Report On

Kheti- Smart farming assistant

Submitted in partial fulfillment of the requirements of the Course project in Semester VII of Final Year Computer Engineering

by

Pratham Ingawale (Roll No. 25)

Prerna kanekar (Roll No. 27)

Kshitij Patil (Roll No. 31)

Supervisor

Dr. Megha Trivedi

University of Mumbai

Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

(2023-24)

Vidyavardhini's College of Engineering & Technology
Department of Computer Engineering

CERTIFICATE

This is to certify that the project entitled “Kheti- Smart Farming assistant” is a bonafide work of "Pratham Ingawale, Prerna Kanekar, Kshitij Patil" submitted to the University of Mumbai in partial fulfillment of the requirement for the Course project in semester VII of Final Year Computer Engineering.

Supervisor

Dr. Megha Trivedi

Dr. Megha Trivedi
Head of Department

Contents

Abstract

The majority of the Indian population relies on agriculture as their primary livelihood. However, the production, income, and yield of crops are significantly affected by plant diseases. Predicting these diseases is a crucial step in mitigating losses, which is why researchers are exploring modern scientific approaches, such as machine learning techniques, to address this issue. This project presents a method involving the collection of random leaf samples, including both healthy and diseased leaves, and subsequently identifying them using datasets. The approach employs a Convolutional Neural Network (CNN) to determine whether a plant is afflicted with a disease or not. The development and evaluation of this CNN-based classification model entail a comprehensive approach.Yield prediction" utilizes data-driven techniques lik 75; e machine learning to forecast agricultural crop yields. By analyzing factors such as historical data, weather conditions, and crop health, this method empowers farmers with valuable insights for efficient resource allocation and decision-making, contributing to improved food production and sustainability in agriculture.

Section-1

Introduction:

1.1Introduction:

Plant diseases play a significant role in determining how many plants farmers can produce. Since it is exceedingly difficult to identify plant illnesses manually and preventing production loss, machine learning techniques represent a big advancement in plant disease monitoring and detection. Machine learning has become a significant advancement in artificial intelligence in recent years. The conventional approach requires an excessive amount of labor and knowledge of plant diseases. Despite this, a few machine learning experimentation strategies have been used to improve the recognition rate with correct findings. Deep learning is an experimental technology that uses machine vision methods to identify unhealthy or disease-free plants in digital photographs.

The method for identifying plant diseases using photos of the leaves has been presented in the current work. Artificial intelligence includes machine learning, which operates autonomously or provides instructions for specific tasks. Understanding training data and incorporating it into models that should be helpful to people is the primary goal of machine learning. Because of this, it can help in making wise decisions and using a lot of training data to forecast the right output. The parameters for classification include leaf color, leaf damage, leaf area, and leaf texture.

1.2 Problem Statement:

Every day, all of us eat delicious food, but we hardly ever give thought to the people who make it possible for us to eat. Despite playing such a vital role in our society, farmers are frequently overlooked. In India, farmers have the greatest rate of poverty, according to the World Bank. This is because farmers frequently plant crops without considering their potential profitability. They must choose the crops that are most appropriate for the land on which they will be planted in order to solve this issue.

The world's most populated nation is India, whose population is still growing. Forests must be cleared in order to provide new farming land in order to feed this population growth. Plantations.

1.3 Scope:

The "Kheti" web application represents a promising project with a broad scope. By leveraging deep learning, it aims to revolutionize agriculture by offering plant disease classification and yield prediction. The deep learning component empowers the system to accurately diagnose plant diseases, which can significantly enhance crop management and increase yields. Simultaneously, the incorporation of the Random Forest algorithm for yield prediction contributes to informed decision-making for farmers. What sets "Kheti" apart is its commitment to linguistic diversity, with support for multiple languages facilitated by Google Translate, thereby making this vital agricultural technology accessible and beneficial to a global community of farmers, regardless of their language preferences. The project's scope extends beyond technology, encompassing the potential to transform farming practices, increase food production, and improve livelihoods while promoting multilingual accessibility, enhancing the agriculture sector's sustainability and efficiency.

