CS 584

INTERMEDIATE PROJECT REPORT

Project title

Harnessing Convolutional Neural Networks for Enhanced Detection of Potato Plant Diseases

Team members

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Project Title: Harnessing Convolutional Neural Networks for Enhanced Detection of Potato Plant Diseases

Introduction (project description):

In the realm of agriculture, particularly for below-ground crops like potatoes, detecting diseases early is crucial yet challenging due to the invisibility of the vegetable from the surface. Addressing this, our research harnesses image processing technology, allowing for the identification of plant diseases through leaf analysis. This innovative approach enables swift diagnosis and intervention, significantly reducing the risk of widespread disease and safeguarding the harvest.

Our application streamlines disease management for farmers by providing immediate results from uploaded leaf images, negating the need for traditional, time-consuming laboratory analyses. Focusing on the widely consumed and economically significant potato plant, our research not only demonstrates the effectiveness of image processing in disease detection but also sets the stage for future applications across various plant species.

Leveraging machine learning, including artificial neural networks and deep learning algorithms, our system enhances the precision of disease detection. By learning from extensive datasets of plant images, it promises a new era in agriculture where technology

empowers farmers with rapid, reliable tools for maintaining crop health and ensuring food security.

Description of Data:

- The dataset utilized for this Machine Learning project on Potato Plant Disease Classification was sourced from Kaggle, comprising approximately more than 3000 images of potato plant leaves. These images were meticulously collected and curated to encompass three distinct categories of diseases: Early Blight, Late Blight, and a Neutral class representing healthy leaves.
- Each image in the dataset serves as a representation of a potato plant leaf at a particular stage of growth and disease manifestation. The images were captured under various environmental conditions and from diverse geographical locations, ensuring a broad representation of real-world scenarios.
- Data augmentation techniques may be employed to further enhance the robustness of the models by introducing variations in lighting conditions, perspectives, and orientations.
- Preprocessing techniques such as image resizing, normalization, and augmentation may be applied to standardize the data and improve model generalization.
- Overall, the dataset offers a rich and varied resource for the development and assessment of machine learning algorithms aimed at automating the diagnosis of potato plant diseases, thereby aiding farmers in timely disease management and crop protection.

Milestones completed

- ✓ Competed the problem study by identifying the most appropriate vegetable to solve the issue of early disease detection. We decided the Potato after carefully reviewing the potential of disease detection and its benefits in potato
- ✓ Collected appropriate data to train our model
- ✓ Started experimenting with two useful image processing machine learning algorithms. Alexnet and Resnet-50

- ✓ Finetuned the training model by changing the number of pooling layers, number of convolution layers, activation function etc... to get the optimal result from the model
- ✓ Selected the tech stack to develop the application to process the image via mobile/web
- ✓ Started writing the paper to document everything properly and collected the references to do the project effectively
- ✓ We also gathered the domain knowledge like different kinds of diseases, symptoms etc.. To decide the parameters and outcomes for training the model

Things to do in coming weeks:

- ➢ Test the model with the testing data
- ➢ Compare the results of Alexnet and ResNet-50 to select the best performing model.
- ➢ Create our own model on top of standard model with some modification to the parameters to best fit the data
- ➢ As per the plan (submitted in proposal) below are the three categories of work remaining to do in coming weeks
    - o Application development
    - o Testing and Validation
    - o Documentation and Reporting
- ➢ Create an android app to

References:

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