

## **Introduction to Semantic Segmentation using Deep Learning**

This week, we continue our journey on Deep Learning, focussing primarily on semantic segmentation tasks.

So far, we have been reviewing specific concepts on Deep Learning and we have reviewed CNN models for classification and bounding box detection (a.k.a. Object detection) tasks. We now extend our concepts to combine encoder and decoder pairs to design semantic segmentation models that classify at image pixel level if a pixel belongs to the background or the foreground.

### **Deep Learning Concepts**

This week you will learn about batch normalization and softmax for classification. The focus for this week is the use of CNN models for computer vision tasks. Since semantic segmentation task comprises more parameters than classification and object detection models, we will review other types of convolutional kernels, such as transposed convolutions and depth wise separable kernels.

We will review semantic segmentation methods and models and learn about the popular U-net and other encoder-decoder pairs. Also, we will learn about some well known evaluation metrics (such as Jaccard and Dice coefficients specific to semantic segmentation) and the DeepDream method to visualize the concentration of features in images.

This week's content has lower weightage on video content and contains more blogs and tutorial files for hands on exercises. There needs to be significant focus on fine-tuning project ideas during the week.

#### **A. Week 7 Learning Objectives:**

- To understand underlying concepts behind batch normalization and softmax classification.
- To review example use cases for the use of deep learning in computer vision.
- To learn specific semantic segmentation methods and models using deep learning.
- To learn about variants in loss functions, convolutional layers and explainability of the deep learning models.