**Day 16**

**What to do?**

Learn about how to initialize weights and different techniques.

**Weights:**

Weights are everything in neural networks. It is the weights that make sure the information is carried forward and backward efficiently to ensure better performance of the network. For a model to perform better, it all comes down to how the weights are initialized.

At the beginner level, weights are usually initialized as all zeros. However, it does not work in neural networks, especially deep neural network. If weights of all layers and neurons are zero, activation values will be the same and so will the gradients. This problem is called “problem of symmetry ways”.

If the weights are too large initially, the gradients tend to explode. If the weights are too small initially, the gradients tend to vanish. To make sure that the weights do not explode or vanish, we could make sure that the weights average to zero and maintain the same variance at every layer.

**Random Initialization: Symmetry Breaking:**

One of the ways to break symmetry problem is to randomly initialize the weights randomly in [-Ꜫ, Ꜫ]. For example, weights at layer 1 = random (10, 11) \* (2 \* epsilon) – epsilon, weights at layer 2 = random (1, 11) \* (2 \* epsilon) – epsilon.

**Xavier initialization:**

Probably the most utilized method to initialize weights. This technique makes sure that the variance remains the same at each layer (var (a [l – 1]) = var (a[l])). After few math steps, it concludes that n[l-1] \*var (W[l]) = 1