COS40007 Artificial Intelligence for Engineering

Portfolio Assessment-5: "Deep learning using YOLO v5'"

Due: by Friday of Week 7 (20/09/2024 23:59 PM) in Canvas

Aim

The aim of this task is for you to demonstrate your understanding of developing deep learning model using YOLO v5 and Pytorch.

Using this dataset develop a YOLO model for graffiti detection

1) Write a function to convert given annotation format in training labels to YOLO annotation format.
2) Train and create a YOLO model by randomly taking 400 images from train data which can detect graffiti in the image
3) Randomly take 40 images from test data and compute IoU for each and generate a CSV file containing 3 columns [image_name, confidence value, IoU value]. If no graffiti is detected for an image then its IoU will be 0.
4) Until IoU value of 80% images in your test data is over 90% or all images are utillised for training and testing purpose, you need to iteratively train and test the model with a new set of 400 training and 40 test images. Make sure you use the model of previous iteration as the pre-trained model for new iteration.
5) Use your final model to detect graffiti in real-time video data. Some example of video data are
    a. https://www.pexels.com/video/a-door-with-graffiti-on-it-is-shown-4543511/
    b. https://www.pexels.com/video/busy-street-footage-854181/
    c. https://www.pexels.com/video/graffiti-painted-on-the-train-station-wall-3413463/
    d. https://www.pexels.com/@pat-whelen-2913248/
    e. https://www.pexels.com/video/a-man-writing-on-a-wall-with-a-marker-9724130/

Submission

Please submit the following in a shared folder (Note Please make sure it is accessible for the tutors. You will get 0 if link is not accessible during marking)

1. Code for step 1
2. The best.pt model of each iteration
3. The CSV file of outcome for each iteration, and 2 good sample of detected images with bounding box. Separate by folder for each iteration
4. Detection outcomes of 5 videos in (5)

Marking criteria

- Conversion of YOLO format [2 marks]
- Training YOLO models [2 marks]
- Computation of IOU [1 mark]
- Test outcomes of images and IoI for each iteration [3 mark]
- Outcomes of detection in the video files [2 marks]

Total **10 marks**