



# Hyperparameter Tuning & Model Validation

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IKN

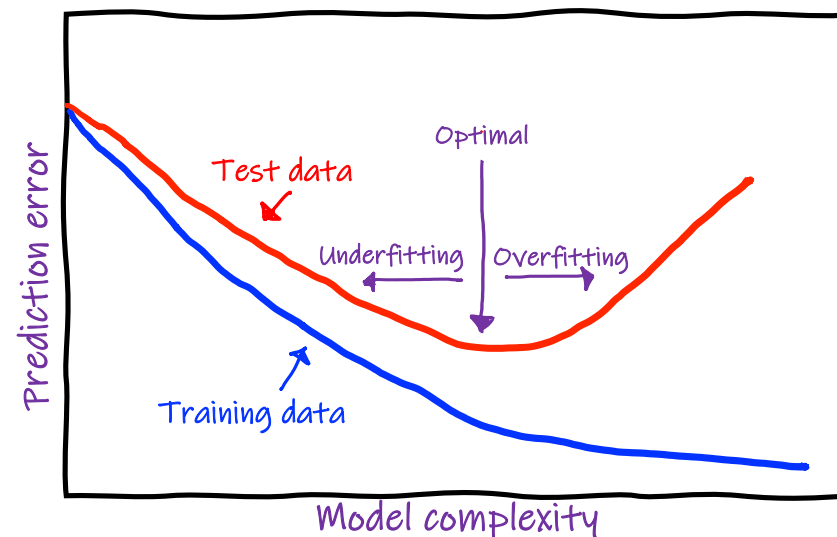


# Hyperparameter Tuning

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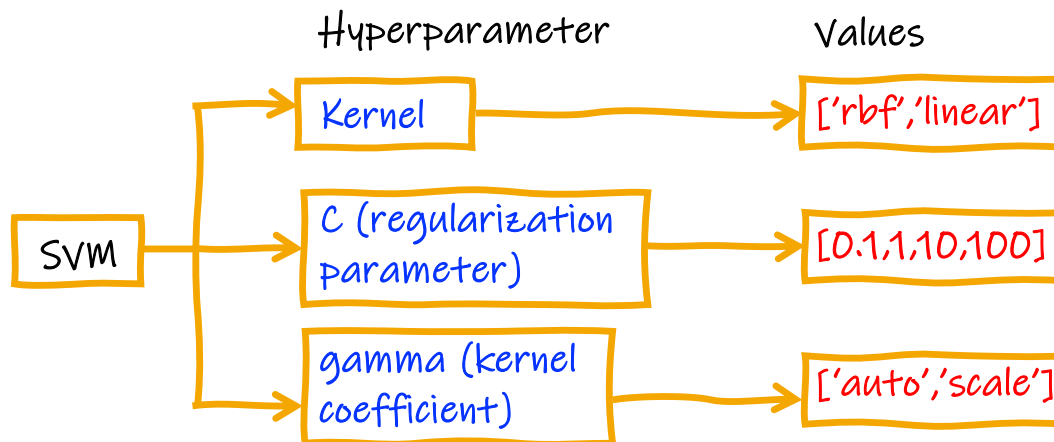
# What is hyperparameter tuning?

- A tightrope walk to achieve a balance between underfitting and overfitting



# What is hyperparameter

- A configuration that is external to the model and whose value cannot be estimated from data.
- Example: Hyperparameter of SVM

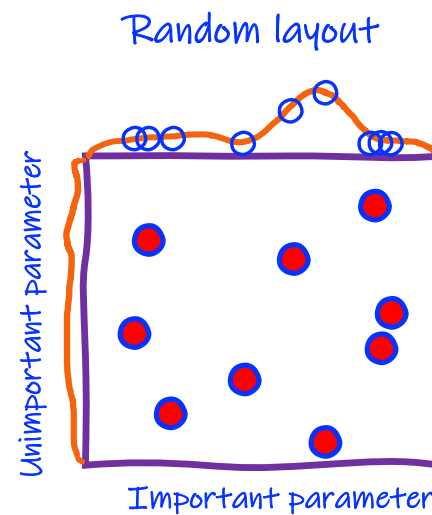
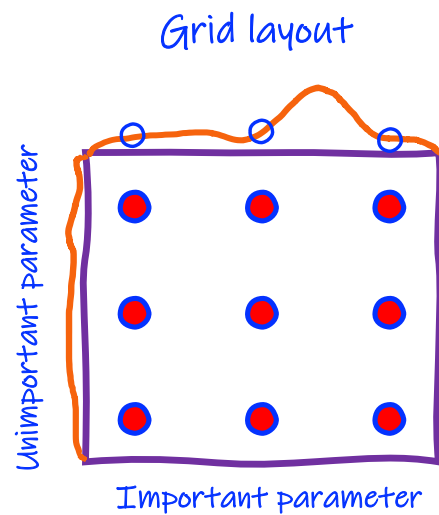


