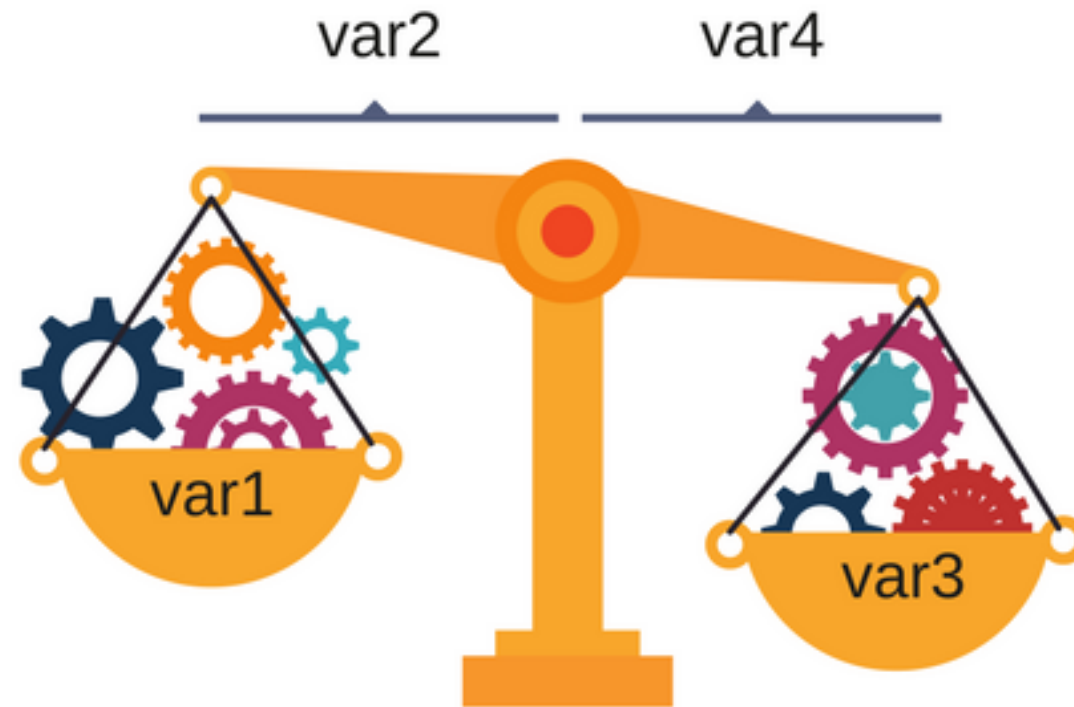
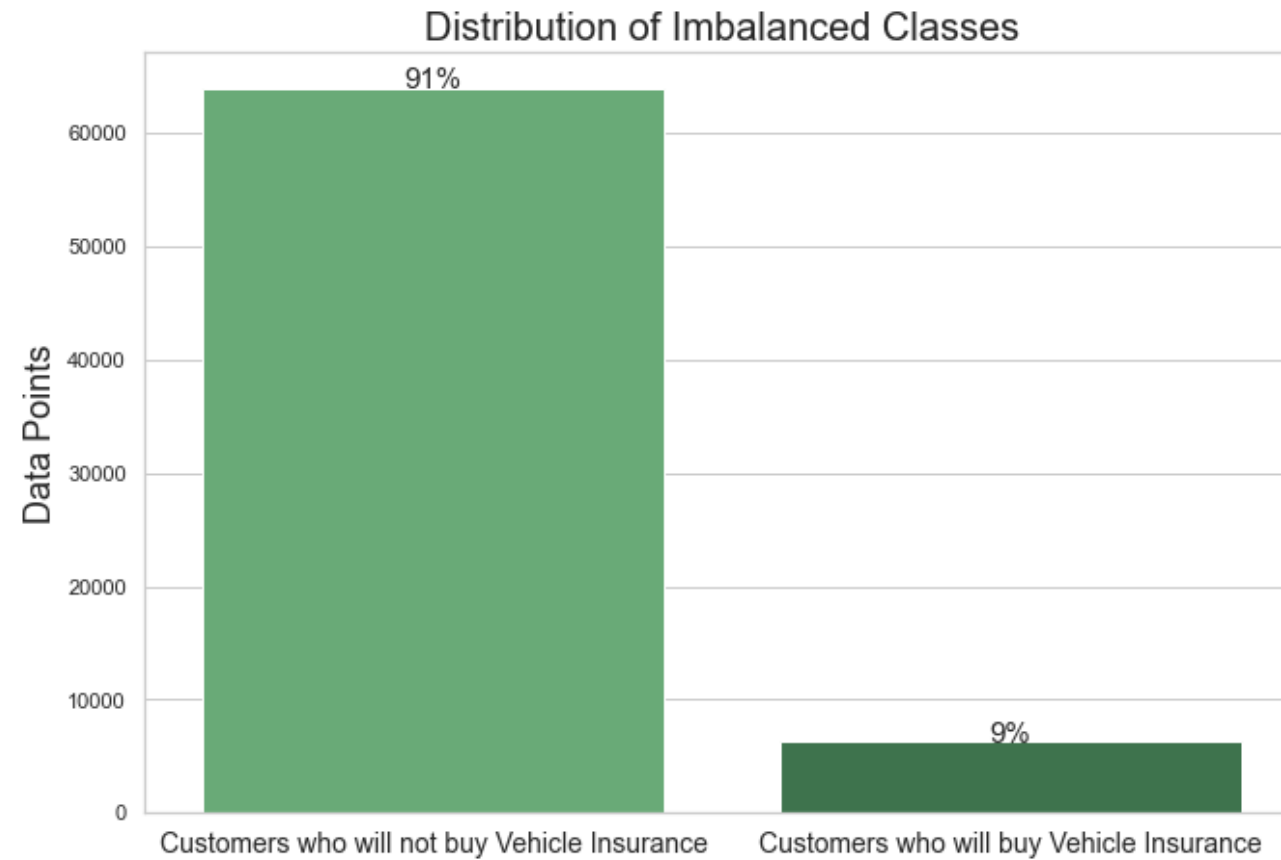


