Great Learning

AIML

CAPSTONE PROJECT

COMPUTER VISION

OBJECT DETECTION/CLASSIFICATION - FOOD

PROBLEM STATEMENT

- **DOMAIN:** Food Industry.
- **CONTEXT:**

  Computer vision can be used to automate supervision and generate action appropriate action trigger if the event is predicted from the image of interest. For example food items can be easily identified by a camera as make of the type of the food, colour of the food, ingredients etc.

- **DATA DESCRIPTION:**

- The Food101 dataset contains 16,256 images of 17 classes of foods. The data can be split into training and testing images, where each class can be roughly split into 70-30. Classes are typically the names of the food, e.g. apple_pie.
- Dataset has been attached along with this project. Please use the same for this capstone project.
- **Original link to the dataset**: https://www.kaggle.com/datasets/dansbecker/food-101 **[for your reference only]**
- **Reference:** It was used in the Paper "Food-101 – Mining Discriminative Components with Random Forests" by Lukas Bossard, Matthieu Guillaumin and Luc Van Gool. It's a good (large dataset) for testing computer vision techniques.

- **PROJECT OBJECTIVE:** Design a DL based Food identification model.
- **PROJECT TASK:** [Score: 100 points]

1. **Milestone 1:** [Score: 40 points]
   - **Input**: Context and Dataset
   - **Process**:
     - Step 1: Import the data [2 points]
     - Step 2: Map training and testing images to its classes. [5 points]
     - Step 3: Create annotations for training and testing images. [8 points]

     [Take any 10 foods(class) of your choice and select any 50 images inside each food and create the annotations manually. You can use any image annotation tool to get the coordinates.]
     - Step 4: Display images with bounding box you have created manually in the previous step. [5 points]
     - Design, train and test basic CNN models to classify the flood. [10 points]
     - Step 6: Interim report [10 points]
   - **Submission**: Interim report, Jupyter Notebook with all the steps in Milestone-1
2. **Milestone 2:** [Score: 60 points]
   - **Input**: Preprocessed output from Milestone-1
   - **Process**:
     - Step 1: Fine tune the trained basic CNN models to classify the food. [5 points]
     - Step 2: Design, train and test RCNN & its hybrids based object detection models to impose the bounding box or mask over the area of interest. [10 points]
     - Step 3: Pickle the model for future prediction [5 Points]
     - Step 4: Final Report [40 Points]
   - **Submission**: Final report, Jupyter Notebook with all the steps in Milestone-1 and Milestone-2
3. **Milestone 3:** [Optional]
   - **Process**:
     - Step 1: Design a clickable UI based interface which can allow the user to browse & input the image, output the class and the bounding box or mask [highlight area of interest] of the input image
   - **Submission**: Final report, Jupyter Notebook with the addition of clickable UI based interface

- References and hints:
  - Please refer to the blog to understand the basics of object detection: https://www.mygreatlearning.com/blog/object-detection-using-tensorflow/
  - YOLO object detection using OpenCV: https://www.mygreatlearning.com/blog/yolo-object-detection-using-opencv/?highlight=detection
  - Face detection: https://www.mygreatlearning.com/blog/face-recognition/?highlight=detection
  - To make GUI as a desk app you can use TKINTER library. You are free to use any other library.
  - To make web service GUI you can use FLASK or DJANGO library.

POINTS TO REMEMBER

1. A maximum of 100 points will be awarded for this project
2. Project to be submitted within 6 weeks of date of release. Late submission will be accepted under genuine situation. Score will be given as per the below formula:

   If the current score is greater than 40 then the final score will be capped at 40.

   Else the current score will be awarded.
3. Any form of plagiarism is strictly prohibited. No score will be awarded in this case.

HAPPY LEARNING!