict the rainfall, production using the datasets.

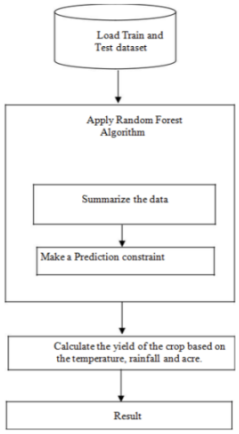

Fig2: Model of Random Forest Classifier (ijesrt.com, 2019)

Precision and Vertical Farming

The agriculture can use some of the cognitive techniques which help in determining the best crop that can be planted according to the climatic conditions. As the Machine Learning approach, which is a subset of AI, is growing at a fast pace which will also help the farming industry using some technologies such as Drones, Chatbots, Automated irrigation systems etc. The vertical farming is another area where the farmers can get more beneficial in terms of farming in a vertical pattern. The main idea behind vertical farming is that instead of farming crops in a single large area it can be cropped over the stack of floors in building present in urban cities.

With the help of this the farmers can grow more food with less amount of land and since it is farmed in an urban place the transportation costs can also get cut. (Natalie Mouyal, 2018).

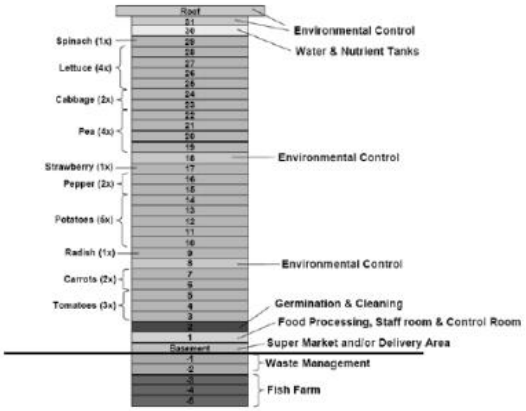

Fig 2: Vertical Farming Model (Natalie Mouyal, 2018)

CONCLUSION

Agriculture is a field that has been lacking the mass adoption of technology and its advancements. Machine learning can be very helpful in developing the yield of crops using various input variables. They have enhanced the accuracy to greater extent which includes sensor-based systems particularly used under precision farming. Using ML even the urban cities with skyscrapers can also do their agriculture which will provide a great benefit to our country.

REFERENCES

[1] Mokaya, V. (2019). Future of Precision Agriculture in India using Machine learning and Artificial Intelligence.*International Journal of Computer Sciences and Engineering*, *7*(2), 1020-1023. doi:10.26438/ijcse/v7i2.10201023

[2] Natalie Mouyal. (2018, October 4). Could the future of farming be vertical? Retrieved from https://medium.com/e-tech/could-the-future-of-farming-be-vertical-ee109aa895af

[3] (2019). Retrieved from http://www.ijesrt.com/issues%20pdf%20file/Archive-2018/April-2018/1.pdf

[4] Balducci, F., Impedovo, D., & Pirlo, G. (2018). Machine Learning Applications on Agricultural Datasets for Smart Farm Enhancement. *Machines*, *6*(3), 38.doi:10.3390/machines6030038

[5] Microsoft News Center India. (2019). Digital Agriculture: Farmers in India are using AI to increase crop yields - Microsoft News Center India. [online] Available at: https://news.microsoft.com/en-in/features/ai-agriculture-icrisat-upl-india/ [Accessed 25 Apr. 2019].

[6] Anon, (2019). [online] Available at: https://www.mindtree.com/sites/default/files/20180 4/Artificial%20Intelligence%20in%20Agriculture.pdf [Accessed 25 Apr. 2019].