Computer Vision 2021 Project
Object Detection and Segmentation

Object detection is a computer vision technique that allows us to identify and locate objects in an image or video. With this kind of identification and localization, object detection can be used to count objects in a scene and determine and track their precise locations, all while accurately labeling them.

The objective of this project will be to apply object detection models on a face mask detection dataset and then counting the number of instances of each class in an image.

A second objective will be to apply segmentation using clustering on the same dataset to separate areas of interest from the background [next lab]

Mask Detection Dataset

The dataset provided to you is a face mask detection dataset.

It contains 3 classes(**"with_mask"**, **"without_mask"**,

"mask_weared_incorrect"). The goal is to build an object detection model that can detect instances of these classes in each image and their positions.

- You can download the Training set from [here].
- You can download the Testing set from [here].
- The training set contains 2 folders, an images folder and an annotations folder, each image in the images folder has a corresponding annotation file in the annotations folder with the same name.
- The annotation file is in XML format
- Dataset Example:

The above image's annotation file:

➢The tags that are most important in the XML file are "name" which represents the label and "bndbox" which contains the xmin,ymin,xmax, ymax coordinates that you will need to use for your object detection model.

Hint: You can use "beautifulSoup" library in python to read XML files

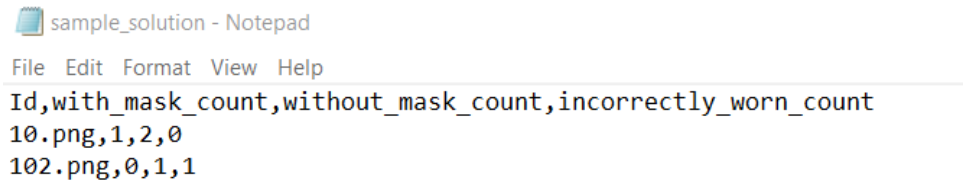
➢ The testing set folder contains the 214 images.

Kaggle Competition

Objective:

After applying the object detection model and predicting the bounding boxes for each instance of a class in the image. Use these detections to count the number of occurences of each class in an image.

Submit a solutions file that looks like this:



where with_mask_count should hold the number of instances of this class in image 10.png and so on.

The submission should contain exactly 214 lines (for the 214 images in the test set)

Important Notes:

1. The segmentation deliverable has no effect on the competition only the object detection models.
2. You will find the competition link [here]
3. The competition metric is MCRMS: Mean Columnwise Root Mean Square Error.
4. The team name on Kaggle should be the same Team ID as the one given to you [here].
5. Competition Deadline: the day before the practical exam.

Practical Exam Project Deliverables:

1. Complete at least 2 object detection models on the given dataset using deep learning techniques [You must use Faster RCNN and Yolo as a minimum requirement but you can add other models if you want].
2. Apply segmentation on the given dataset using “kmeans” and “meanshift” algorithms [next lab].
3. A Report that includes description of:
    - Your data preparation process.
    - Brief description of the models used.
    - Training and Testing times for each model.
    - Object detection Training accuracy of each model.
    - Kaggle competition MCRMSE score.
    - Screenshots of the dataset from your segmentation trials.