Objective:

In the case of the autonomous driving, given an front camera view, the car needs to know where to move on the road. For that we need to detect free spaces on the road. This assignment was already done as a part of our college Self Driving Car project.

Algorithm:

A trained neural network is used to label the pixels of a road in images which uses a method named Fully Convolutional Network (FCN). FCN-VGG16 was trained with KITTI dataset for free space detection. FCNs can be described as encoder (a pre-trained model + 1-by-1 convolutions) and decoder(transposed convolutions). Pre-trained VGG16 model with fully connected layers replaced by 1-by-1 convolutions is used in encoder. Transposed convolutions is used to upsample the input to the original image size. Two skip connections were used in the model. Cross entropy loss is used as the loss function.

Dependencies and My environment:

1. Python
2. Tensorflow-gpu
3. CUDA 9.0
4. Numpy, SciPy

How to run:

1. Download pre-trained **VGG** from here . Extract the files and place them inside the **data** folder.

2. The trained model can be downloaded from here . Extract the files and place them inside the **model** folder.

3. Then run the code

   python main.py.

   This code will take the input images from **input_images** folder which is inside the data folder and detects free space/ drivable area in these images and saves them in the **outputs** folder. The output videos are in the **output_videos** folder.