Imbalanced Dataset



Imbalanced Dataset



Is there any rule?

There isn't a strict rule or universally agreed-upon threshold for what constitutes an imbalanced dataset. It's often context-dependent and can vary based on the specific problem, the nature of the data, and the goals of the analysis or model.

However, a commonly used heuristic is the **80-20 rule**, where a dataset is considered imbalanced if the class distribution is roughly 80% to 20% or worse. In this case, **the majority class would have around 80% of the samples and the minority class around 20%.**

That being said, what's considered imbalanced can vary widely. In some cases, a class distribution of **60-40 might be considered imbalanced**, especially if the minority class is critical or costly to misclassify. In other cases, a distribution of **90-10 might be considered balanced**, especially if the classes are naturally imbalanced in the real-world scenario to which the model will be applied.

Ultimately, it's important to consider the **specific domain**, the implications of misclassifications, and the goals of the analysis when determining whether a dataset is imbalanced. Additionally, the choice of threshold might be influenced by practical considerations and domain expertise.

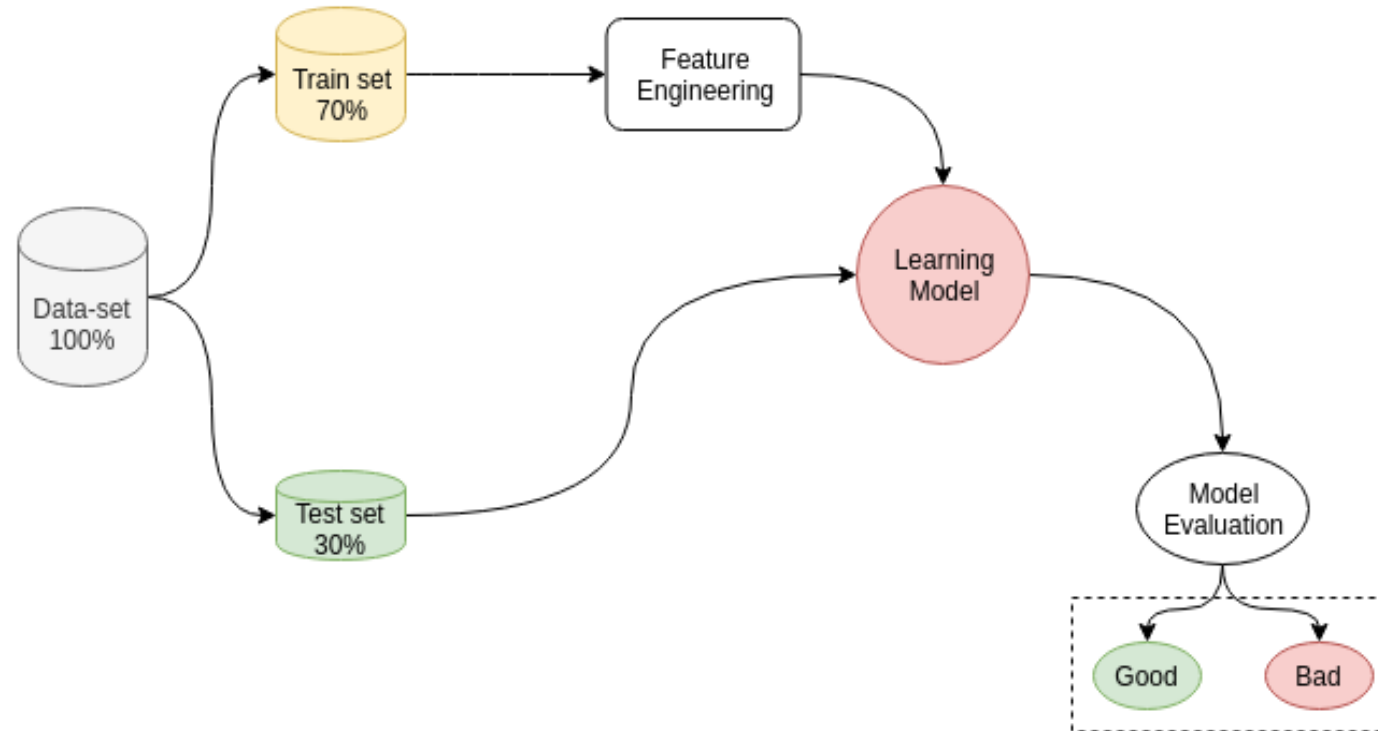
Cross Validation

Cross-validation is a resampling procedure used to evaluate machine learning models on a limited data sample. It is a technique used to protect against overfitting in a predictive model, particularly in a case where the amount of data may be limited. In cross-validation, you make a fixed number of folds (or partitions) of the data, run the analysis on each fold, and then average the overall error estimate.

Cross Validation

- *Hold Out Cross Validation*
- *K-Fold Cross Validation*
- *Leave One-Out Cross Validation (LOOCV)*
- *Stratified K Fold Cross Validation*

