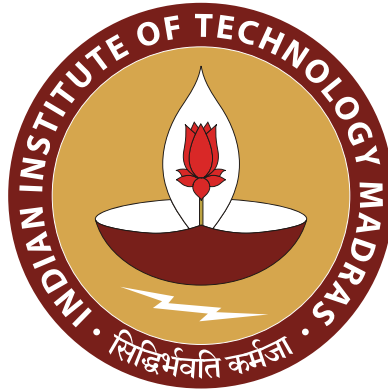


Segmentation module for autonomous car



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Weekly Report for 8th March - 21st March

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Overview

This is a report of the Segmentation module for autonomous car. This contains the progress made by me on the project in the week of 8th March - 21st March, target for the next week and track of the time invested over the project.

Progress made

1) Learnt about convolutional neural networks

Learnt about convolutional neural networks and how they could be used for the project. Started learning how it could be applied on computer vision applications. And solved some of the example problems such as below:

1. Built a convolutional network from scratch. ¹
2. Used the above for the hand signs prediction.²

2) Learnt about ResNets

Learnt about ResNets and why are they used. Very very deep neural networks which are required for object detection, are quite difficult to train. The main issue is due to vanishing and exploding gradients. Hence, we use ResNets for it. Used it for prediction of SIGNS dataset.³

3) Learnt about transfer learning

Learnt how to use transfer learning for our project. There, is always a limitation to the data that we have and the amount of resources that we could use for our model. In such cases we need to be able to someone else's learning to build our own model. Implemented a model using transfer learning.⁴

¹The code for it is in the link

²The code for it is in the link

³ResNet implementation link

⁴Transfer learning implementation link

4) Used YOLO algorithm for car detection in an image

Objective: Our objective in this project is to get the successive pictures received from the camera and detect objects around. So, that our self driving car can move safely around it. Hence, we want to detect objects such as this

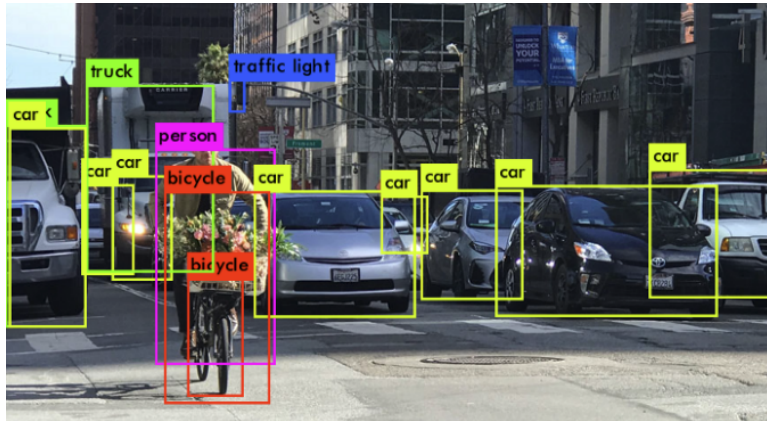


Figure 1: Objective

Hence, we use YOLO algorithm for car detection in an image here. We need to first preprocess the image and make prediction tables which can be used for object detection.

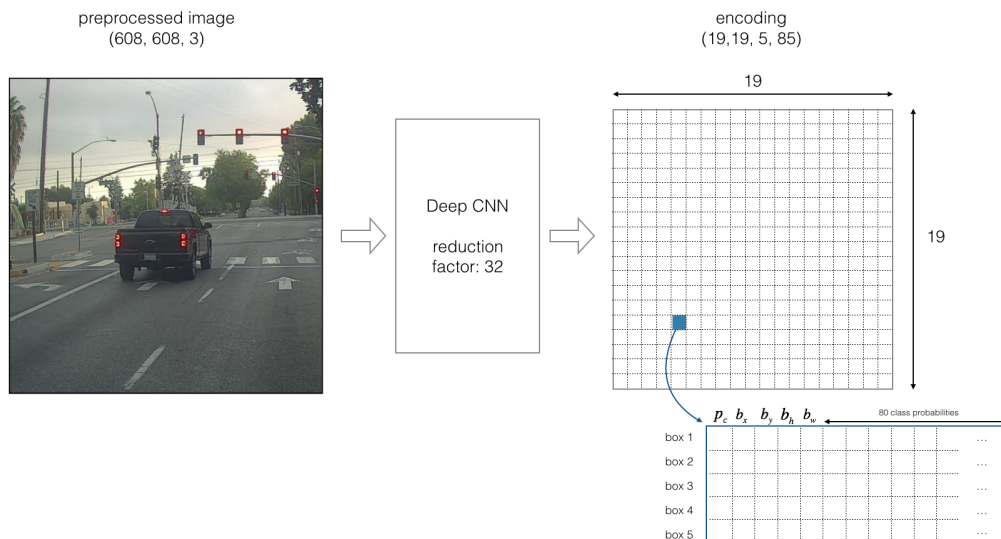


Figure 2: Input image preprocessed

Further we apply semantic segmentation of image, so that it could see various parts of the image. The below picture shows us that

