Plant Doctor Application

The Plant Doctor application is used to diagnose disease in common crop plants such as tomatoes, potatoes, strawberries, and corn. The application uses an open-source machine learning model from Hugging Face to perform diagnosing. The particular model used is called **mobilenet_v2_1.0_224-plant-disease-identification.** This is an image classification model.

The diagnosis is performed by sending a picture of a plant leaf to the Hugging Face inference API, which returns the results of the image classification as an array of diagnoses which have a confidence score associated with each diagnosis. The model is limited and doesn't recognize a huge number of plants. Further training and customizing the model would be required for this to be a reliable diagnosing tool. This application is just a prototype.

The application was implemented with React Native using Expo tools and components. Authentication was implemented with Google's Firebase authentication. Firebase's Firestore document database was used for storing diagnosis data.

The application was tested only using the Expo Go application (available from the Play store for Android).

Features of Plant Doctor

The Plant Doctor allows users to diagnose plants by taking a picture of a plant leaf or using a saved picture from the end user devices gallery.

The user can save the results of the performed diagnoses. The saved results can be viewed in a list view and in a map view. Users' location is saved as metadata for the diagnosis using the end-devices GPS.

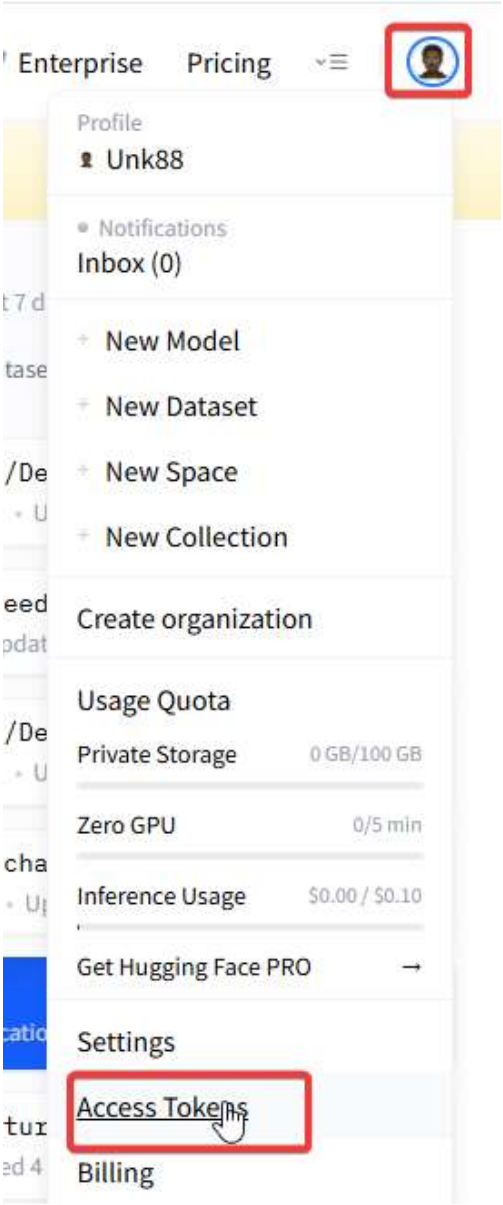
Diagnoses can be deleted from the list view screen.

How to setup and use the application

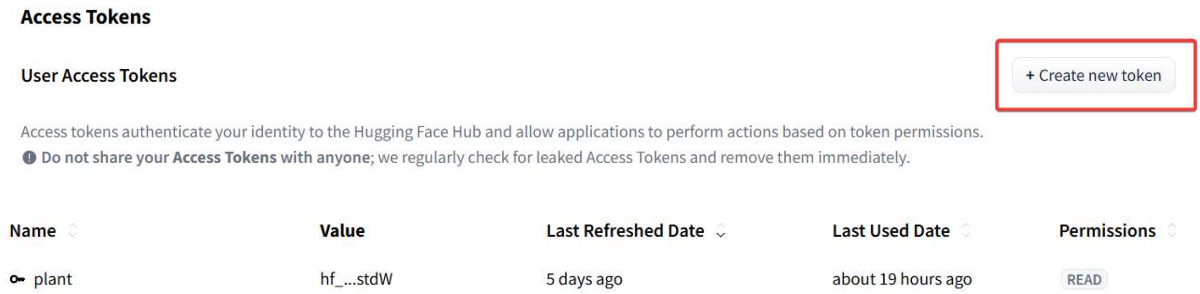
The application is not published to any hosting service. The only testing has been performed with the Expo Go mobile application, which can run React Native applications. The following steps are required in order to test the application.

