**How to improve a neural network.**

**Overview Mode.**

**Fine tuning Neural Network Hyperparameters**

**1.) Fine tuning Neural Network Hyperparameters.**

a. No.of Hidden Layers ? Kitna Hidden Layers hona chaye this is Hyperparameter

b. How much Number of Neurons must be their it is one of the hyperparameter?

c. What to set Learning Rate? Learning Rate Hyperparameter

d. Which Optimizer?

e. Batch_size ? how to decide this ?

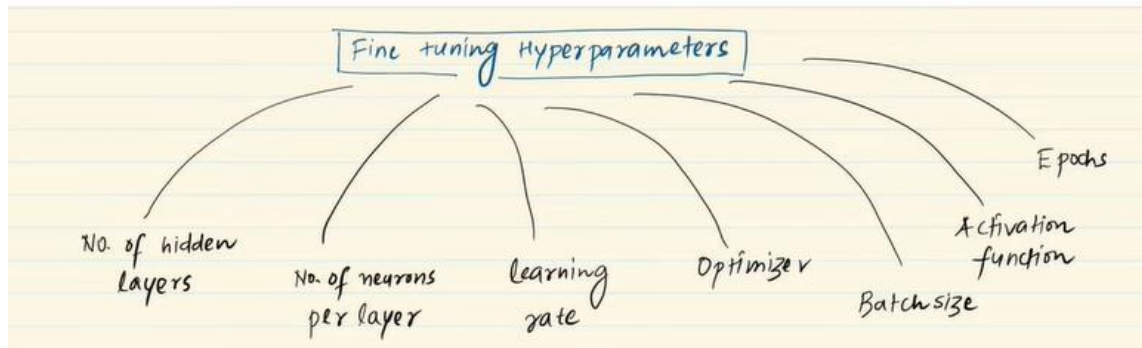f. Activation Function? How to decide this

g. Epochs ? How to Decide this

**Agr Upar ke saare chiz thikh krliye then to Kuch problems hai jo aaskte**

**Below are those problem:**

**2.)By Solving Problems**

a.)   Vanishing/Exploding Gradient
b.)   Not Enough data
c.)   Slow Training
d.)   Overfitting (As NN mai bht saare parameters rehte so ovefit kabhi issue rehta hai)

How to Tune Hyperparameters

Fine tuning Hyperparameters

No. of hidden layers — No. of neurons per layer — learning rate — Optimizer — Batch size — Activation function — Epochs

1. No of Hidden Layers

How much?

You can even just use 1 Hidden layer with Lot of Neurons

But Much Better approach is Using Multiple Hidden Layers with Few Neurons, This architecture will help you best in lot of scenario.

Why Like this?

As Deep Learning uses a technique known as Representation learning,

Data mai Jo Primitive Patterns hai,

Shuru vale Hidden Layers unko Capture karte hai,

Shuru vale Hidden Layers will Capture Primitive Features like Lines, Layers

Beech vale Hidden Layers -> Lines, layers , basically primitive Features ka use karke Shape banate hai,

& Last Vale Hidden Layers -> saare shapes ko joddkr Complex pattern banate hai & full picture dete hai.

So Yeah jo Hierarchy hota hai, ishe bhaut acha capture krpata hai

1 Deep neural Network mtlb zyaada no. of hidden layers

So It must be prefer that we must use More No. of hidden Layers with normal Neurons.

How much Hidden Layer ?

Jbhtak Overfitt nahi hota tbhtak , experiment karke hidden layers bada ghataskte hai

Ish Approach ka 1 Aur Fayda hai, we call it Transfer learning

Of CNN.

E.g We have model which detects human faces

Suddenly we got another project we have to identify Monkeys images,

So in that scenario we can use Starting & Middle Hidden layers of our Old Model

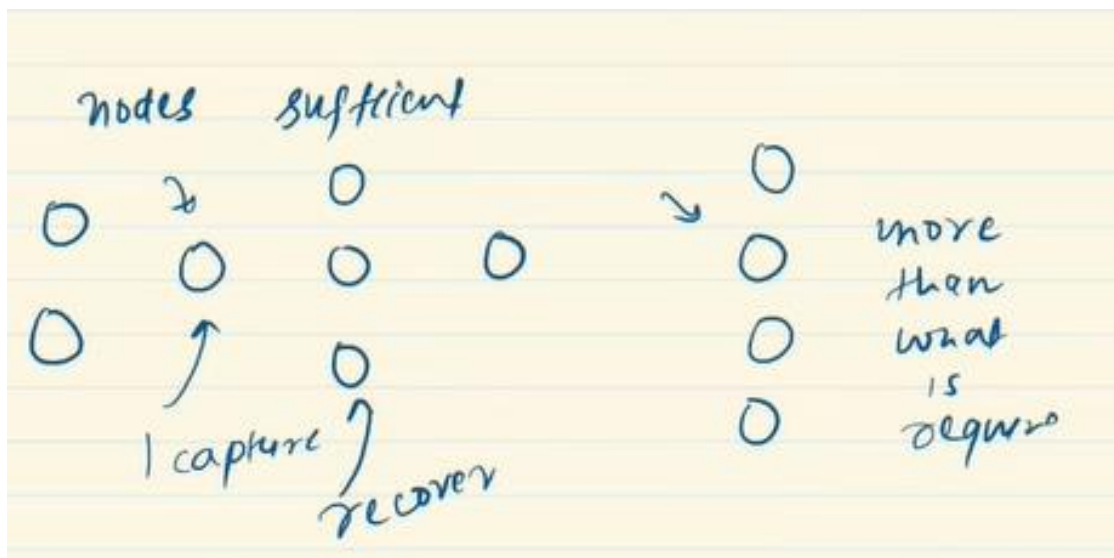*& last phase of hidden layers mai , we will train it on monkey images.*