# Hyperparameter tuning algorithms

	Random	Adaptive	Evolutionary
Sequential	Grid search/ Random search	Bayesian optimization	Genetic algorithm
Parallel	Asynchronous Successive Halving Algorithm (ASHA)	Bayesian Optimization with Hyperband (BOHB)	Population Based Training

# Hyperparameter tuning algorithms

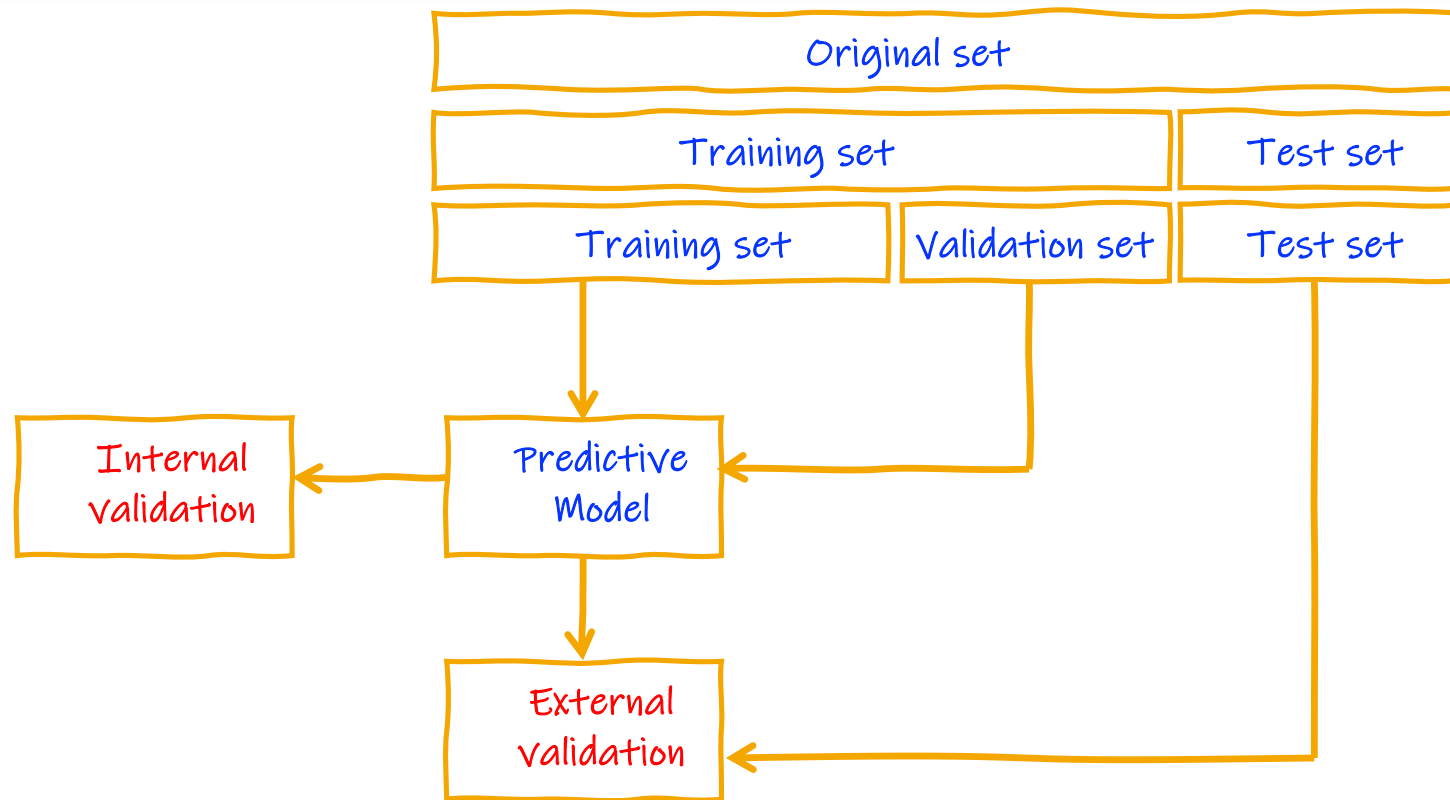
- Grid search vs Random search





# Model Validation

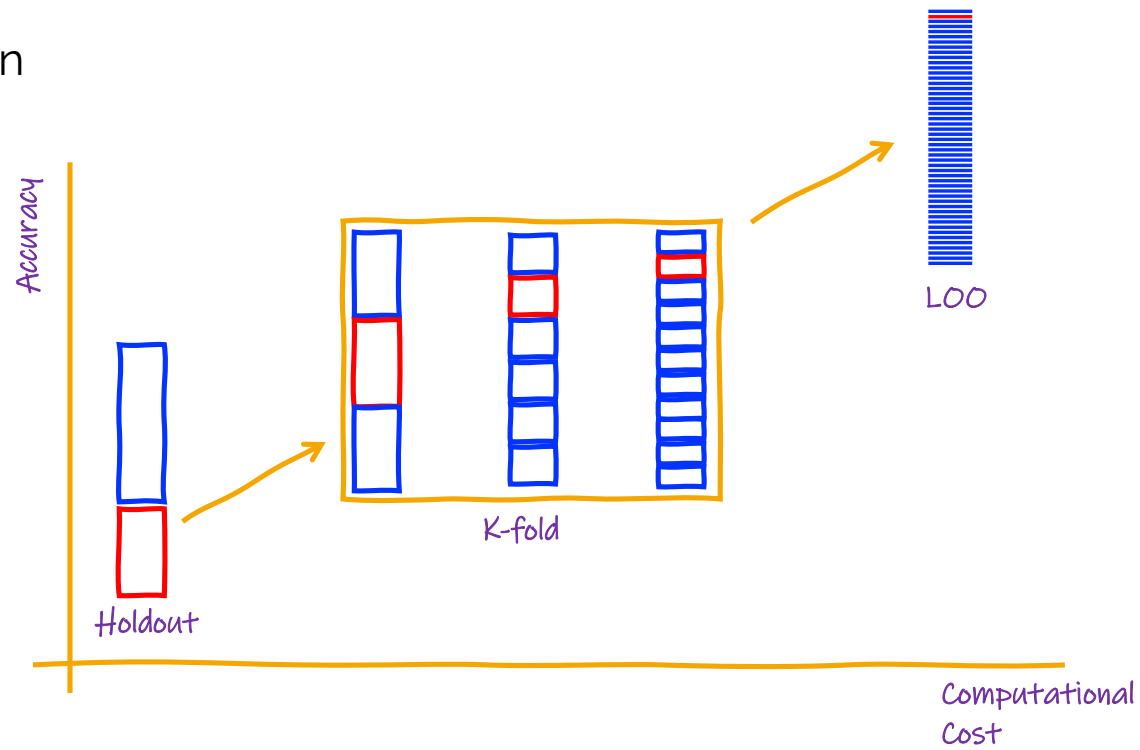
