

A
B.TECH PROJECT PROPOSAL
on
A Machine Learning Based Fertilizer Predictor
for
B.Tech. in Computer Science and Engineering
Submitted to



Department of Computer Science and Engineering,
Annasaheb Dange College of Engineering & Technology,
Ashta, Sangli.

(An Autonomous Institute Affiliated to Shivaji University Kolhapur)

by
Ms. Shubhada Rajmane(19131075)
(Group Leader)
Ms. Ravina Kumbhar(19131082)
Ms. Madhuri Kadam(19131103)
Ms. Pratiksha Kalokhe(19131104)

Under the Guidance of
Prof. Sandip G. Sutar

Academic Year
2022-23

Abstract

India is known as an agricultural country, where the recommendations are given by traditional methods. At present, recommendations for farmers are based on communication between farmers and experts and different experts have variety of recommendations. Recommendation can be provided to farmers using past agricultural activities' data. The application provides recommendations to farmers for identification of appropriate fertilizer. The proposed methodologies comprise of four stages: soil analysis, data pre-processing, data analysis and Recommendation. The soil sample is analyzed using an IoT based device utilizing NPK sensor, the data gathered from sensors are figured into correct dataset and machine learning algorithm is utilized to recognize the reasonable fertilizer. This Project is extremely valuable to farmer to pick the right fertilizer toward the start of product cycle and amplify the yield.

Keywords: N, P, K, Soil, Crop, Fertilizer Predictor.

Contents

Abstract	i
1 Introduction	2
1.1 Background and Context	2
1.2 Purpose	2
2 Literature Survey	2
3 Problem Statement	4
4 Objectives	4
5 Scope	4
6 Proposed Work	5
6.1 Methodology	5
6.2 Software and Hardware requirements and availability	6
7 Schedule	6
References	7

1 Introduction

1.1 Background and Context

India is a horticulture-based country and agriculture is considered as the key to human progress since ancient times. Agriculture gives the foremost method for work for more than 60 percent of India's populace. But in recent years due to multiple fertilizers present in the market, farmers get confused and apply the fertilizer famous around his locality without a second thought. This leads to two major problem low yield or soil pollution.

Due to insufficient nutrient after applying fertilizers the yield of crop is reduced. Due to over fertilization, the land and food produced from the land will be polluted resulting food poisoning. The over usage of fertilizer also leads to root burn, mineral degradation, soil acidification and ground water pollution. Fertilizer plays a major role in farming and contributes around 55 Percent of the yield enhancement. There are three main nutrients in soil that play a major role in farming: Nitrogen (N), Phosphorous (P) and Potassium (K) collectively known as NPK.

The proposed framework centers to effectively estimating these nutrients in soil and characterizing them to recommend the fertilizer for the crop. Machine learning techniques and algorithms can be used for recommending fertilizers.

1.2 Purpose

The ultimate goal of the Machine Learning based Fertilizer Recommender is to develop a Web Application which uses IOT to extract parameters from soil and recommends right fertilizer to user based on soil parameters using Machine Learning Technology and also provides the facility to store and access user's soil testing details for better quality production of crop.

2 Literature Survey

[A]- Existing System

There are mainly two types of soil testing methods.

- soil testing in laboratory
- Mobile soil testing

1. Soil Testing In Laboratory:

- This method involves soil testing in laboratory.
- It may take weeks or days to test the soil.
- The people take soil samples and give them to the laboratories for soil testing.
- They detect the NPK values of soil by using chemical analysis[1].

2. Mobile Soil Testing:

- In this type people do the test and give suggestions on the tests regarding, the fertilizers and it is done once per crop.
- So this method is not suitable for effective crop production and it does not give the accurate results. The following three methods are used for detecting the soil fertility.
- They are
 - (a) Spectroscopy
 - (b) Conductivity
 - (c) Electro chemical sensor methods.
 - (d) These are cost effective and will not give the accurate results [2].

[B]- Papers/Journals

Kiran Shinde, Jerrin Andrei, Amey Oke published international journal on ‘Web Based Recommendation SystemforFarmers’ in 2015. The paper proposes the use of data mining to provide recommendations to farmers for crops, crop rotation and identification of appropriate fertilizer. The System can be used by farmers on web as well on android based mobile devices[3].