Machine Learning Model

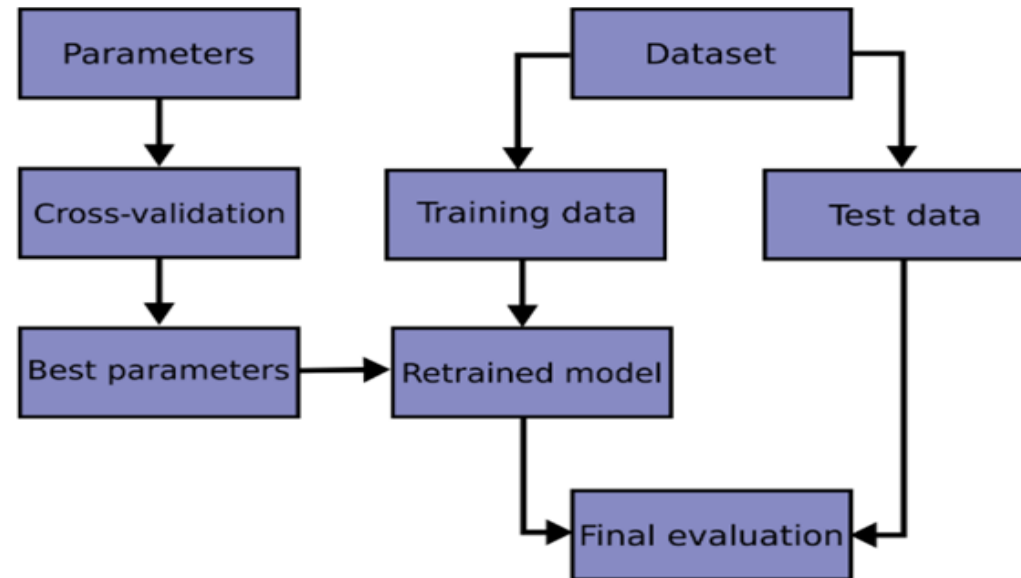


Cross Validation

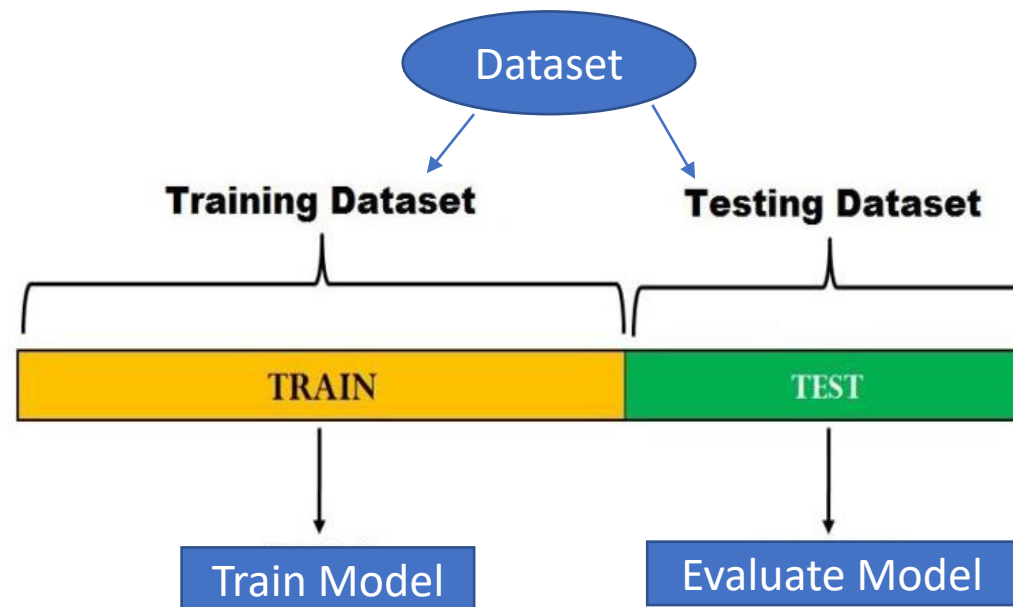
Cross-validation is a resampling procedure used to evaluate machine learning models on a limited data sample.

1
2
3
4
5

K = 5



Hold Out Cross Validation