# Model validation



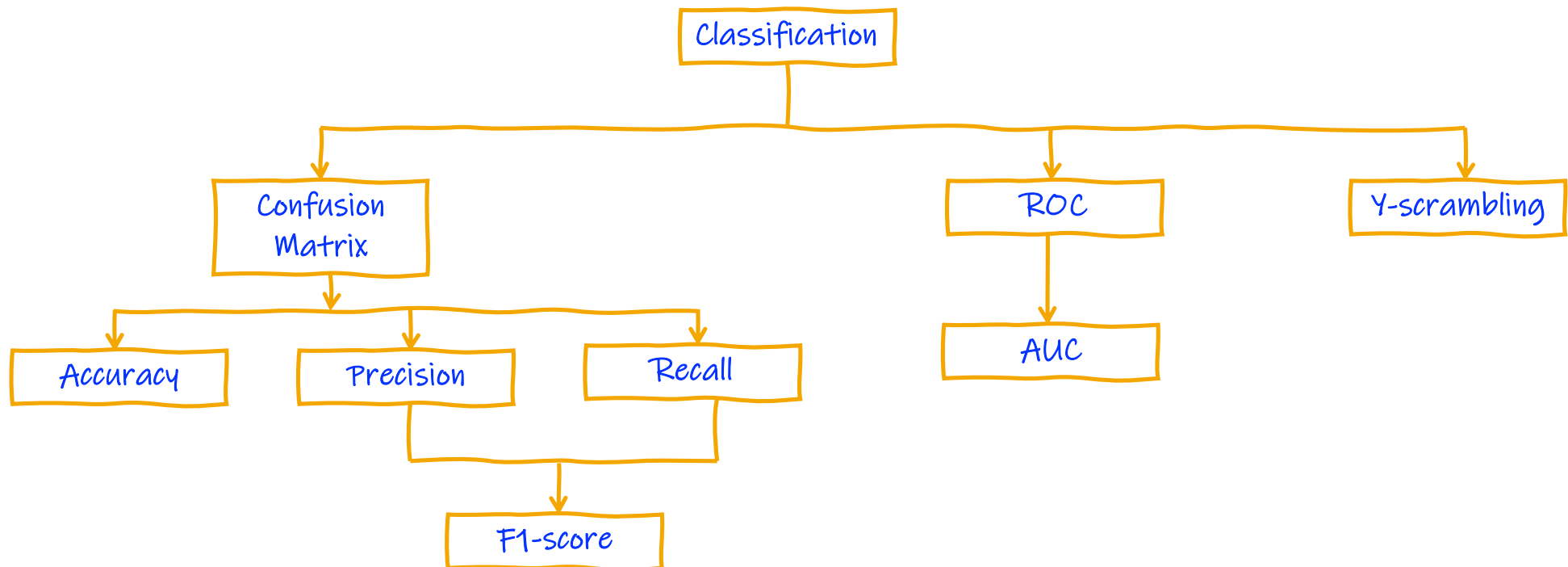


# Model validation

- Cross validation



# Classification metrics



# Confusion matrix

		Predicted Class		
		Positive	Negative	
Actual Class	Positive	True Positive (TP)	False Negative (FN)	Recall $\frac{TP}{TP + FN}$
	Negative	False Positive (FP)	True Negative (TN)	
		Precision $\frac{TP}{TP + FP}$		Accuracy $\frac{TP + TN}{TP + TN + FP + FN}$

**F1-score**  
 $\frac{2 * \text{Precision} * \text{Recall}}{\text{Precision} + \text{Recall}}$