Concept -> *1 Problem keliye Model train krke rkhte hai*

Then Similar Problems ke upar same technique use krskte (atleast Shur uke hidden layers)

How Much Neuron in Each Layer?

Answer to this is: *Sufficient*

Number of Neurons must be sufficient

Learning Rate, Optimizer, Activation Function, we will study Later

Let's understand Batch Size & epoch

Batch Size

Small Batch – 8 to 32

Large 819 -Depends on GPU

Dono ka fayda Nuksan hai

Large Batch Size se Training fast hota hai, Small se slow hota hai,

Small Batch Size se Naye Data set Pe Generalization ya result Better hota hai

As Per Research What you can do is , Do with Learning Rate Scheduler.

Warming Up Technique:

Shuru mai Epoch ke time , LR kammrkho &

Dheere Dheere aageh Learning Rate increase karte jaao.

Warming Up Technique Result acha deti hai,

Start kro pehle Large batch size se if Result better millrha then best chiz hai agr nahi millrha tou vahi Warm Up technique use karo
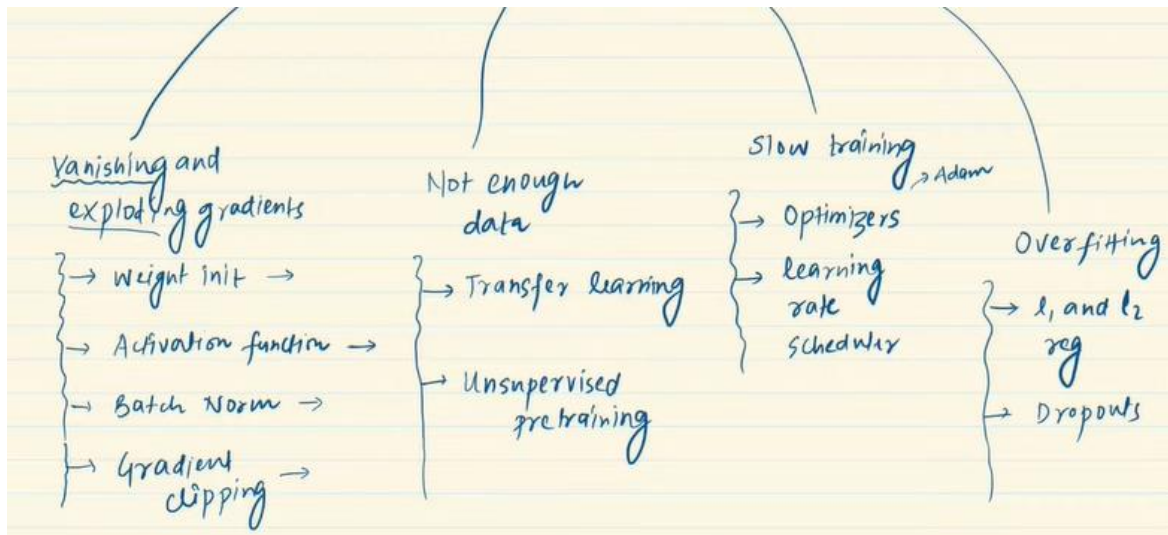
Till How Much Epoch we can run it?

You can run epoch as per your wish,

But Just use the concept of

**Early Stopping**

Early Stopping Mechanism jo hai

Intelligent jishe pata hota hai kbh rukna hai,

JBh Loss mai koi improvement nai dikta kindoff tbhi vo rukkjata hai.

Detail mai aageh dekhenge

Problems with Neural Network
& Their Solution Overview

Vanishing and Exploding Gradients

Solution:

1.) *Weight Initialization*
2.) *Activation Function*
3.) *Batch Normalization (Recent Technique)*
4.) *Gradient Clipping (Specifically used for Exploding Gradient)*

Not Enough Data?

Solution:

1.) *Transfer Learning*
2.) *Unsupervised Learning*

Slow Training?

Solution:

1.)	*Optimizers*
2.)	*Learning Rate Scheduler*

Overfitting?

1.)	*L1 & L2 Regularization*
2.)	*Dropouts*

This is what, will learn in coming time, this all will give a solid foundation on Neural Network.