FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

BOTANIC IMAGE ANALYZER

2. APPLICANTS (S)

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3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the nature of this invention and the manner in which it is to be performed

BOTANIC IMAGE ANALYZER

THEREFORE

TECHNICAL FIELD

"Botanic Image Analyzer" is primarily within the domain of Botanical field and Agricultural technologies

BACKGROUND

Plants have been a boon for human civilization since the beginning, they helped us providing shelters, tools to hunt and to sustain fire, they have been of a great help for us always. An important a use of plants in medical support, there are many species of plants which provide medical aid when needed. In curing wounds to deadly disease they are very efficient and for this we must have knowledge of which species of plant is have medical capabilities, and also they provide us many foods. Such as fruits, vegetables, etc. They are like backbones to humans from a very long time. Our model helps in determining the species of plant and also provide the information whether the plant is infected or not from the leaf of the plant.

Amid this landscape, early detection and intervention are pivotal for curbing the escalating rates of disease detection in plant. However, the inherent challenges in detection these conditions, pose significant obstacles. Existing detection methods often lack in accuracy and efficiency, leading to overfitting or missed detection. The consequences are profound, impacting fast disease detection and plant identification.

To address these multifaced challenges, our project introduces a plant leaf image detection with disease prediction if found any. To provide these features we provide a deep learning model (CNN), image processing (OpenCV), fast API, etc. We trained our model using leaf image dataset (we divide the same dataset in three parts 1st part is training dataset and 2nd part is validation dataset and the last part is testing dataset), and for validation we use the same dataset to check whether the model is accurate or not and at last for testing we use the third part of same dataset to get the predicted result.

This project is motivated for providing a better solution in identifying the species of the plant which saves time and effort put by the researchers, in first identifying and then determining the usage of the plant. It also helps in identifying the different diseases which plant can suffer from by identifying them from the condition of the plant leaves, which will further help researchers in gaining insights of the diseases and their reaction on the plant species. This will also help them recognizing the chemicals released by plants to fight them.

At last, this project is all about recognizing the aspects of plant species and their amazing habitat which they have been evolving from a very long time and also their efforts in developing their new features for changing climatic conditions. We used deep learning, image processing, fast API and give this project a right path.

This project helps in saving time and effort while providing the most probable solution for the problem specified. It will be a easy to implement web based application for an botany enthusiast as well as researchers.

SUMMARY OF THE INVENTION

The invention is a cutting-edge system designed for the identification of leaf images and the detection of diseases affecting plants. Leveraging advanced computer vision techniques machine learning and Deep learning algorithms, the system aims to revolutionize the agricultural sector by providing farmers and researchers with a powerful tool for early and accurate diagnosis of plant health issues.

The core functionality of the system involves the classification of detected issues into specific plant diseases. By leveraging a comprehensive database of known plant diseases and their visual characteristics, the system can provide precise information about the nature and severity of the identified problem. Early detection of plant diseases helps in implementing timely interventions, reducing the spread of infections and minimizing crop losses.

The system is designed with a user-friendly interface, ensuring accessibility for users with varying levels of technical expertise. This simplicity enables farmers and researchers to easily integrate the technology into their existing workflows.

DESCRIPTION OF DRAWINGS

The drawings for the project "Botanic Image Analyzer" provide a comprehensive and visually appealing overview of the project's approach. The drawings highlight the following key components:

1. **System Architecture Overview**

   It illustrates the interaction between components such as the image capture device, processing unit, machine learning module, and the output interface.

2. **Image Capture and Preprocessing**

   details the image capture process, showcasing the capturing device (e.g., a camera or sensor) and the preprocessing steps. It may include image enhancement and filtering techniques to prepare the input data for analysis. The image capture device (2a), such as a high-resolution camera or sensor, captures leaf images. Preprocessing steps (2b) include noise reduction, color correction, and resolution enhancement.

3. **Feature Extraction**

   Illustrating the feature extraction stage, how distinctive features are identified and extracted from the leaf images. Various techniques such as shape analysis, texture mapping, and color profiling may be highlighted.

4. **Machine/Deep Learning Model Training**

   Depicting the training phase of the machine learning model, the interaction between the system and the training dataset. It may include the representation of neural network layers and the learning process. Neural network layers (4b) are depicted, emphasizing the learning process as the model refines its ability to classify features.

5. **Disease Classification**

   Focusing on the disease classification module, how the system categorizes identified features into specific plant diseases. Decision trees, clustering algorithms, or other classification methods (5b) may be represented, emphasizing the model's ability to identify and categorize diseases based on learned patterns.

6. **User Interaction**

   Detailing the user-friendly interface, how users interact with the system. It may include screens displaying input options, analysis results, and user prompts.

ABSTRACT

BOTANIC IMAGE ANALYZER

This project is a collective thought of all four members of this team, we try to solve a general problem in the field of agriculture, research and plant biodiversity. This project is named as botanic image analyzer which uses deep learning algorithms and machine learning techniques to automatically identify and classify plant species from images, providing detailed information about these plants and facilitating disease recognition.

This application is comprised of an image processing feature which takes image of plant leaves and produce a gray scale image with detailed features in it. It then is transmitted to a deep learning model which uses its previous knowledge and then predicts the result according to the details in the image. This model accuracy is based on the training dataset used for training the model and we found an 0.98 efficiency in predicting the results and the loss is 0.02 which is highly acceptable. We used Tensorflow and keras for using the files of the dataset with different classes and training the model with high efficiency which kept on increasing from 0.71 to 0.99 (one time), this is considered to be a great model which learns and produce fast results.

It explores the development, advantages, and potential applications of the leaf image analysis. The analysis highlights its impact on plant identification, education, agriculture, and conservation, providing insights into its implications for plant sciences, the project strives to create a user-friendly web application to address challenges of Leaf image identification and plant disease detection by providing a comprehensive solution.