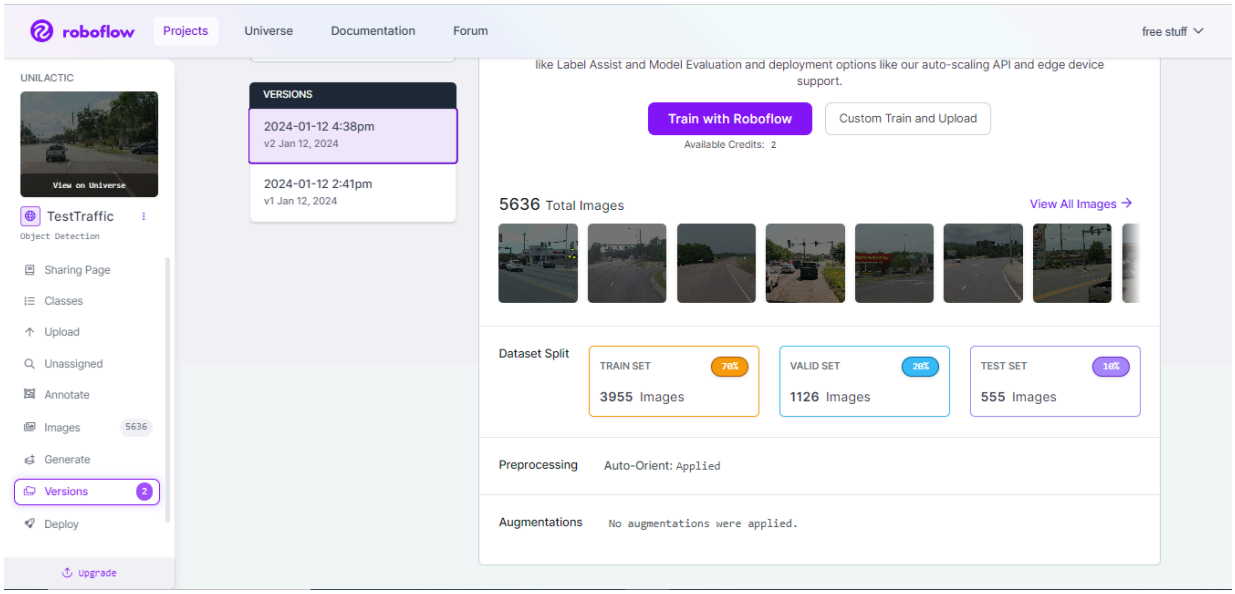
Akshay Dhame
Project: Traffic-Sign-Detection

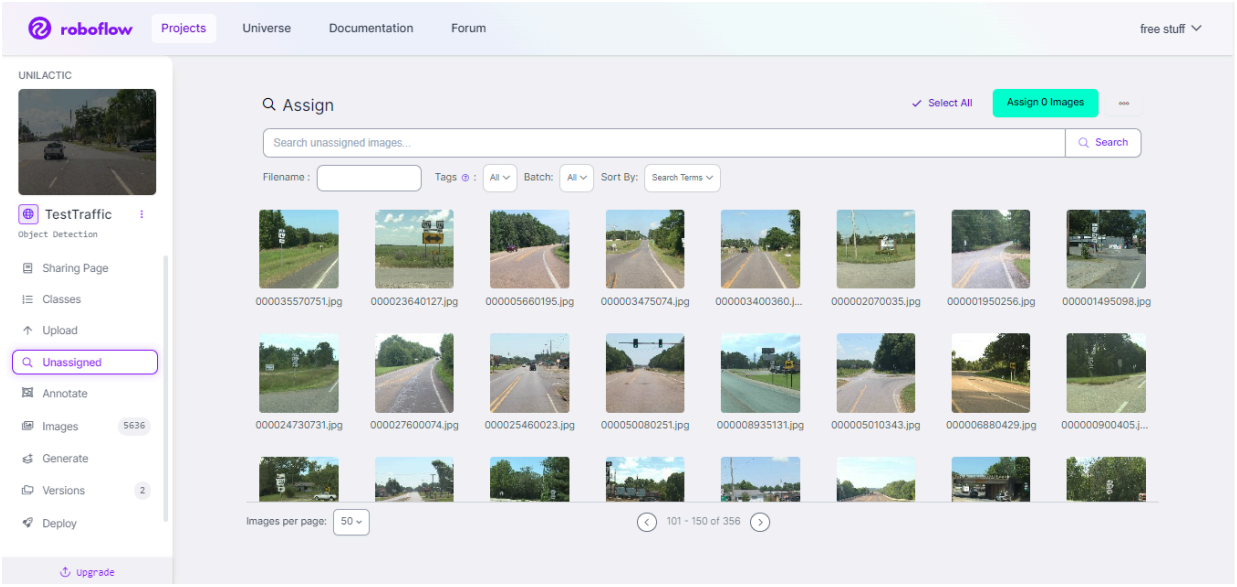
Flow:

