WiDS '22 - '23 Final Documentation

<Project UID: 46>
<Traffic Sign Detection using YOLO>
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Introduction to Problem Statement

Given a dataset of real-life road images containing traffic sign and annotations, classify the traffic sign according to its type (danger, prohibitory, etc.) using YOLO (You Only Look Once) algorithm.

Existing Resources

Tutorials

- How to Train A Custom Object Detection Model with YOLO v5 | by Jacob Solawetz | Towards Data Science
- YOLOv5 Object Detection on Windows (Step-By-Step Tutorial) – Weights & Biases

Proposed Solution

1. Understand the basics of python, numpy, opencv and pytorch
2. Understand the how to do image processing using opencv
3. Either create a dataset and annotate it using roboflow OR given a dataset of images and annotations use roflow for annotation
4. While annotating do proper preprocessing and augmentation of images
5. Import the dataset in your notebook
6. Import relevant python libraries and yolov5 model
7. Train the model using yolov5, find the best weights using the validation set and then test the weights on the test set

8. According to the metrics like precision, recall, Mean Average Precision(mAP) etc on the dataset update the hyperparameters like batch size, number of epochs etc.
9. Then repeat until you get satisfying prediction on the test dataset

Methodology & Progress (Mention the work done week-wise)

Week 1: Revising Python basics, Introduction to OpenCV and TensorFlow. Dataset generation for interested mentees.
Week 2, Week 3: Understanding object detection & classification and the working of the YOLO algorithm. Implementing the YOLO algorithm on the dataset.
Week 4: Summarizing and Report making

Results

https://github.com/Shrey371/WiDS-190100112

Learning Value

- **Basics of numpy, python, opencv and pytorch**
- **Generating my own dataset using python**
- **Annotating images for object detection using roboflow**
- **Data augmentation using various python libraries**
- **Theory behind object detection**
- **Implementation of yolo v5 model**

Tech-stack Used

Operating system: Windows 11
Programming language: Python
Programming Environment: Jupyter Notebooks
Packages: Check the notebook given in the github repo

Suggestions for others

Be patient and try new stuff. If you hit a roadblock, check-out other methods to reach the destination.

Contribution by each Team Member

Done individually

References and Citations

Basics

- Python Tutorial - GeeksforGeeks
- NumPy Tutorial
- OpenCV Python Tutorial - GeeksforGeeks
- TensorFlow - Basics

Generating Dataset

- How to Create Your Own Image Dataset for Deep Learning | by Matt Oehler | Towards Data Science

Annotating Dataset

- How to use CVAT for computer vision [2022 updates]
- Roboflow

Image Augmentation

- Learn Image Augmentation Using 3 Popular Python Libraries

Object Detection Theory

- Classification, Object Detection and Image Segmentation - Qualcomm Developer Network
- What is Object Detection?. Computer Vision Object detection... | by Ashish Patel | ML Research Lab | Medium