Manikrao Mulge, Manish Sharnappa, Anjali Sultanpure, Divya Sajjan, Monika Kamani proposed the international journal on ‘AGRICULTURAL CROP RECOMMENDATION SYSTEM USING IoT and M.L’ in June 2018. The Agriculture system proposed in this paper is an integration of the concepts of Machine learning and IOT using IoT boards and various sensors, through which live data feed can be obtained and processed[4].

Aishwarya Bhosale, Nikita Asode, Mayur Ahuja, Rutank Thanekar, Indira Joshi published international research paper on ‘Soil Based Fertilizer Recommendation System using IoT’ in April 2020. This system will be used for soil analysis in order to increase crop yield. Based on soil analysis report, fertilizers will be recommended to the user. Fertilizers will be recommended using nutrient status table which is stored in the database. By comparing values of nutrients with table, classification will be done and accordingly fertilizers will be recommended to the user[5].

P. Sindhu and G. Indirani published international journal on ‘IoT Enabled Soil Testing’ in November 2018. This system is proposed to help the farmers to increase the production and the suggestions are made through the mobile application. The following sensors will be used to test the soil: 1. Soil moisture sensor 2. PH Meter 3. Humidity Sensor. Depending on the soil test results, suggestions will be recommended to the user[6].

Gouravmoy Banerjee and Indrajit Ghosh published a conference paper on ‘A Machine Learning Based Fertilizer Recommendation System for Paddy and Wheat in West Bengal’. To mitigate the lack of experts and assist the rural farmers, an intelligent machine learning based fertilizer recommendation system for paddy and wheat is very noteworthy. This work proposes a machine learning-based fertilizer recommendation system for this purpose[7].

3 Problem Statement

To design and develop a Web Application of Fertilizer Predictor using Machine Learning and IOT technology to help farmers to pick the right fertilizer for better quality production, growth and higher yield.

- Ideally: The ideal system provides the facility of fertilizer recommendation based on following parameters extracted from soil using IOT: Nitrogen, Potassium, Phosphorous, Soil Type, Crop Type, Temperature, Humidity and Moisture.
- Reality: The existing systems provides the facility of extracting related parameters from soil and predict fertilizer but some methods are time consuming, some methods are costly and some methods gives inaccurate results.
- Consequences: The existing system do not provide the facility of extracting related parameters from soil and predicting the right fertilizer to the user without consuming so much time and money. The existing system do not provide the facility of web application for storing and accessing the user's soil testing details.
- Proposal: **The proposal is to develop a Web Application of Fertilizer Predictor which uses IOT to extract parameters from soil and Machine Learning to recommend right fertilizer to user and provides the facility to store and access user's soil testing details for better quality production and crop yield.**

4 Objectives

Our objective is to make a system that will use Machine Learning, Web Development and IoT technology to predict the fertilizer from the sample of soil. The main objectives of this project are stated below:

1. To train a machine learning system with a training dataset.
2. To implement the Machine learning algorithm which will give the highest accuracy.
3. To detect parameter values of a sample of soil by using IoT and use it as the input.
4. To Design Registration and Login Form.
5. To store the details of the farmer and sample of soil in the database.
6. To evaluate the performance of the system.

5 Scope

1. The system provides the facility of recommending fertilizer to user based on following parameters extracted from soil using IOT device:
Nitrogen, Potassium, Phosphorous, Soil Type, Crop Type, Temperature, Humidity and Moisture.
2. The system provides the web service to store, access and maintain user's history records.
3. The system provides the feature of making reports based on user's historical data.

6 Proposed Work

6.1 Methodology

Figure 1 shows overall process of project.