1. Model Selection for detection: YOLOv8
2. Data preparation: YOLO format dataset
3. Installing YOLO dependencies
4. Training
5. Validating
6. Predicting
7. Repeat from 4. If required

1. Exploratory data analysis on the data

- Classes: 3
- Total images: 6000 (2000 for each class)
- Modified ImagePath, x0, x1, y0, y1 to ImagePath x0, y0, x1, y1 in csv for correct annotations
- Converted CSV dataset to YOLO format: classNumber centerX, centerY, Width, Height in separate txt file for each image with data.yaml using Roboflow
- Unannotated image: 356 (majorly DIRECTIONAL ARROW AUXILIARY)
- Splitted dataset into train, test and valid dataset in a ratio of 7:2:1
- Applied Preprocessing to Auto-Orient
- No Augmentations applied
- Exported with code



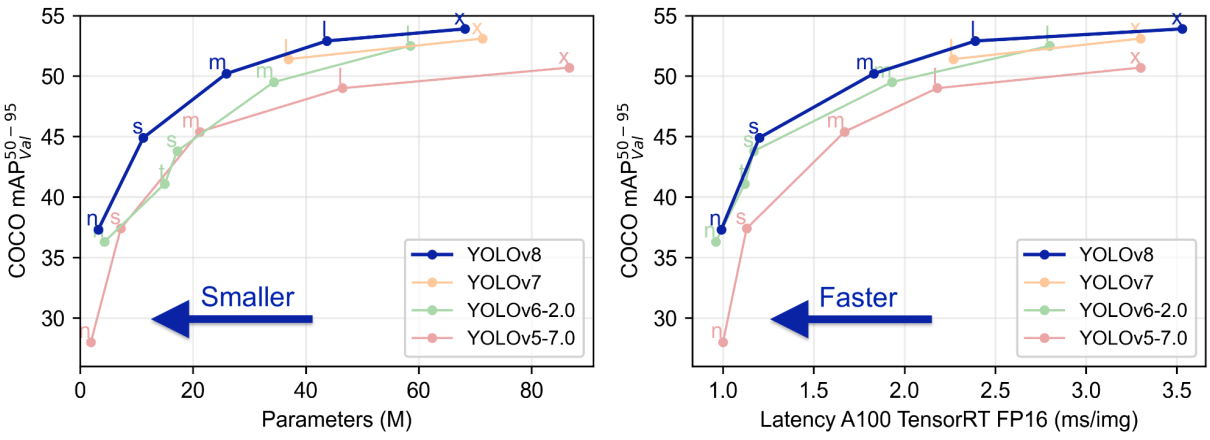


2. Number of training epochs and other parameters set for training

Ans:

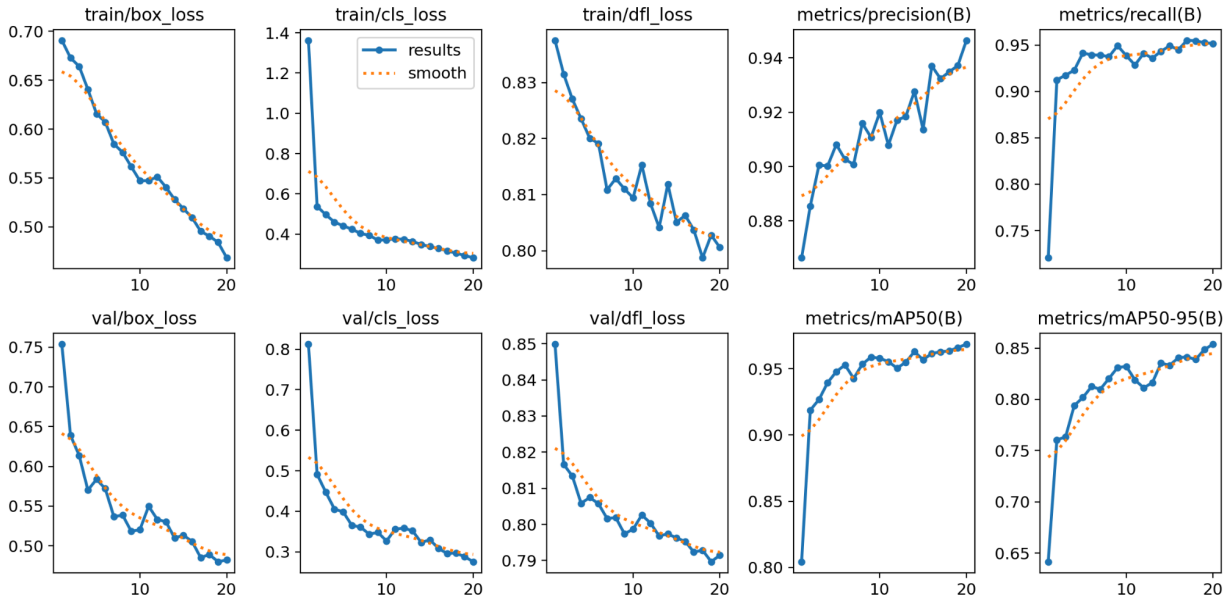
Used YOLOv8m model for combination of accuracy, FPS & simplicity