Hold Out Cross Validation

```
from sklearn.model_selection import train_test_split
```

```
xtrain, xtest, ytrain, ytest = train_test_split(x,y, train_size=0.7, random_state=1)
```

K-Folds Cross Validation

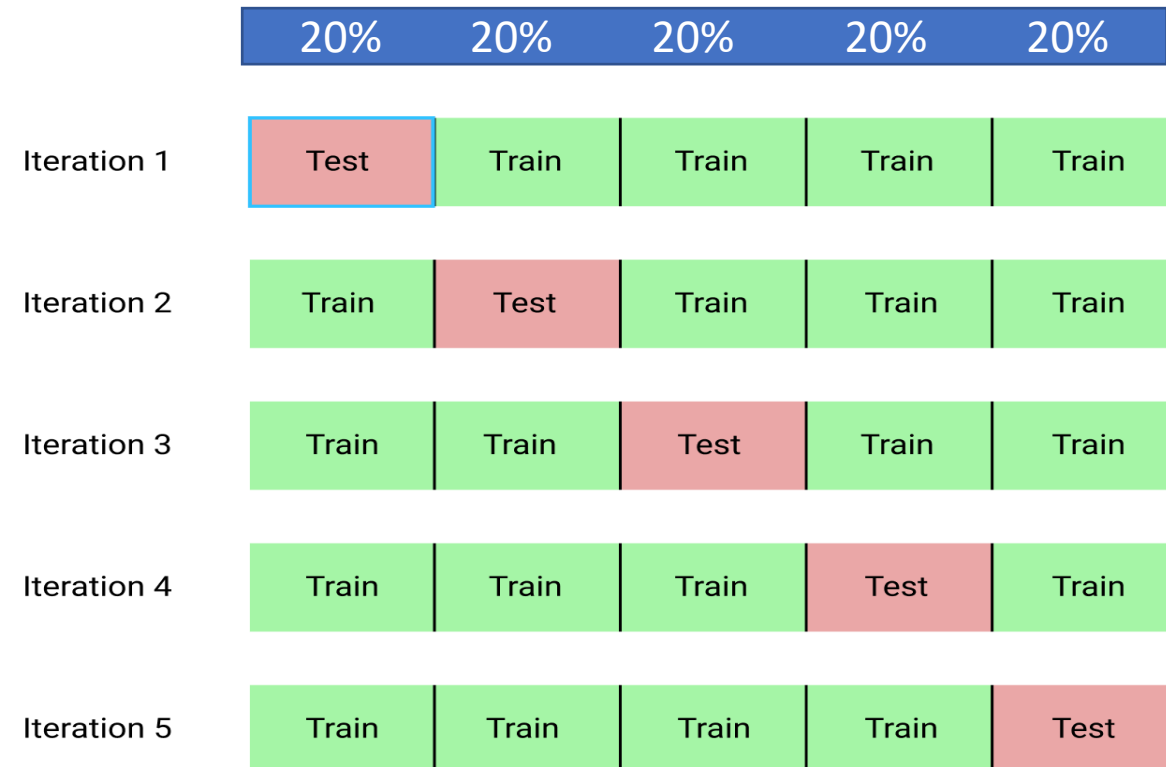
The general procedure is as follows:

- 1. Shuffle the dataset randomly.*
- 2. Split the dataset into k groups*
- 3. For each unique group:*
 - 1. Take the group as a hold out or test data set*
 - 2. Take the remaining groups as a training data set*
 - 3. Fit a model on the training set and evaluate it on the test set*
 - 4. Retain the evaluation score and discard the model*
- 4. Summarize the skill of the model using the sample of model evaluation scores*

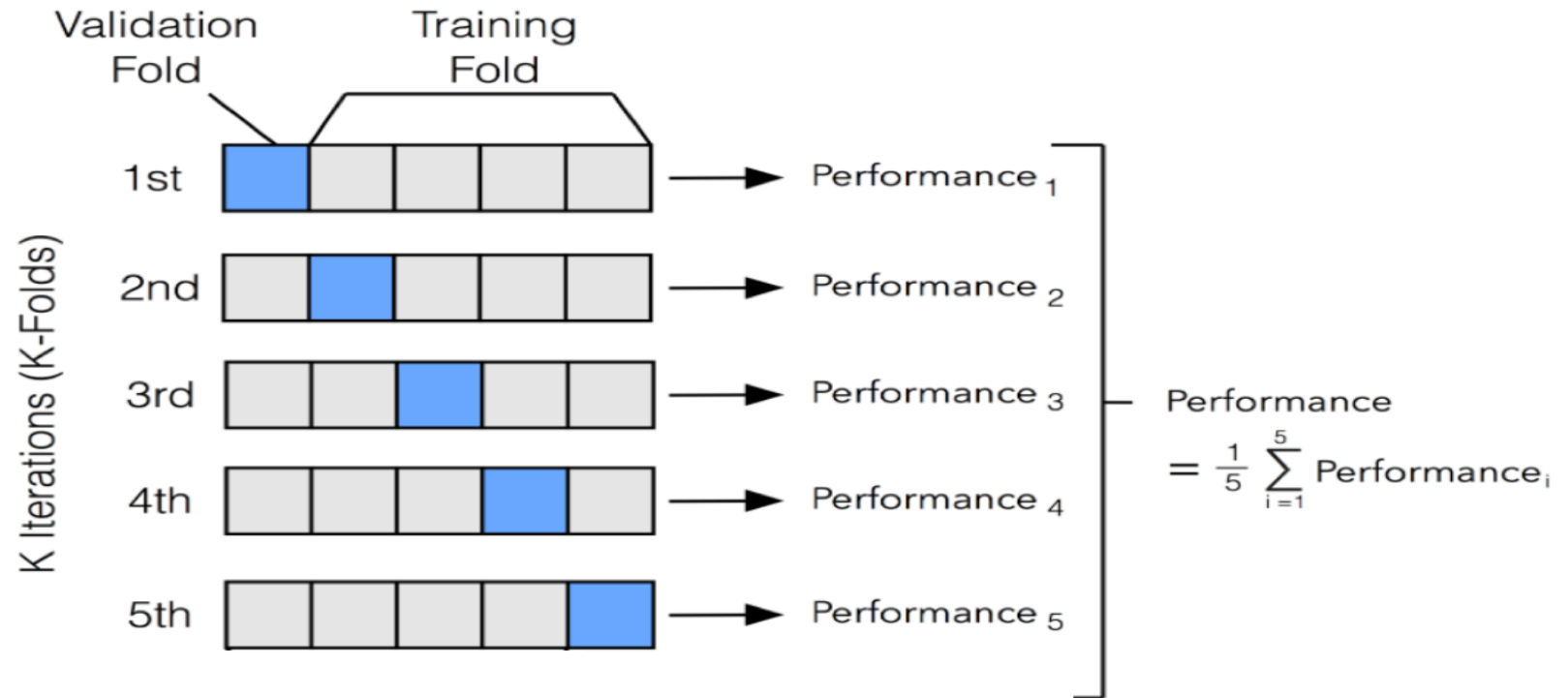
K-Folds Cross Validation

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