Student Software Project Competition @ 13th ISEC 2020

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Detection of Vehicles using Fully Convolutional Neural Network

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About the Project

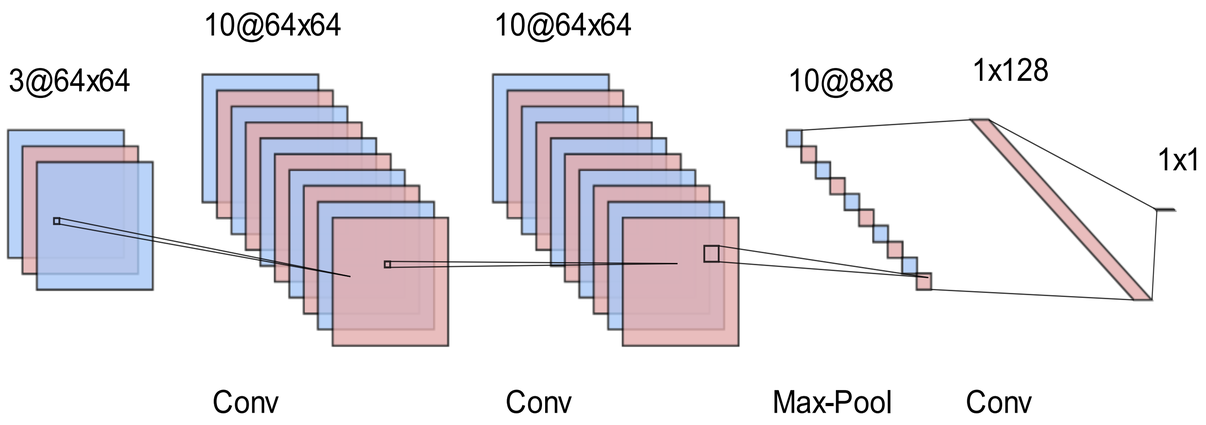
The project implements **Sliding Window Algorithm** using **Fully Convolutional Neural Networks** (FCNN) to detect cars on road. The project has also been extended to parse real-time videos and generate video output with bounding boxes around cars. The use of a FCNN to implement the sliding window algorithm gives computational advantage as the process of convolution is similar to that of sliding window**.**

The project has been implemented using PyTorch and training and testing has been done on GPUs using CUDA to speed up the training and testing process. The trained model has an accuracy of **99.07 %.** The trained network can be deployed on GPUs for faster detection. The project can turn out to be very useful for Autonomous Driving Systems due to computational efficiency of FCNN rather than a brute sliding window implementation.

Software Design

- The project includes a Binary classifier for the image.
- The CNN classifies 64x64 closely cropped images into vehicles and non-vehicles.
- The network is fully convolutional and the dense layers are implemented as 1x1 convolutions.
- The final output of the model is 1x1x1 image or pixel value.
- The classifier is then run of the images to be tested which are of the size greater than 64x64. The output of this is an heatmap image.
- The heatmap is then processed by applying threshold so as to remove false positives. The resulting image contains many bounding boxes.
- Rectangles are then grouped to get one bounding box for producing final output.

Solution



Snapshots