99% de acurácia... tá, mas e aí?

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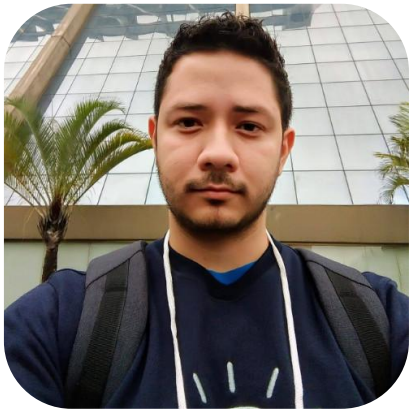
kaggle https://www.kaggle.com/rdcmdev

Quem sou eu?



UEA
UNIVERSIDADE DO ESTADO DO AMAZONAS

itriad.
Instituto Triad de Pesquisa e Desenvolvimento

Engenheiro de Machine Learning

Graduando em Engenharia de Computação

Ex Maratonista de Programação

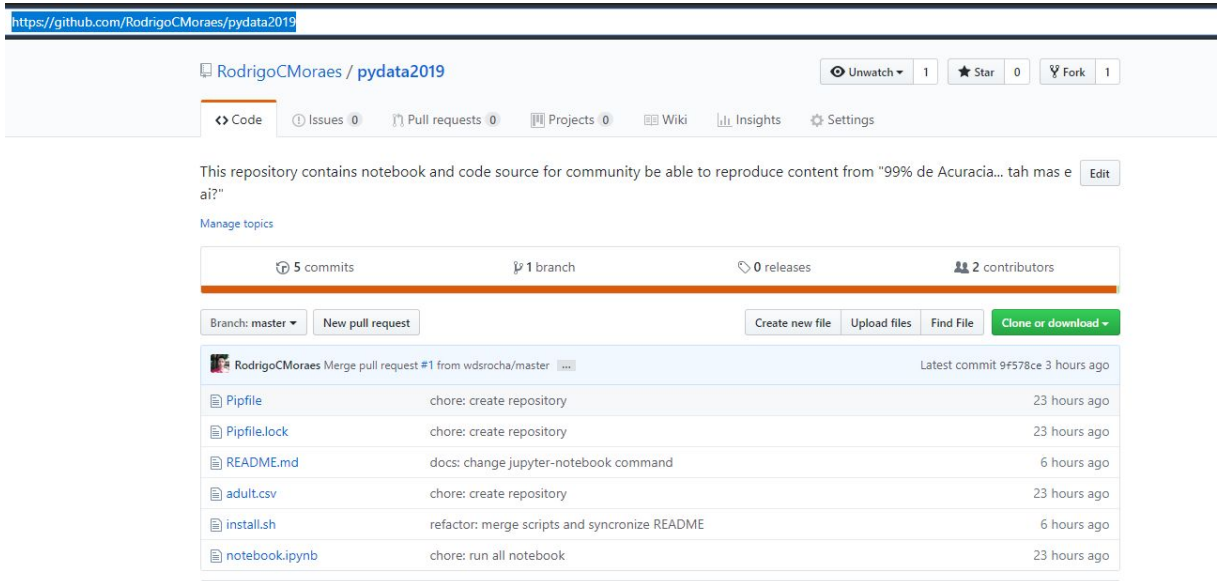
...

Como validar um modelo de Machine Learning?