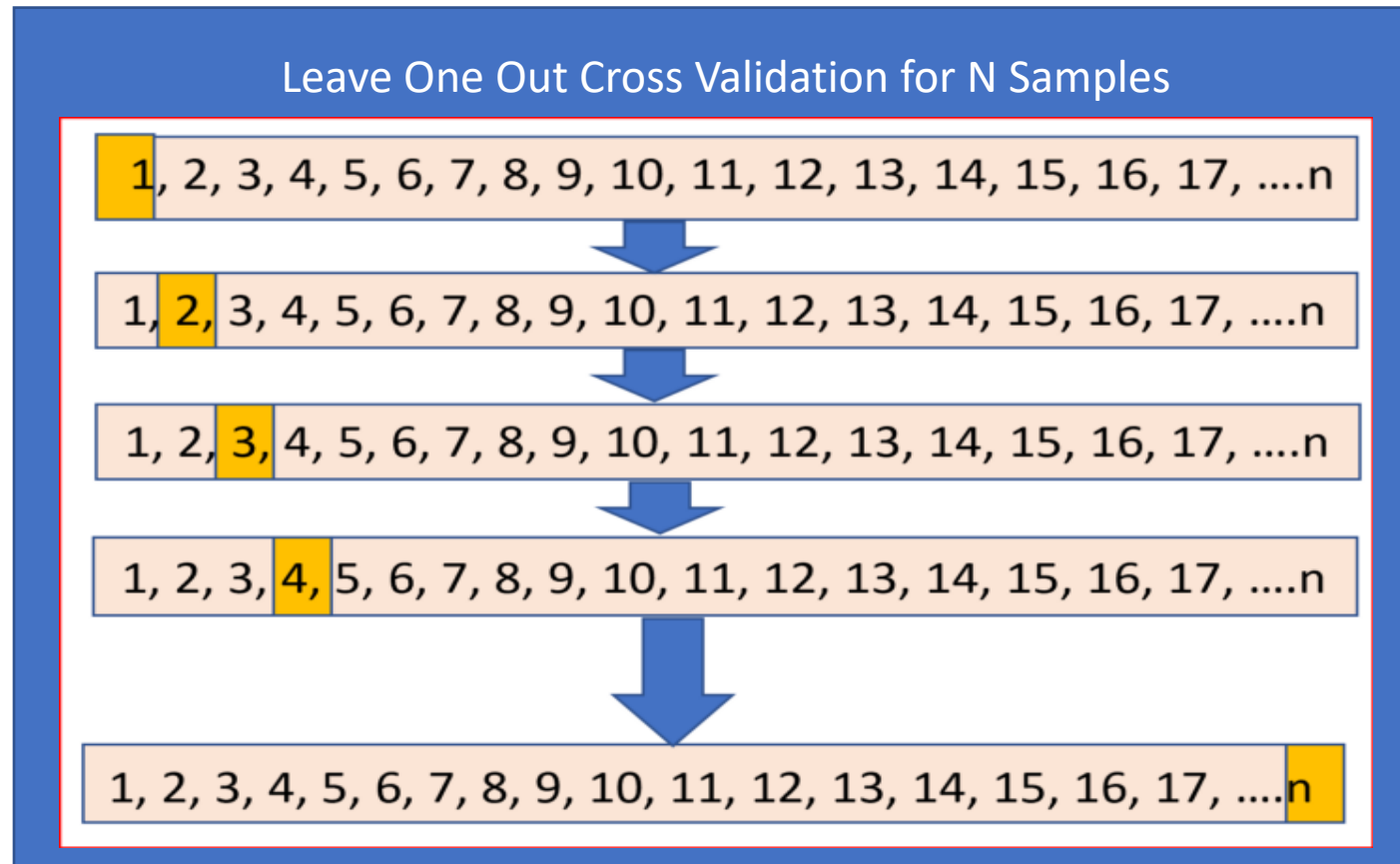
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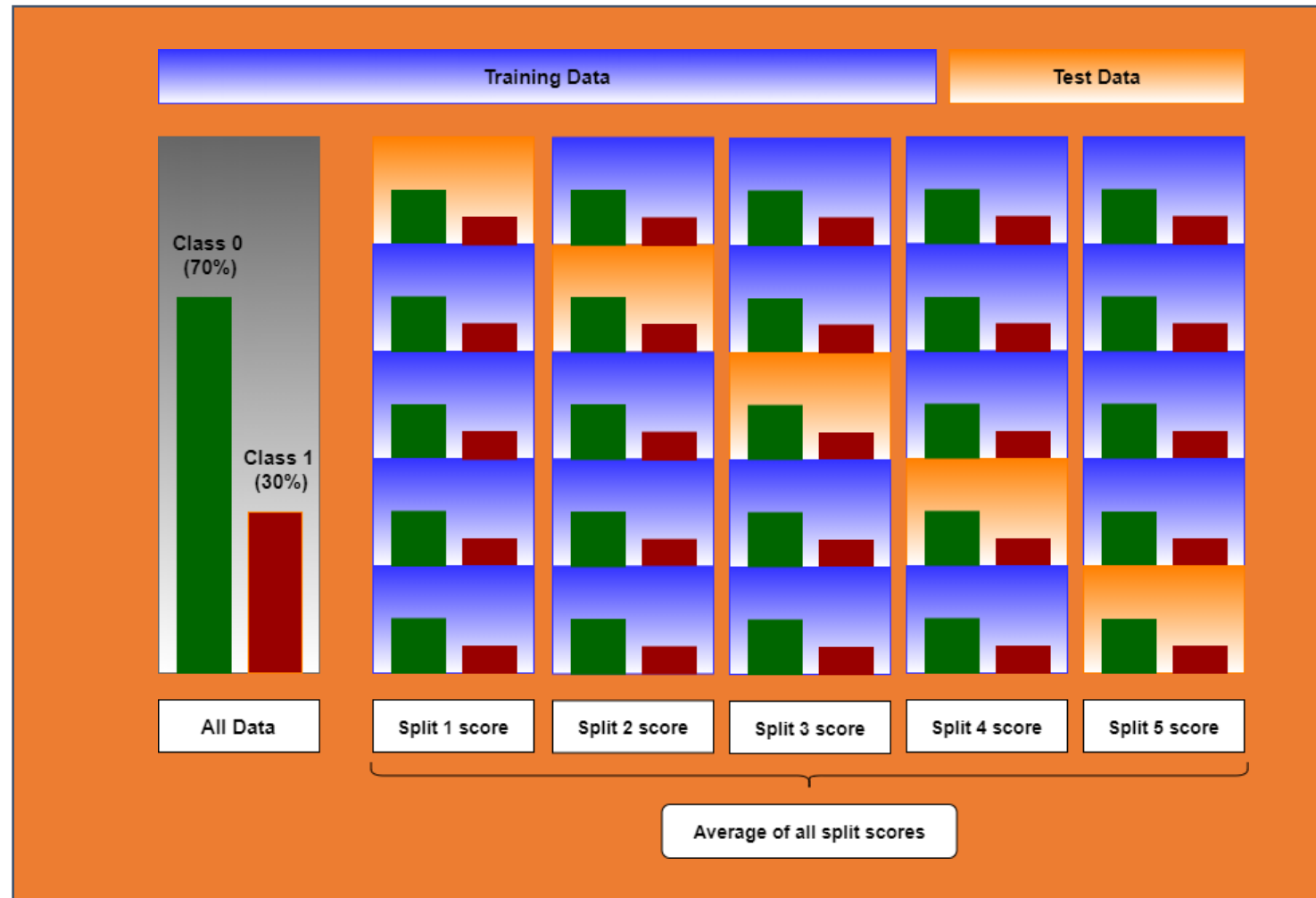
K-Folds Cross Validation



Leave One-Out Cross Validation (LOOCV)



Stratified K Fold Cross Validation



Let's Do it with PYTHON