Hugging Face token

You need a token for making calls to the Hugging Face inference API. First sign up and login through their web page: https://huggingface.co/. Once logged in click you profile from the upper right-hand corner and select tokens.



Click “Create a new token”. Read permissions are enough for using the api in this applications context. Name to token however you like.



This token is needed for the .env file in the root folder of the application code. More about that in the environment configuration section.

Get the code from GitHub

Code can be found on GitHub: https://github.com/ollisu/plant-doctor. Clone the repository. Run “npm install” in the terminal to install needed dependencies. Start the application with “npm start”. Before that we need to add the .env file to the root folder of the project.

Environment configuration

You need to add a .env file to the projects root folder. Add the following environment variables:

- EXPO_PUBLIC_HUGGINGFACE_TOKEN=**<THE HUGGING FACE TOKEN CREATED EARLIER>**
- EXPO_PUBLIC_HUGGINGFACE_MODEL=**<NAME OF THE HUGGING FACE MODEL>**

The model's name for the second environmental variable is **linkanjarad/mobilenet_v2_1.0_224-plant-disease-identification**

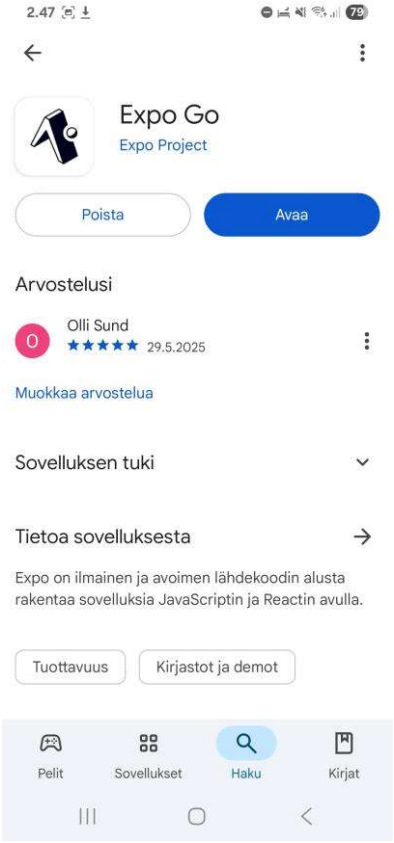
https://huggingface.co/linkanjarad/mobilenet_v2_1.0_224-plant-disease-identification

Run the Plant Doctor application

Once you have created the .env file, run "n*pm install*" to install needed dependencies and then run *"npm start"* to start the application (in your terminal).

Expo Go application

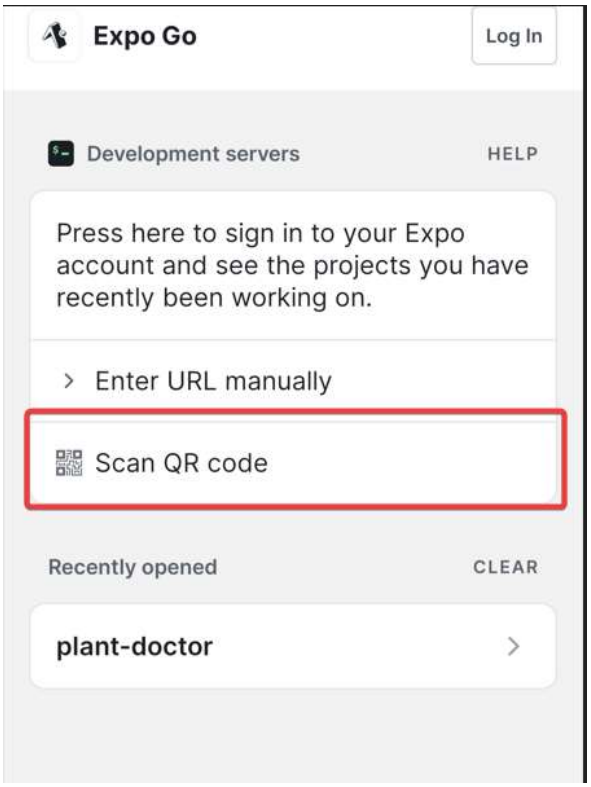
I only had time to test this on an Android device using the Expo Go mobile application. Install Expo Go from the Google Play Store.