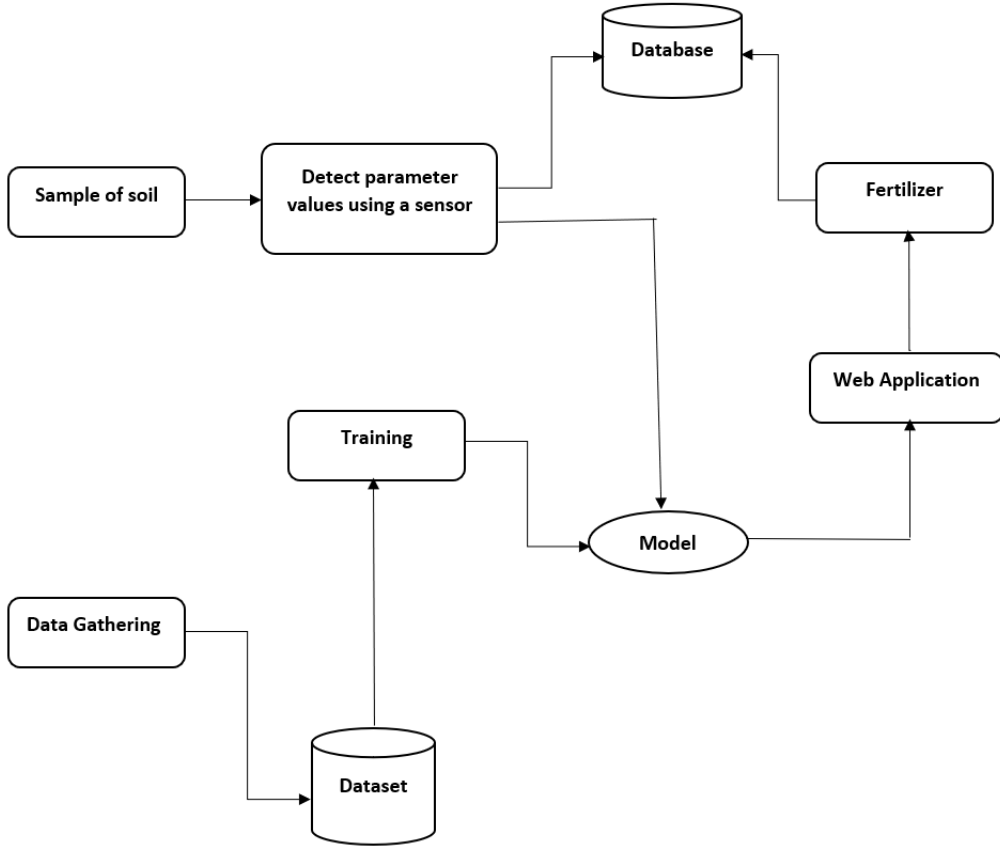


Figure 1: Overview of the proposed work

The various steps are listed as follows :

1. First the data is gathered using various sensors and stored in the database.
2. The feature dataset will be used for training, using a classification algorithm.
3. Training process will result in a model.
4. The sample of soil will be provided to the system. After undergoing all the steps mentioned above, the model will predict the fertilizer which will be displayed on the website and stored in the database.
5. After testing with several samples of soil performance of the system in terms of accuracy will be computed.

6.2 Software and Hardware requirements and availability

Hardware

Laptop/Computer with minimum following functionalities:

- with Processor: Intel Core i5
- RAM: minimum 4 GB
- Operating System: 64bit ,Windows 10
- NPK sensor

Software

- Python (libraries - Open CV, PyTesseract, Google Transliterate)
- Collab/Anaconda
- Xampp
- Latex

Other

- Internet Connection Required

7 Schedule

Figure 2 shows the Schedule with Gantt Chart of Project.

