Project: Agriculture with Computer Vision

This document will outline the project description, datasets, methods, desired outcomes, and important dates for your final submissions.

Overview:

The project serves as a platform for you to apply your knowledge of computer vision techniques and algorithms to address real-world challenges in the field of agriculture. The objective is to leverage computer vision technologies to enhance agricultural practices, optimize resource management, improve crop yield, and enable precision farming.

Project Description:

Below are some project ideas to inspire and guide you in selecting your final project topic. You are also encouraged to propose your own project ideas, as long as they align with the overall theme of agriculture and computer vision.

1. Crop Disease Detection:

- Description: Develop a computer vision system that can identify and classify common diseases in crops, enabling early detection and timely intervention.
- Dataset: Plant Village Dataset (https://www.kaggle.com/datasets/tushar5harma/plant-village-dataset-updated)

2. Plant Pathology:

- Description: Build a model to diagnose and classify diseases in plant images.
- Dataset: Plant Pathology 2021 - FGVC8 Dataset (https://www.kaggle.com/competitions/plant-pathology-2021-fgvc8/data)

3. Plant Seedlings Classification:

- Description: Create a system that classifies different types of plant seedlings.
- Dataset: UCO Plant Seedlings Classification Dataset (https://www.kaggle.com/competitions/uco-plant-seedlings-classification/data)

4. Fruit Classification:

- Description: Develop an automated system that uses computer vision algorithms to classify different types of fruits.
- Dataset: Fruits 360 Dataset (https://www.kaggle.com/datasets/moltean/fruits)

5. [Proposed Project Idea]

- Description: [Provide a detailed description of your proposed project idea, including the problem statement, objectives, methodologies, datasets, and expected outcomes. Justify why your project is relevant and how it contributes to the field of agriculture with computer vision.]

Methods:

In your project, you should employ various computer vision techniques, including the use of at least two models, pretrained weights, well-defined loss functions and evaluation metrics, as well as Exploratory Data Analysis (EDA). Consider the following guidelines:

1. Exploratory Data Analysis (EDA): Conduct thorough EDA on your dataset before proceeding with model development. Analyze the distribution of classes, examine sample images, visualize key features, and investigate any potential biases or data quality issues. EDA helps in understanding the characteristics of your data.

2. Model Selection: Choose at least two appropriate computer vision models based on the requirements of your project.

3. Pretrained Weights: Utilize pretrained weights to initialize your models. Pretrained weights can be obtained from popular models trained on large-scale datasets like ImageNet. This helps in leveraging the knowledge gained from pretraining and accelerates the convergence of your models.

4. Loss Function: Define an appropriate loss function that aligns with the objectives of your project. The choice of loss function will depend on the specific task you are solving.

5. Evaluation Metrics: Determine suitable evaluation metrics to assess the performance of your models. Select metrics that are relevant to the task at hand.

Ensure that you explain your choice of models, justify the use of pretrained weights, clearly define your loss function, discuss the selection of appropriate evaluation metrics, and present the findings of your EDA in your project documentation.

Outcomes:

Your project submission should include the following components:

1. GitHub Repository: Create a dedicated GitHub repository to host your project code, documentation, and any additional resources. Ensure that your repository is well-organized and contains clear instructions on how to reproduce your results.

2. Demo Presentation: Prepare a comprehensive demo presentation that showcases your project's functionality, methodology, and results. Use visual aids, code snippets, and sample output images or videos to effectively communicate your work.

Bonus Deliverable: Interactive Web Application using Streamlit (https://streamlit.io/)

As a bonus deliverable for your final project, I encourage you to create an interactive web application using Streamlit or similar tools. Streamlit is a powerful framework that enables you to build intuitive and interactive user interfaces for your machine learning or computer vision projects.

Optional: Docker Integration

As an optional suggestion, I encourage you to consider incorporating Docker (https://www.docker.com/) into your project workflow to enhance its professionalism and ease of deployment.

Important Dates:

- Team Formation & Project Proposal Submission: **June 13th, 2023**

- Final Project Submission: **June 19th, 2023**

- Demo Presentation: **June 21st, 2023**

Throughout the project duration, I will be available to guide and support you. Feel free to reach out to me for any questions, clarifications, or assistance you may require. If you have any inquiry don't hesitate to email me: ahmedhosny0094.ah@gmail.com

Good luck,
Ahmed Hosny