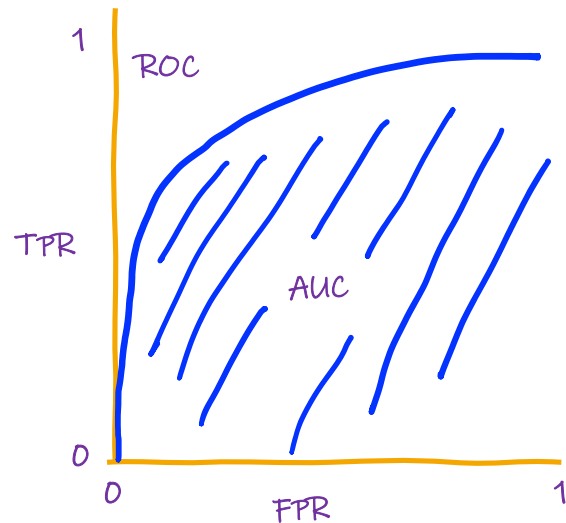
a measure that tells us what proportion of positive label was predicted by the algorithm as positive label

a measure that tells us what proportion of positive label, actually positive label

the number of correct predictions made by the model over all kinds predictions made

# Area under curve (AUC)

- AUC tells how much model is capable of distinguishing between classes.



# Regression metrics