Programação do Minicurso

1. Apresentação
2. Código/Hands-on

Acesso ao material do minicurso

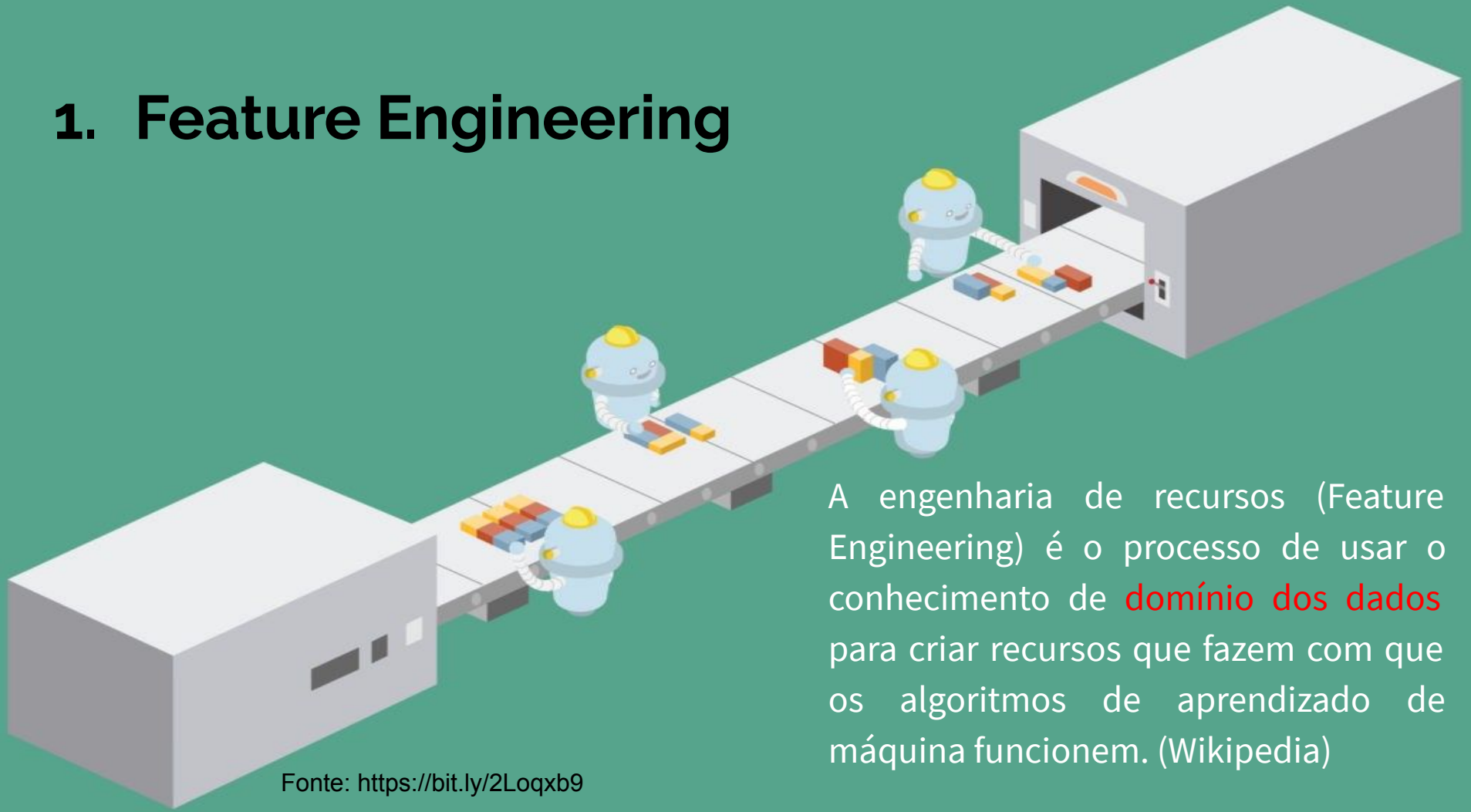


https://github.com/RodrigoCMoraes/pydata2019

Conceitos

1. Feature Engineering
2. Split do Dataset
3. PCA
4. Métricas de validação
5. Modelo
6. Overview

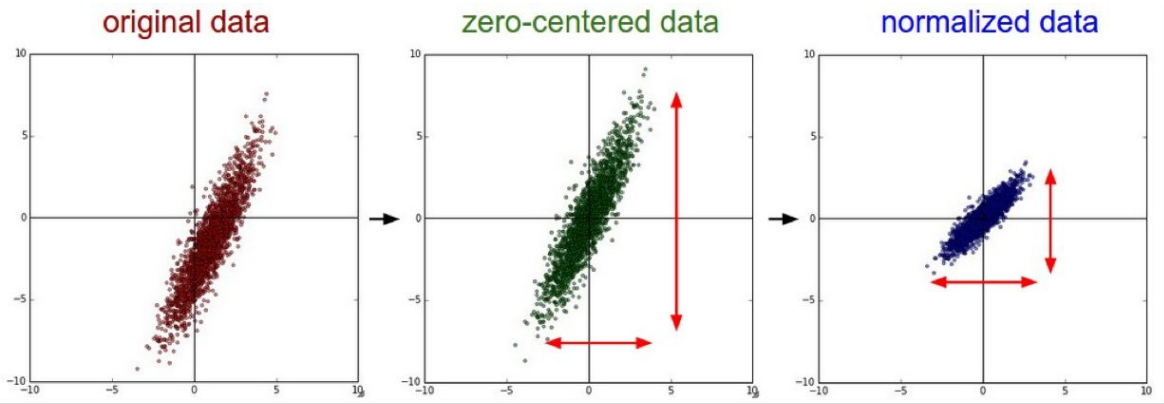
1. Feature Engineering



Fonte: https://bit.ly/2Loqxb9

A engenharia de recursos (Feature Engineering) é o processo de usar o conhecimento de domínio dos dados para criar recursos que fazem com que os algoritmos de aprendizado de máquina funcionem. (Wikipedia)

