**USE OF SEMANTIC SEGMENTATION OR FCN IN AUTONOMOUS VEHICLES**

Classical CNN estimates the probability of an object or the region of interest for a particular class or category. But this cannot be used in case we need to determine what all objects are present in a particular scene, as the CNN is trained according to the need of classifying a particular object in the scene. The classical CNN method, or the advanced CNN methods even, are not able to do the required task because the model we would be using in Autonomous Vehicles should be able to cope with the changes in the surrounding , even on which the model was not trained on.

This problem is tackled by **SEMANTIC SEGMENTATION**. This involves breaking down the image at pixel level and each pixel is classified to a particular category. Thus, the model not only detects all the objects in the scene, but also gives an idea about the location of those objects in that scene.

The CNN structure can be converted to a **FCN (Fully Connected Network)** by converting the Fully Connected Layers or Dense Layers into CNN layers. One of the benefits of using FCNs is that the model is no longer limited to the input size of the image as the model will scan thoroughly through every pixel of the image and classify the pixels accordingly. The output of FCN is through the deconvolutional layers , which find the input for corresponding output of probability of different pixels. The FCN network classifies each pixel of the image with some probability of it’s occurrence and space in the image, later similar probabilities are grouped together to form the object along with their location in the image. Finally, the deconvoluted layer finds the input for which the cluster was made and returns the cluster of pixels for different objects based on the probability.

The FCN architectures proposed are FCN-8s, FCN-16s, FCN-32s and FCN-AlexNet.