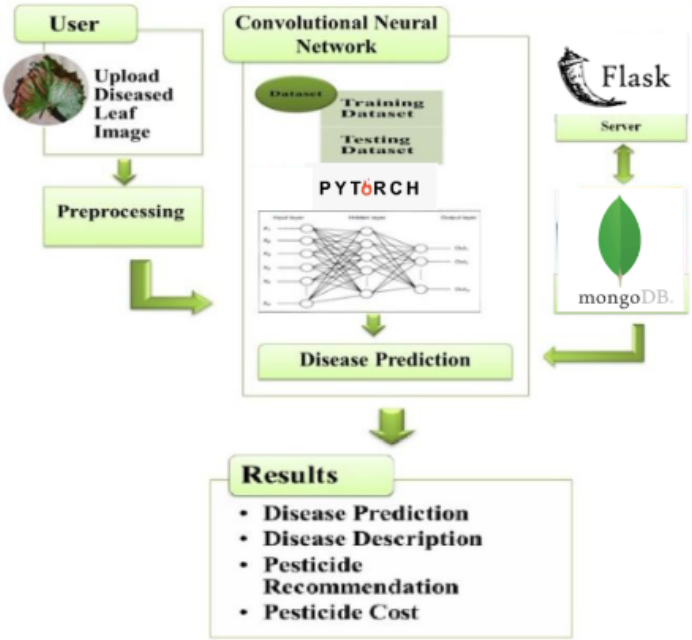
Section-2

Proposed System:

2.1 Introduction:

The proposed system, known as "Kheti," is a groundbreaking web application designed to address critical challenges in agriculture by harnessing the power of modern technology. In a world where food security and efficient crop management are paramount, "Kheti" offers an innovative solution that combines deep learning for plant disease classification and Random Forest for yield prediction. Agriculture is the backbone of many economies, and its success is closely tied to the health of crops and accurate yield forecasts. "Kheti" promises to be a game-changer in this field. It employs advanced deep learning algorithms to accurately identify and classify plant diseases, enabling early intervention and precise treatment. Moreover, it leverages the predictive capabilities of the Random Forest algorithm to forecast crop yields, helping farmers make informed decisions about planting, harvesting, and resource allocation. What sets "Kheti" apart is its commitment to inclusivity, with support for multiple languages, thanks to integration with Google Translate. This feature ensures that farmers worldwide can access and benefit from the system, transcending language barriers. "Kheti" holds the potential to revolutionize agriculture, enhance food production, and empower farmers with the tools they need to meet the growing demands of our world while promoting sustainability and efficiency in the agriculture sector.

2.2 Block diagram:



2.2 Flow of system architecture

2.3 Module Des cription:

1. Data Ingestion Module:

Description: This module is responsible for gathering and importing the data that will be used to train and test the Random Forest model. It can support various data sources, including databases, files, APIs, and more.

2. Data Preprocessing Module:

Description: This module handles data cleaning, transformation, and feature engineering. It prepares the data for training and ensures it is in the right format for the Random Forest algorithm.

3. Random Forest Training Module:

Description: This is the core of the system. It trains the Random Forest model on the prepared data. This module creates an ensemble of decision trees, applies bootstrapping, and selects random features at each split.

4. Hyperparameter Tuning Module:

Description: This module is responsible for optimizing the hyperparameters of the Random Forest model, such as the number of trees in the ensemble, the maximum depth of trees, and the number of features considered at each split.

5. Cross-Validation Module:

Description: Cross-validation is crucial for model evaluation. This module performs k-fold cross-validation to assess the performance of the Random Forest model on different subsets of the data.

6. Prediction and Inference Module:

Description: This module allows users to make predictions using the trained Random Forest model on new, unseen data. It also supports real-time inference if the system is deployed for online predictions.

7. Model Deployment Module:

Description: If the Random Forest model is to be used in production, this module helps deploy it to a production environment, ensuring it can handle requests, scalability, and version control.

2.4 Details of Hardware & Software:

Hardware:

- Computer with a 1.1 GHz or faster processor
- Minimum 2GB of RAM or more
- 2.5 GB of available hard-disk space
- 1366 × 768 or higher-resolution display

Software:

- Operating System: Windows 11
- Google Chrome/Internet Explorer

2.5 Code:

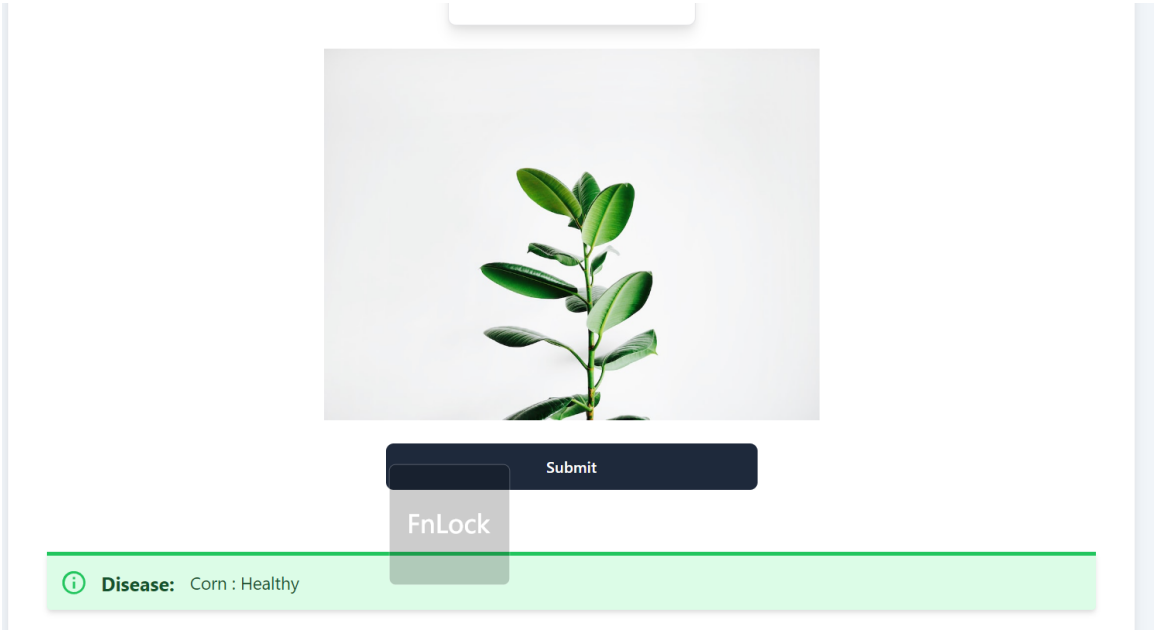
```
import React, { useEffect } from "react";
import Link from "next/link";

import IndexNavbar from "components/Navbars/IndexNavbar.js";
import Footer from "components/Footers/Footer.js";
import ChatBot from "components/ChatBot";
import Image from "next/image";
import Layout from "components/Layout";

export default function Index() {
 return (
  <Layout title="Home / KHETI">
   <IndexNavbar fixed />
   <section className="header relative pt-16 items-center flex h-screen max-h-860-px">
    <div className="container mx-auto items-center flex flex-wrap">
     <div className="w-full md:w-8/12 lg:w-6/12 xl:w-6/12 px-4">
      <div className="pt-32 sm:pt-0">
       <h2 className="font-semibold text-4xl text-blueGray-600">
        KHETI - Smart Agriculture
       </h2>
       <p className="mt-4 text-lg leading-relaxed text-blueGray-500">
        KHETI is a software application that helps farmers manage and
        optimize their agricultural operations.
       </p>
       <div className="mt-12">
        <Link href="/disease">
                    <a className="get-started text-white font-bold px-6 py-4 rounded outline-none focus:outline-none mr-1 mb-1 bg-blueGray-800 active:bg-blueGray-500 uppercase text-sm shadow hover:shadow-lg ease-linear transition-all duration-150">
          Get started
         </a>
        </Link>

        {/* <a
```

```
            href="https://github.com/sarvesh2902/Hackanova_CTRL-ALT-ELITE"
                    className="github-star ml-1 text-white font-bold px-6 py-4 rounded outline-none focus:outline-none mr-1 mb-1 bg-blueGray-700 active:bg-blueGray-600 uppercase text-sm shadow hover:shadow-lg"
            target="_blank"
            rel="noreferrer"
           >
            Github Repo
           </a> */}
          </div>
         </div>
        </div>
       </div>
       <img
        className="absolute top-0 b-auto right-0 pt-12 sm:w-6/12 -mt-16 sm:mt-0 w-100 max-h-860-px"
        src="/img/homelogo.png"
        alt="..."
       />
      </section>
```

Section-3

3.1 Results:

3.1.1 Home Screen



3.1.2 Detecting a healthy disease

Description: Corn plants prefer daytime temperatures of 75 to 80 degrees F and 65 to 70 degrees F during the night. The soil should be kept consistently moist, but not soggy and they only need fertilizer every 6 months. Although dracaena can take low light conditions, they do best when placed in bright but indirect light.It's just natural for a plant to produce a few yellow leaves, its nothing to get alarmed about.However if it produces a lot of yellow leaves all at once, say five or six, you may be over-watering or the plant may be suffering from a lack of light.