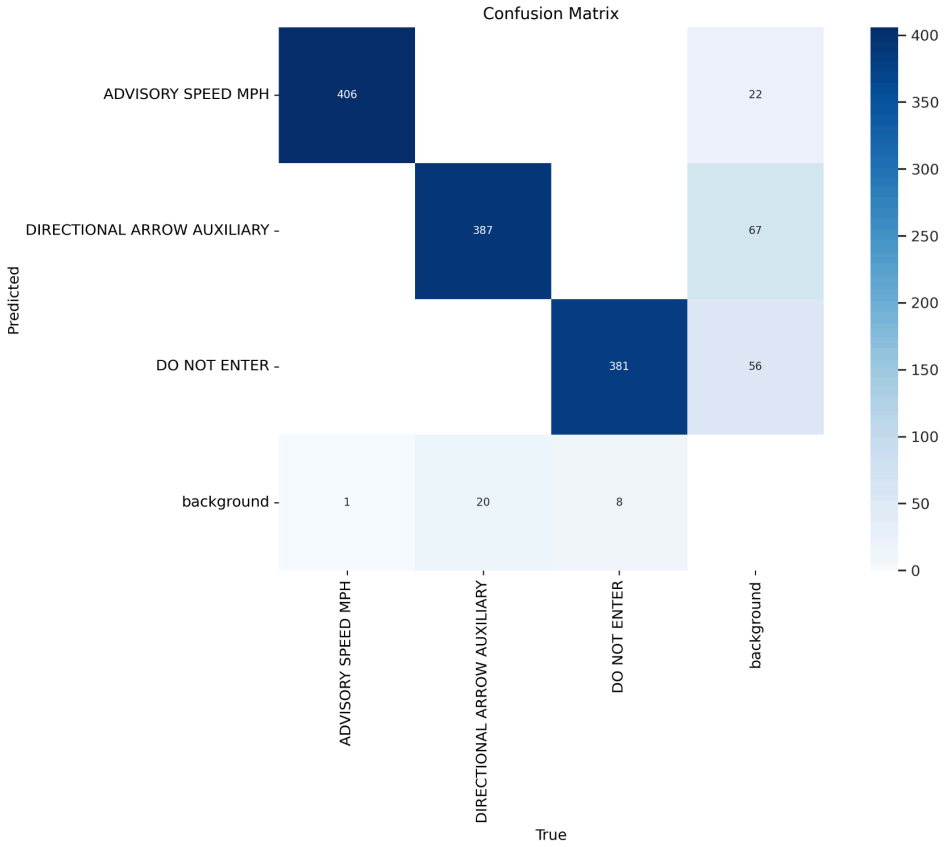
epochs=20, imgsz=720 Training time 1 hour+ with 3.3 minutes per epoch



3. A note on the Training results regarding the performance and graphs.

Loss reduces with epochs in decreasing logarithmic curve
And Accuracy increased with epochs in increasing logarithmic curve





4. A note on the detection results obtained on the unseen data

Ans: with the resolution of 640, the model was not that accurate as training and testing resolution were very different but with resolution of 720, results were impressive. For higher resolutions Google colab GPU was going out of memory.

Though output contains some false detections but confidence scores for that are too low so can be ignored.

Improvements: All images annotation, Higher resolution, extra large yolo model, increased number of epochs

5. A note on the object tracking results

Ans: Tracking results were not good for original low FPS video and tracking needs at least 1-2 frames to track. After trimming the video from 2 minutes(232 frames) to 12 seconds(353 frames), results improved.

Videos attached