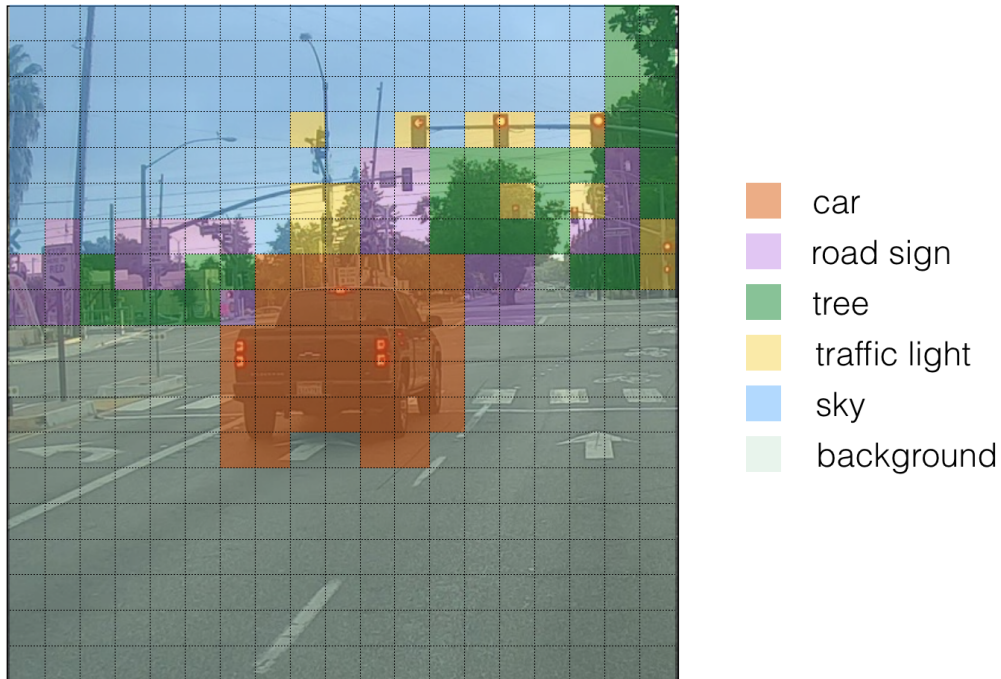


Figure 3: Image after segmentation

Finally, after applying filters and making boxes around the maximum probability predictions. Got the final output as this

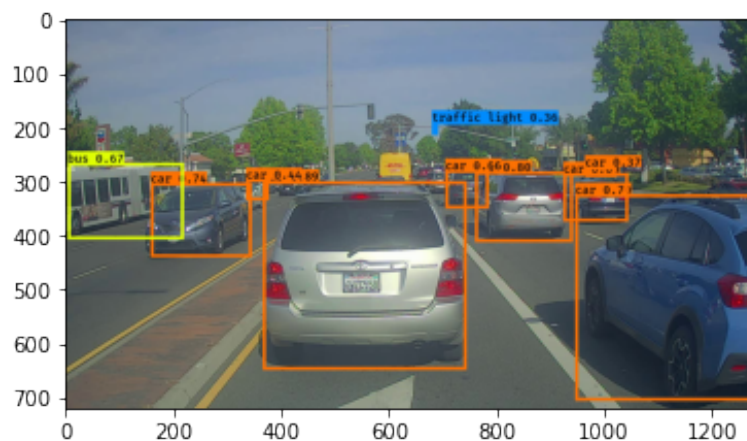


Figure 4: Input image preprocessed

The code for this is given here [link](#). This might not load images in the notebook. Hence, you could download the pdf using this [link](#)

Time track

The time track of the project is as follows

1. Learning about convolutional neural networks (8 hours)
2. Learning about ResNets (6 hours)
3. Learning about transfer learning (6 hours)
4. Implementation of YOLO algorithm (12 hours)

Conclusion

The learning part of the project is almost over. And we can now slowly start working on the project while learning small intricacies side by side.

THE END
THANK YOU