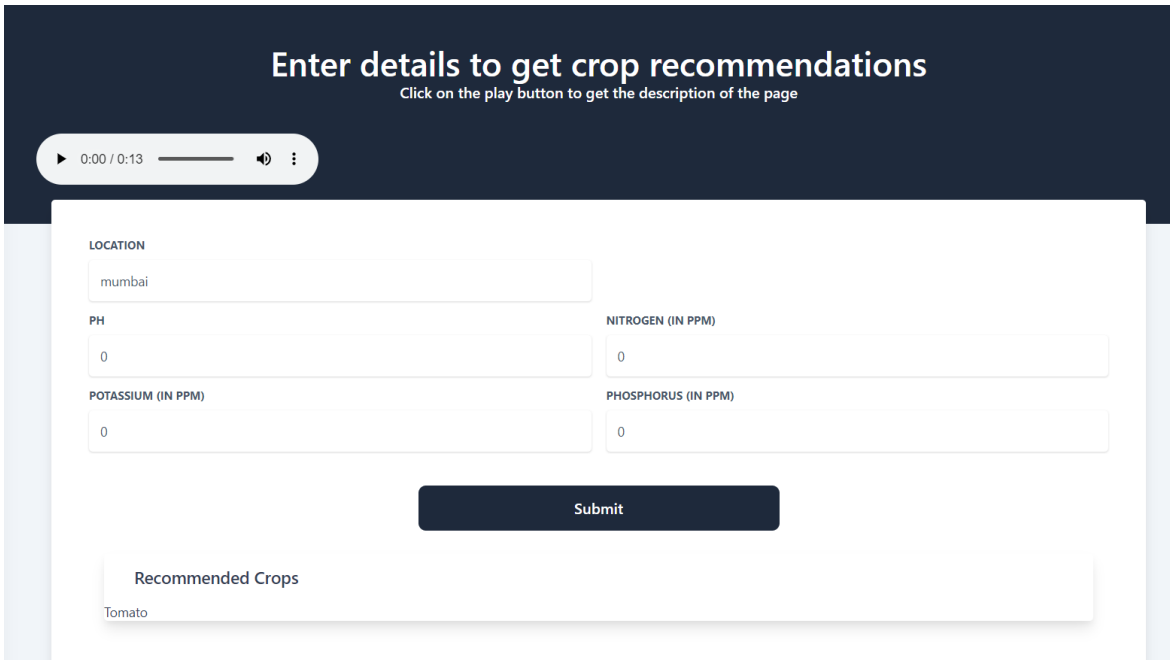
Prevention Measures: Corn has several health benefits. Because of the high fiber content, it can aid with digestion. It also contains valuable B vitamins, which are important to your overall health. Corn also provides our bodies with essential minerals such as zinc, magnesium, copper, iron and manganese.

Cure Measures

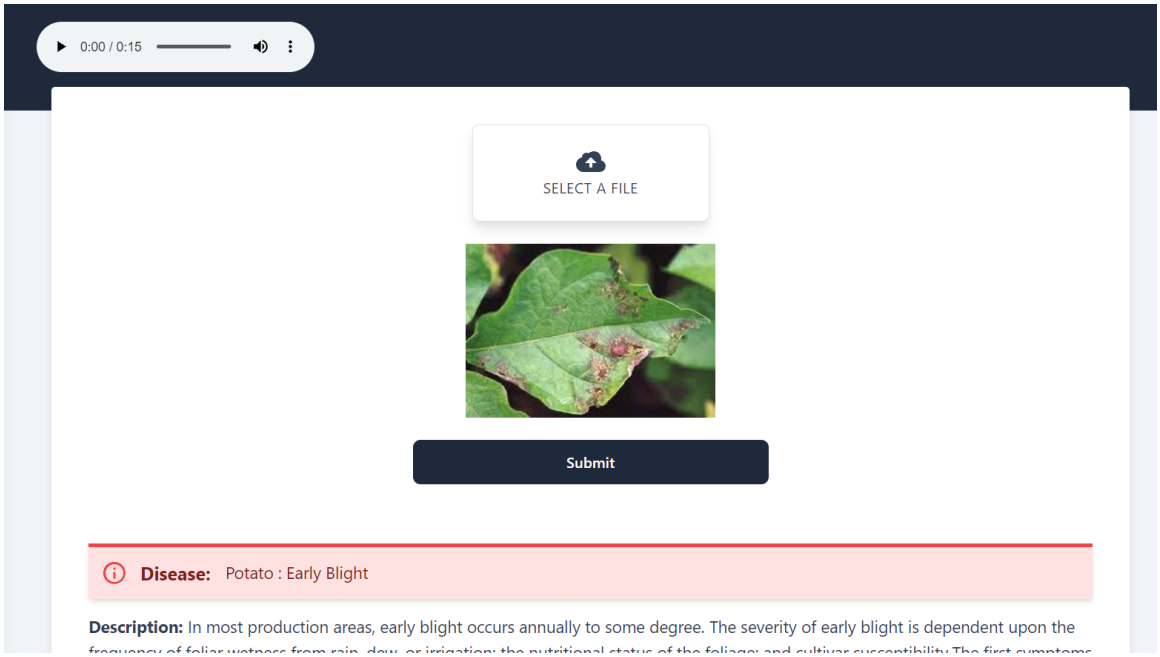
Supplement Name: Biomass Lab Sampoorn Fasal Ahaar (Multipurpose Organic Fertilizer & Plant Food)

