Efficient Shallow Learning Methods for Object Recognition/Detection, Face Recognition, Image Classification etc as an Alternative to Deep Learning Models

CS6350 : Computer Vision
TPA No: 09

Introduction

Shallow learning, also known as shallow machine learning, refers to the use of relatively simple models with a small number of layers or processing stages. These models typically have a limited capacity to learn complex patterns from data. Examples of shallow learning algorithms include linear regression, logistic regression, decision trees, Random Forest k-nearest neighbours, and support vector machines.

Object recognition is a computer vision task where you aim to identify different objects in images. Object recognition might involve identifying all objects in an image for use in captioning, or identifying specific objects for data analysis. Facial recognition is a way of identifying or confirming an individual's identity using their face. Facial recognition systems can be used to identify people in photos, videos, or in real-time. Whereas, Image Classification aims to understand and categorize an image as a whole with a specific label. Unlike object detection, which involves classification and location of multiple objects within an image, image classification typically pertains to single-object images.

Problem Statement

In this project, you are supposed to select one (preferably two) Computer Vision task(s): Object recognition/detection, Face Recognition, Image Classification and train a shallow model (preferably non-deep learning based) to identify what types of objects are present in images and reflect the position and orientation of the object in a specific scene or identify and localize the faces present in an image or classify
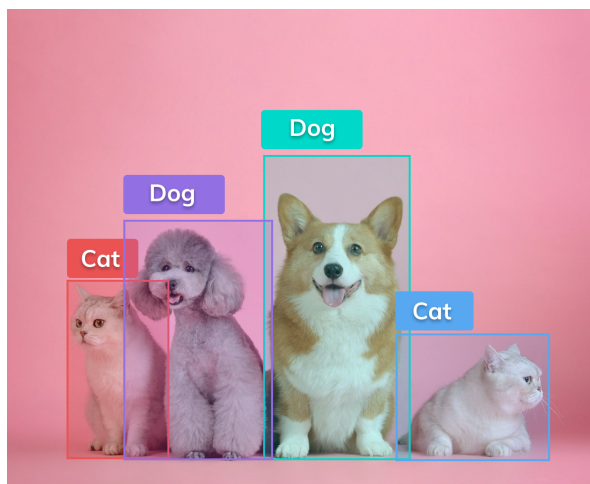
the image based on the object category. During the test time, your model is supposed to recognize the object/face present in a given image.
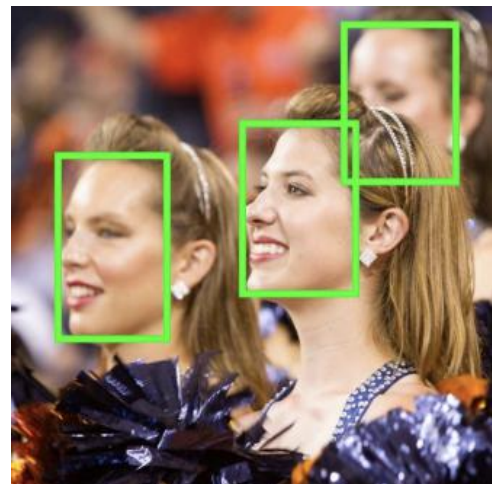
Inputs

Images containing objects and or faces. Images may contain multiple objects of the same or different classes.

Expected Output
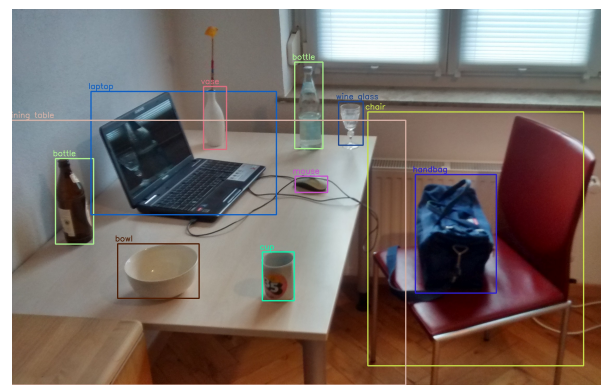
The expected outputs are

(a) Object Recognition Output.

(b) Face Recognition Output

(c) Image Classification Output

(d) Object Detection Output

Figure 1: Expected Output for the different tasks.

Dataset

1 Object Recognition/Detection, Image Classification Datasets

- ImageNet.

- Coco

- COIL-100 : [https://www.kaggle.com/datasets/jessicali9530/coil100]

- Pascal VOC

2 Face Recognition Datasets

- Labeled Faces in the Wild : https://vis-www.cs.umass.edu/lfw/

- VGG Face Dataset

- Adience : https://talhassner.github.io/home/projects/Adience/Adience-data.html

References

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