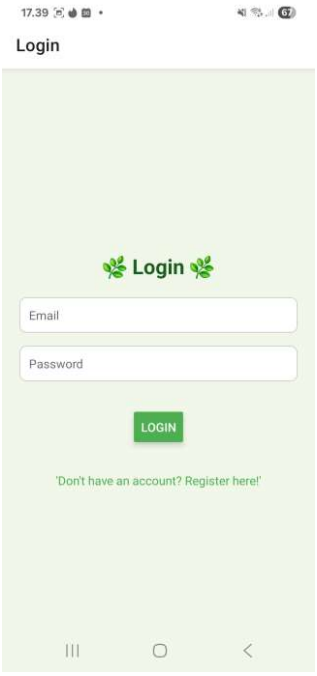
Once you start the Plant Doctor application, you can see a QR-code in the terminal

Now open the Expo Go application on your phone (no registration is needed for the Expo Go itself). Make sure your phone and the device you are running the plant doctor app are on the same network.

Scan the QR code with Expo Go.



If the device running Expo Go and the device running the plant doctor, this should open the plant doctor app in Expo Go.



Using the Plant Doctor application

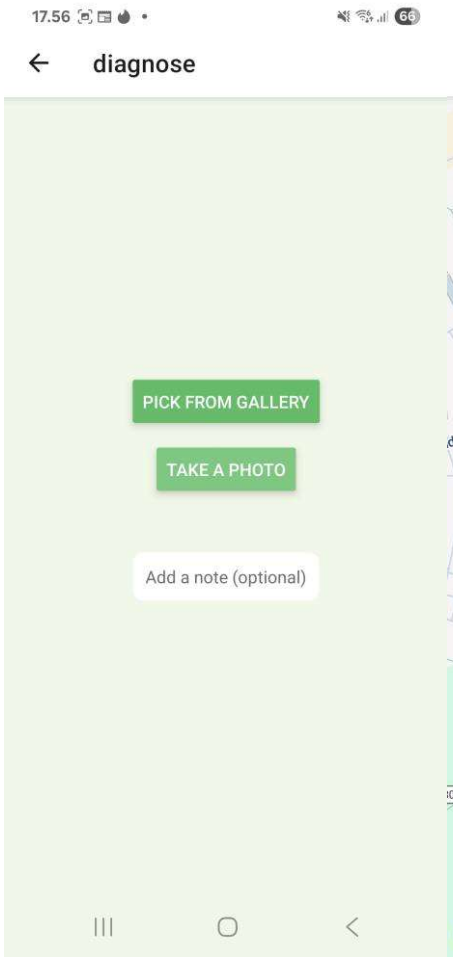
The video can be used as a reference. Here we go through the features very briefly.

With the Plant Doctor application you can:

- Diagnose a plant for disease using pictures taken with end-device camera.
- Diagnose a plant for disease using picture chosen from end-device gallery.
- View saved diagnoses from a list.
- Delete a diagnosis from the list.
- View saved diagnoses on a map.