Buy Now: https://www.flipkart.com/biomass-lab-sampoorn-fasal-ahaar-multipurpose-organic-fertilizer-plant-food-1-kg-fertilizer-

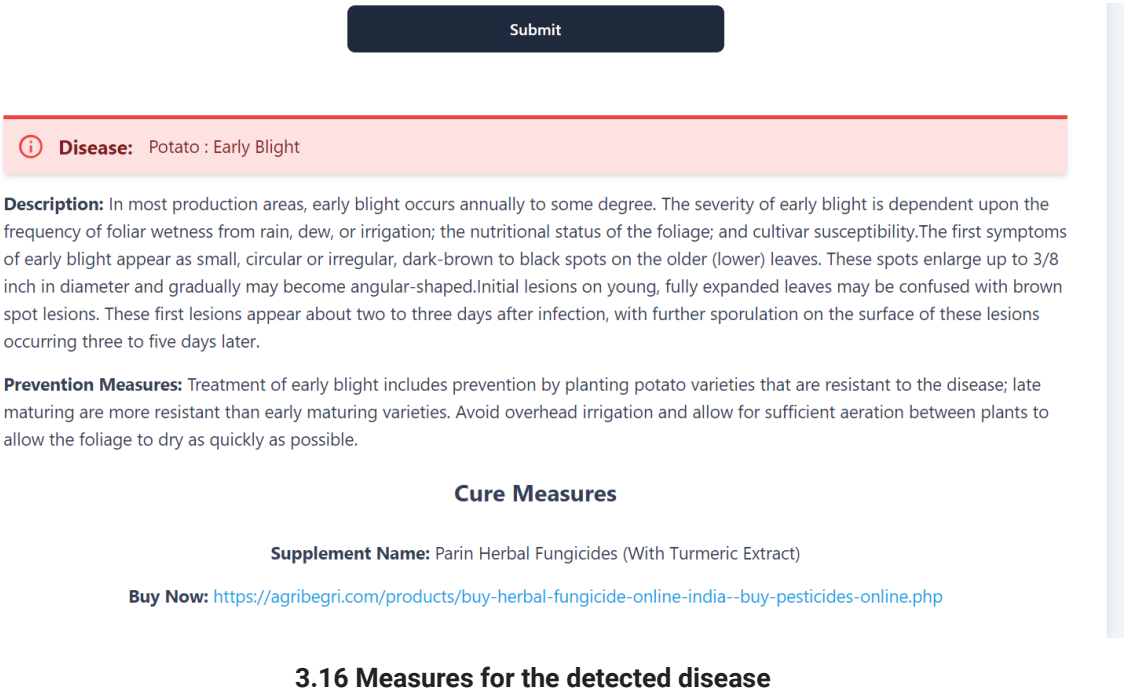
3.1.3 Suggesting fertilizer for the disease detected



3.1.4 Entering values for crop recommendation



3.1.5 Detecting a diseased crop.



3.16 Measures for the detected disease

3.2 Conclusion:

In conclusion, Kheti can help farmers save time and money. By using Kheti, farmers can avoid having to hire experts to identify plant diseases. Kheti can also help farmers avoid having to purchase expensive pesticides and fertilizers. Kheti can help farmers improve the quality of their crops. By using Kheti, farmers can identify and treat plant diseases early, which can help to prevent the spread of diseases and improve the quality of the crops. Kheti can help farmers increase their yields. By using Kheti, farmers can identify the optimal amount of fertilizer to use and the best time to plant their crops. This can help to increase the yields of their crops

Section-4

References:

- Soni, V. K., & Soni, P. (2022). Plant Disease Prediction using Machine Learning. Mathematical Statistician and Engineering Applications, 71(4), 9739-9747.

- Kranth, G. P. R., Lalitha, M. H., Basava, L., & Mathur, A. (2018). Plant disease prediction using machine learning algorithms. International Journal of Computer Applications, 18(2), 0975-8887.

- Wang, G., Sun, Y., & Wang, J. (2017). Automatic image-based plant disease severity estimation using deep learning. Computational intelligence and neuroscience, 2017.