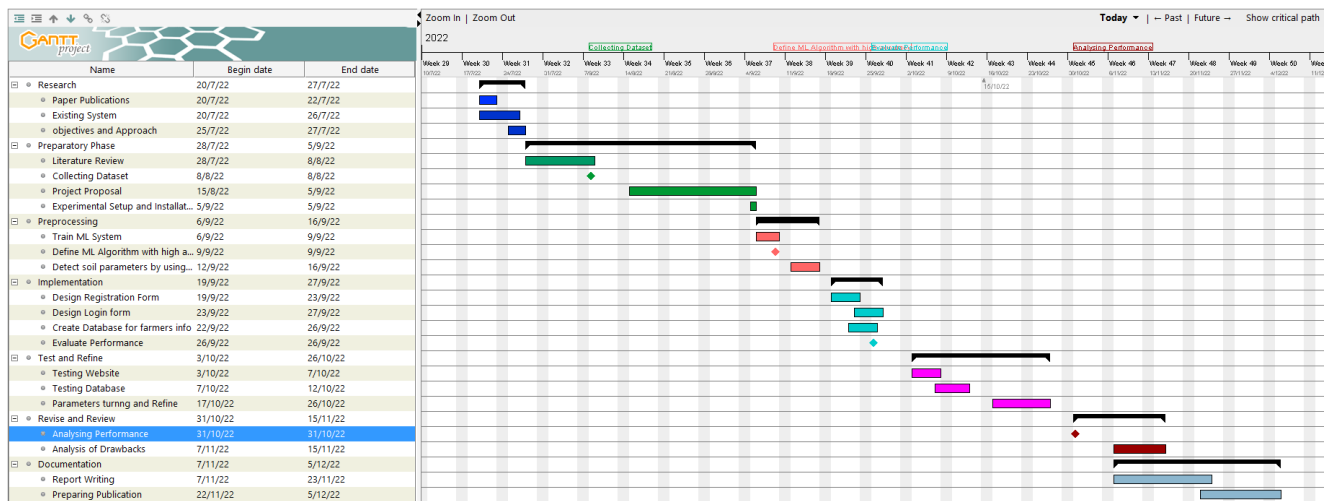


Figure 2: Schedule with Gantt Chart

References

- [1] BNC News Service, “English”, <http://soil quality.org>.
- [2] P. Sukumar, Dr. T. Kavitha, and V. Jashanavi (2018), Real Time soil Fertility Using IOT, *International Journal of Engineering and Techniques(IJET)*, 4, 54-57. <http://www.ijetjournal.org/Special-Issues/NCETIMES/NCETIMES31.pdf>
- [3] Shinde Kiran, Andrei Jerrin, Oke Amey. (2015),. Web Based Recommendation SystemforFarmers. *International Journal on Recent and Innovation Trends in Computing and Communication*, 4, 1444-1448. <https://play.google.com/store/apps/details?id=com.CultureAlley.japanese.english>
- [4] Mulge Manikrao, Sharnappa Manish, Sultanpure Anjali, Sajjan Divya, Kamani Monika. (2018), AGRICULTURAL CROP RECOMMENDATION SYSTEM USING IoT and M.L. *The International journal of analytical and experimental modal analysis (IIAEMA)*, 6, 1112-1117. <https://ijritcc.org/index.php/ijritcc/article/view/4052/4052>,
- [5] Bhosale Aishwarya, Asode Nikita, Ahuja Mayur, Thanekar Rutank, Joshi Indira. (2020), <http://www.ijaema.com/gallery/118-ijaema-june-4106.pdf>
- [6] Sindhu P. and Indirani G. (2018),IoT Enabled Soil Testing. *Asian Journal of Computer Science and Technology*, 4, 54-57. <https://www.irjet.net/archives/V7/i4/IRJET-V7I4584.pdf>
- [7] Banerjee, G., Ghosh, I.(2021),A Machine Learning Based Fertilizer Recommendation System for Paddy and Wheat in West Bengal. *Computational Intelligence in Communications and Business Analytics. CI-CBA*,12, 163–174.<https://doi.org/10.1007/978-3-030-75529-413>

Group Members

Sr.NO	Name of the Student	Contact No.	Email ID	Signature
1	Ms.Shubhada Shivling Rajmane	7720822297	shubhada.rajmane007@gmail.com	
2	Ms.Madhuri Shankar Kadam	9322452724	madhurikadam220@gmail.com	
3	Ms.Pratiksha Popat Kalokhe	9325125032	kalokhepratiksha5050@gmail.com	
4	Ms.Ravina Ramesh Kumbhar	7666475009	ravinark23@gmail.com	

Date: August 7, 2022

Place: Ashta

Prof.Sandip G. Sutar
GUIDE

Dr.A. N. Jadhav
Project Coordinator

Prof.Suhel S. Sayyad
HOD
CSE