Great Learning

AIML

CAPSTONE PROJECT

COMPUTER VISION

OBJECT DETECTION - CAR

Great Learning

PROBLEM STATEMENT

- **DOMAIN:** Automotive Surveillance.

- **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 a car moving on the road can be easily identified by a camera as make of the car, type, colour, number plates etc.

- **DATA DESCRIPTION:**

The Cars dataset contains 16,185 images of 196 classes of cars. The data is split into 8,144 training images and 8,041 testing images, where each class has been split roughly in a 50-50 split. Classes are typically at the level of Make, Model, Year, e.g. 2012 Tesla Model S or 2012 BMW M3 coupe.

Data description:

- ‣ Train Images: Consists of real images of cars as per the make and year of the car.
- ‣ Test Images: Consists of real images of cars as per the make and year of the car.
- ‣ Train Annotation: Consists of bounding box region for training images.
- ‣ Test Annotation: Consists of bounding box region for testing images.

Dataset has been attached along with this project. Please use the same for this capstone project.

Original link to the dataset for your reference only: https://www.kaggle.com/jutrera/stanford-car-dataset-by-classes-folder [for your reference only]

Reference: 3D Object Representations for Fine-Grained Categorisation, Jonathan Krause, Michael Stark, Jia Deng, Li Fei-Fei 4th IEEE Workshop on 3D Representation and Recognition, at ICCV 2013 (3dRR-13). Sydney, Australia. Dec. 8, 2013.

- **PROJECT OBJECTIVE:** Design a DL based car identification model.

- **PROJECT TASK:** [Score: 100 points]

1. **Milestone 1:** [Score: 40 points]
   - ‣ **Input**: Context and Dataset
   - ‣ **Process**:
     - ‣ Step 1: Import the data. [3 points]
     - ‣ Step 2: Map training and testing images to its classes. [6 points]
     - ‣ Step 3: Map training and testing images to its annotations. [6 points]
     - ‣ Step 4: Display images with bounding box. [5 points]
     - ‣ Step 5: Design, train and test basic CNN models to classify the car. [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 car. [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!