Fertilizers Recommendation System For Disease Prediction

Team ID : PNT2022TMID28620

Project Objectives:

1. Preprocess the images.
2. Applying the CNN algorithm to the dataset.
3. How deep neural networks detect the disease.
4. You will be able to know how to find the accuracy of the model.
5. You will be able to build web applications using the Flask framework.

Project Flow :

- A web Application is built where;
    - Farmers can interact with the portal build
    - Interacts with the user interface to upload images of diseased leaf
    - Our model built analyses the Disease and suggests the farmer with fertilizers are to be used
- To accomplish the above task you must complete the below activities and tasks;
    - Download the dataset.
    - Classify the dataset into train and test sets.
    - Add the neural network layers.
    - Load the trained images and fit the model.
    - Test the model.
    - Save the model and its dependencies.
    - Build a Web application using a flask that integrates with the model built.

Prior Knowledge :

- **Supervised and Unsupervised learning:**
  - Supervised learning, as the name indicates, has the presence of a supervisor as a teacher. Basically supervised learning is when we teach or train the machine using data that is well labelled. Which means some data is already tagged with the correct answer. After that, the machine is provided with a new set of data. so that the supervised learning algorithm analyses the training data and produces a correct outcome from labelled data.
  - Unsupervised learning is the training of a machine using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance. Here the task of the machine is to group unsorted information according to similarities, patterns, and differences without any prior training of data.

- **Regression Classification and Clustering:**
  - Clustering is an unsupervised technique. With clustering, the algorithm tries to find a pattern in data sets without labels associated with it. This could be a clustering of buying behaviour of customers. Features for this would be the household income, age, … and clusters of different consumers could then be built.
  - Classification algorithms look at existing data and predicts what a new data belongs to. Classification is used for spam for years now and these algorithms are more or less mature in classifying something as spam or not. With machine data, it could be used to predict a material quality by several known parameters (e.g. humidity, strength, color, …).

- **Artificial Neural Networks :**
  - To understand the concept of the architecture of an artificial neural network, we have to understand what a neural network consists of. In order to define a neural network that consists of a large number of artificial neurons, which are termed units arranged in a sequence of layers. Lets us look at various types of layers available in an artificial neural network.
    - ➤ Input Layer
    - ➤ Hidden Layer
    - ➤ Output layer

- **Convolution Neural Networks :**
  - A convolutional neural network, or CNN, is a deep learning neural network sketched for processing structured arrays of data such as portrayals.
  - CNN are very satisfactory at picking up on design in the input image, such as lines, gradients, circles, or even eyes and faces.
  - CNN can run directly on a underdone image and do not need any preprocessing.

- **Flask:**
  - To put it to use in order to predict the new data, we have to deploy it over the internet so that the outside world can use it. In this article, we will talk about how we have trained a machine learning model and created a web application on it using Flask.

Prerequisites :

Anaconda Navigator :

- Anaconda Navigator is a free and open-source distribution of the Python and R programming languages for data science and machine learning-related applications. It can be installed on Windows, Linux, and macOS. Conda is an open-source, cross-platform, package management system. Anaconda comes with so very nice tools like JupyterLab, Jupyter Notebook,QtConsole, Spyder, Glueviz, Orange, Rstudio, Visual Studio Code. For this project, we will be using Jupiter notebook and spyder.

To build Deep learning models you must require the following packages :

- **Tensor flow:** TensorFlow is an end-to-end open-source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML and developers can easily build and deploy ML powered applications.

- **Keras :** Keras leverages various optimization techniques to make high level neural network API easier and more performant. It supports the following features.

  1. Consistent, simple and extensible API.

  2. Minimal structure - easy to achieve the result without any frills.

  3. It supports multiple platforms and backend.

  4. It is user-friendly framework that runs on both CPU and GPU.

  5. Highly scalability of computation.

- **Flask:** Web framework used for building Web applications.

Technical Architecture :