Optuna

Hyperparameter Tuning

→ # Types of parameters:

① Model Parameters

→ These are parameters of model that can be determined by traing with training data. These can be considered as internal parameter.
Eg: weights & Biases (y = wx + b)

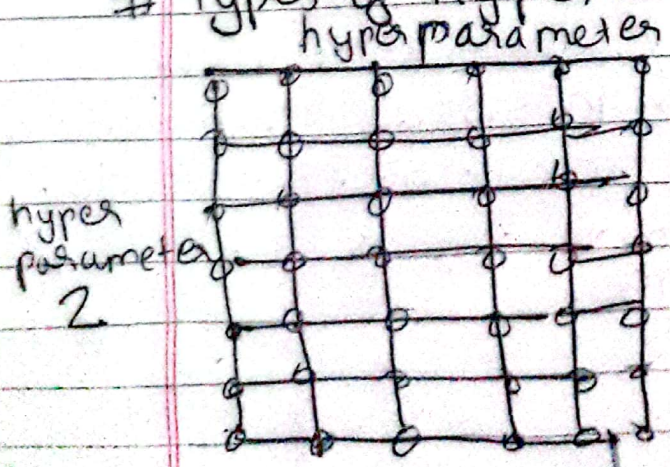
② Hyperparameters

→ Hyperparameters are parameters whose values control the learning process. These are adjustable parameters used to obtain an optimal model. External Parameters

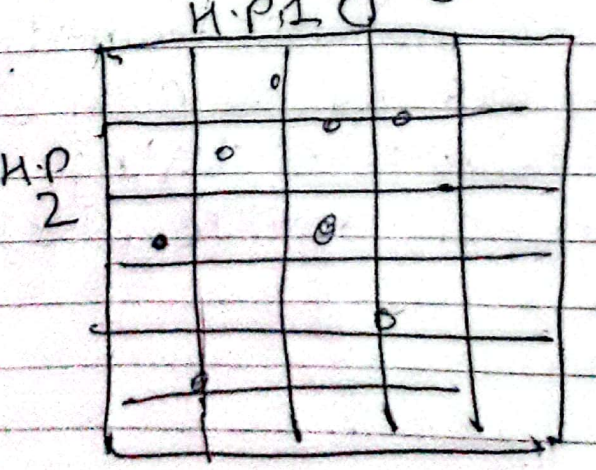
- Learning rate, No of epochs, n-estimators

- Hyperparameter tuning is finding best hyper parameters for machine learning model.

Types of Hyperparameter Tuning type-



Grid search CV
choosing each value in grid.



Randomized search CV
Choosing random value.

optuna:

→ Hyperparameter tuning Framework.

→ GridSearch & RandomSearch are slow. optuna use Bayesian search.

→ It says like take two hyperparameter.

max_depth & n_estimator.

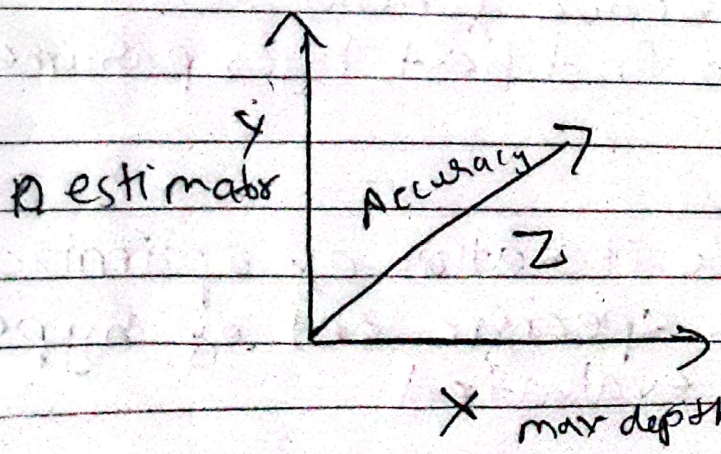
So if max depth & n estimator values increase increases accuracy.

Max_depth ↑ n_estimator ↑ → accuracy ↑

It says there is some mathematical relation between max depth & n estimator & accuracy.

So we can write,

accuracy = f(max_depth, n_accuracy).



Bayesian search tries to find maximum accuracy so we can get its corresponding max depth & n estimator.

Gridsearch & ~~Use~~ Randomsearch doesn't depend on perevious points but bayeisean does.

Eg: max_depth
(1,2,3,4,5)

n_estimators
(50,100,150,200,250)

	50	100	150	200	250
1					
2					
3					
4					
5					

1) Study
→ A study in optuna is optimization session that encompasses multiple trials. Its essentially a collection of trials aimed at optimizing objective function.
- Eg: A study to find best hyer parameters.

2) Trial
→ Trial is single iteration of optimization process where specific set of hyper parameters is evaluated.

3) Samplers
→ Samplers is algorithm that says which next H.P should be tried next. Optuna uses

Tree-structured parzen estimator (TPE) by default.

4) Objective function
→ Function to be optimized during hyperparameters search.