

Hyperparameter Tuning:

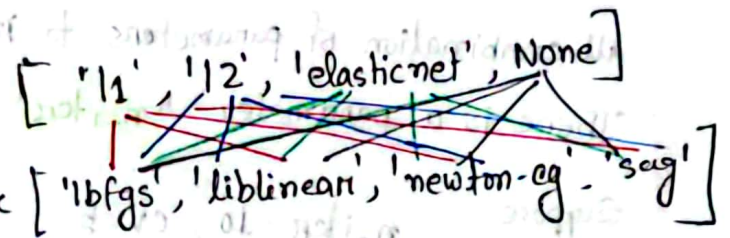
Machine learning algorithms have settings or configurations that cannot be learned from the data. These (settings) parameters are called Hyperparameters. Hyperparameter tuning is the process of best parameters combinations for a machine learning model to achieve the best performance on a given task.

Types of Cross Validation techniques for Hyperparameter tuning:

- ① Grid Search CV [Grid Search + CV]
- ② Randomized Search CV [Randomized Search + CV]

Grid Search CV:

Parameters 1 → Penalty ['l1', 'l2', 'elasticnet', None]
Parameters 2 → Solver ['lbfgs', 'liblinear', 'newton-cg', 'sag']



Suppose, we will perform Logistic Regression. We will take each unique combination and run the model. Then for each combination, we will also do cross validation for 5 Times (K Fold CV). To calculate average accuracy. So, for every combination we will

get an average accuracy after cross validation. So, for which combination we will get the best average accuracy we will use those parameters while model creation.

It's called Grid Search because we take all the combinations of the parameters.

Disadvantage:

- ① Time complexity increase to train the model, as it takes all kinds of combination test.

Randomized Search CV:

Same process like Grid Search CV but randomized Search CV doesn't check all combination of parameters to increase performance.

There is a parameter "n_iter" in which we declare values like

Suppose $n_iter = 10$, $cv = 5$

Means, it will take 10 random parameter combinations to train the model and for each combination it will perform cross validation for 5 times and will find the average accuracy. Then we will use the best average accuracy to get the best parameter combination which will use in the model creation.

Major advantage: Less time complexity as it is not checking all combinations