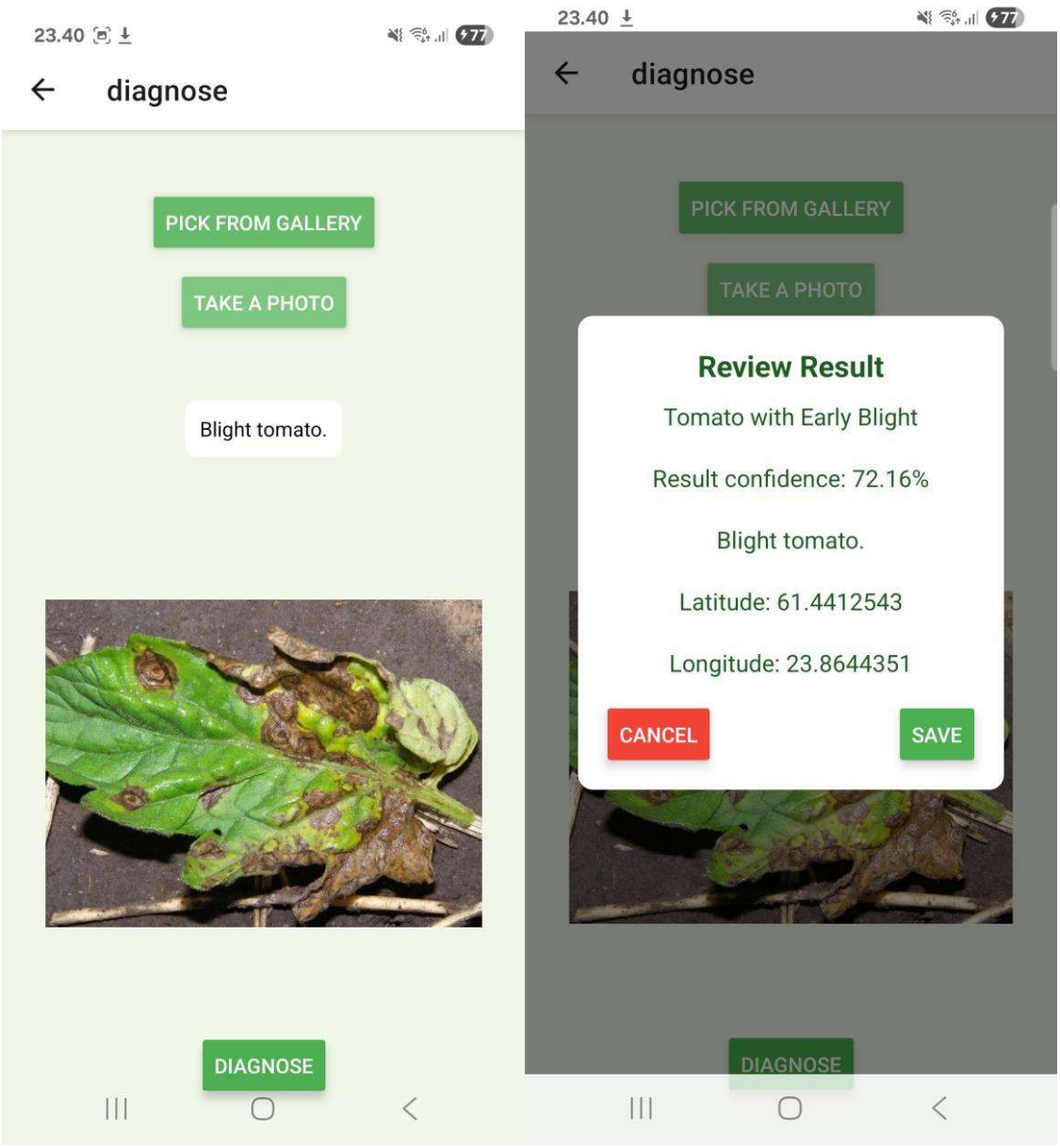
The landing page:

The diagnosis page, map view, and diagnosis list:



The video shows the flow of the application better.

Example diagnosis of a tomato leaf with blight:



Model used:

https://huggingface.co/linkanjarad/mobilenet_v2_1.0_224-plant-disease-identification

The dataset the model is trained on:

https://github.com/spMohanty/PlantVillage-Dataset

Expo:

https://expo.dev/