1. Feature Engineering - Reorganizing



Fonte: https://bit.ly/2Y7NYXY

1. Feature Engineering - Polynomial Features

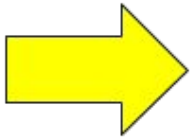
Examples

```
>>> X = np.arange(6).reshape(3, 2)
>>> X
array([[0, 1],
       [2, 3],
       [4, 5]])
>>> poly = PolynomialFeatures(2)
>>> poly.fit_transform(X)
array([[ 1.,  0.,  1.,  0.,  0.,  1.],
       [ 1.,  2.,  3.,  4.,  6.,  9.],
       [ 1.,  4.,  5., 16., 20., 25.]])
```

Fonte: https://bit.ly/2Y1Hx8w

1. Feature Engineering - Encoding

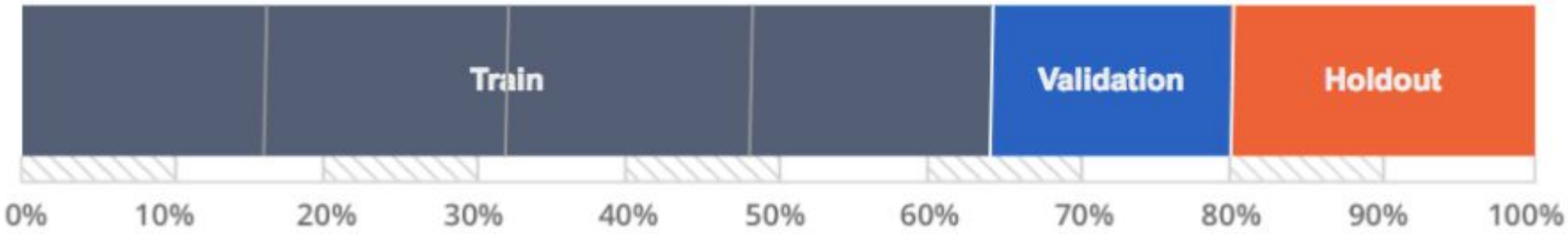
Color
Red
Red
Yellow
Green
Yellow



Red	Yellow	Green
1	0	0
1	0	0
0	1	0
0	0	1

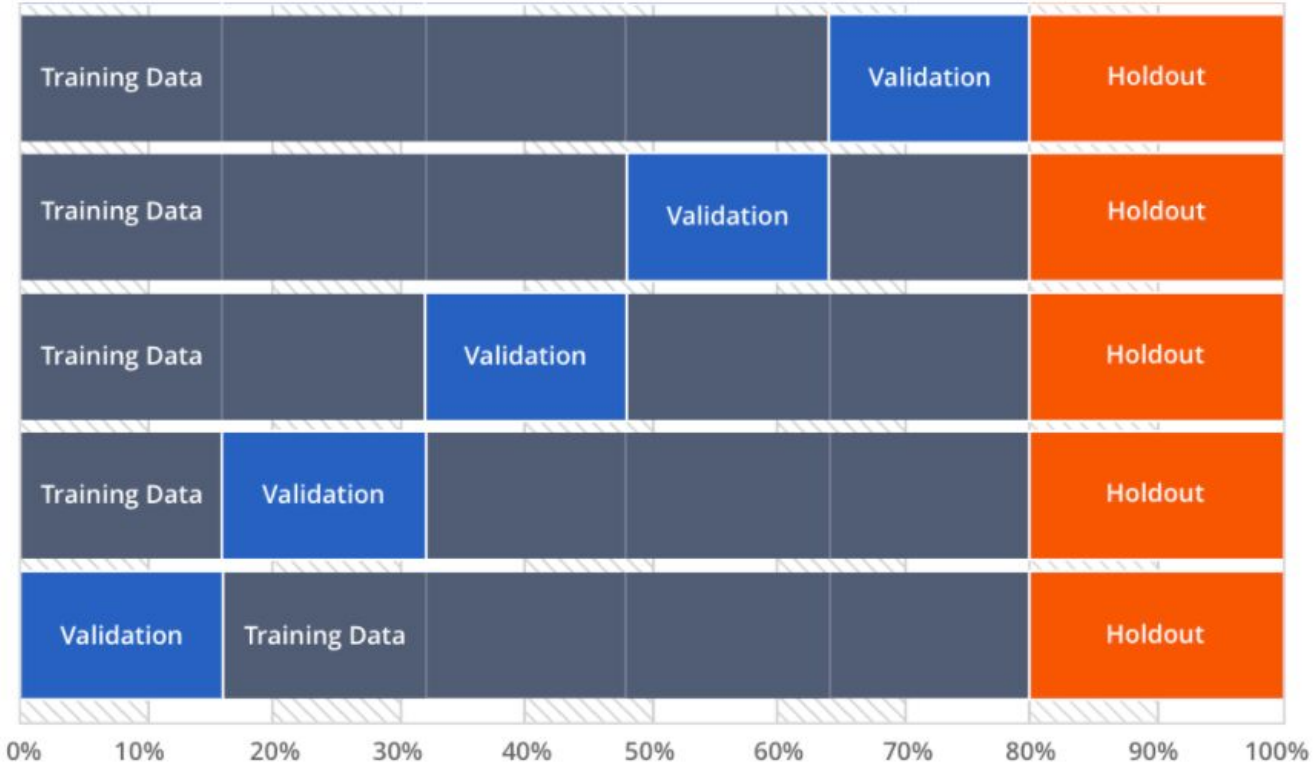
Fonte: https://bit.ly/2V0D443

2. Split do Dataset: Holdout



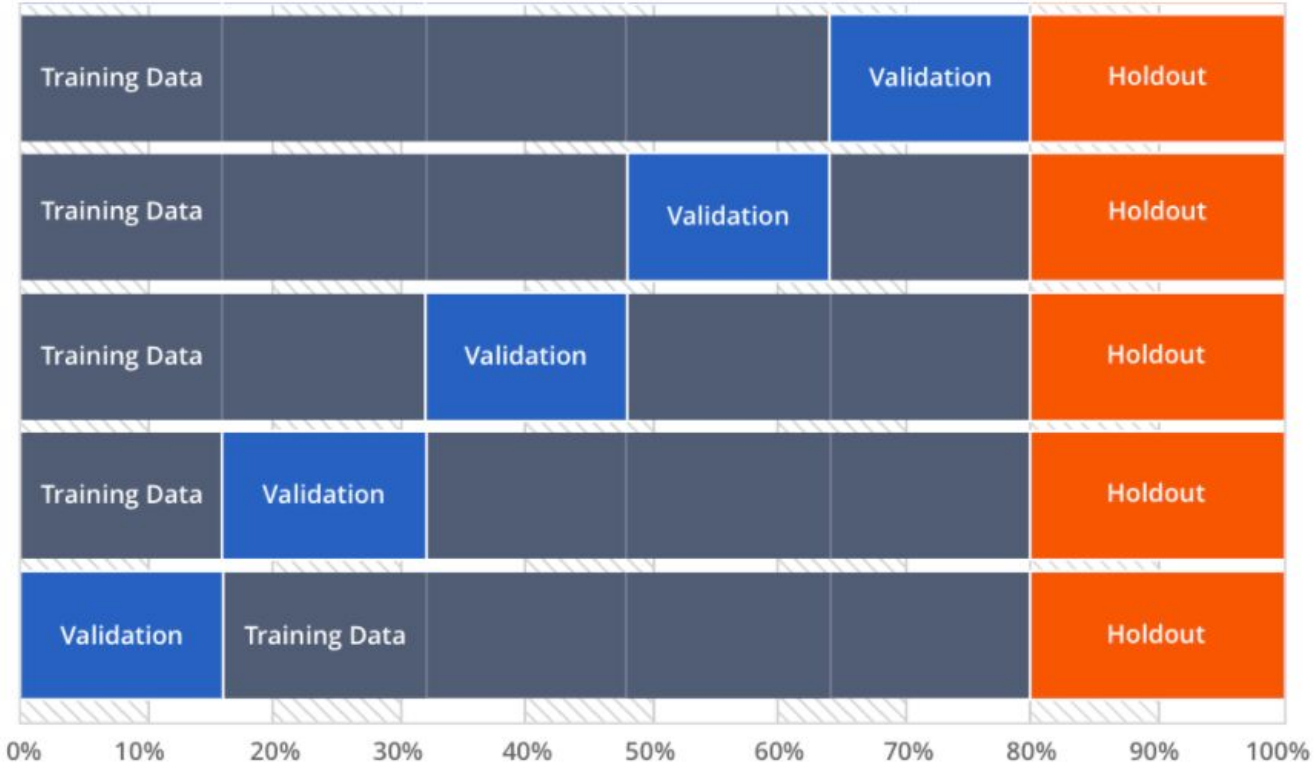
Fonte: https://bit.ly/2JnwjHJ

2. Split do Dataset: K-Fold+Validação Cruzada



Fonte: https://bit.ly/2JnwjHJ

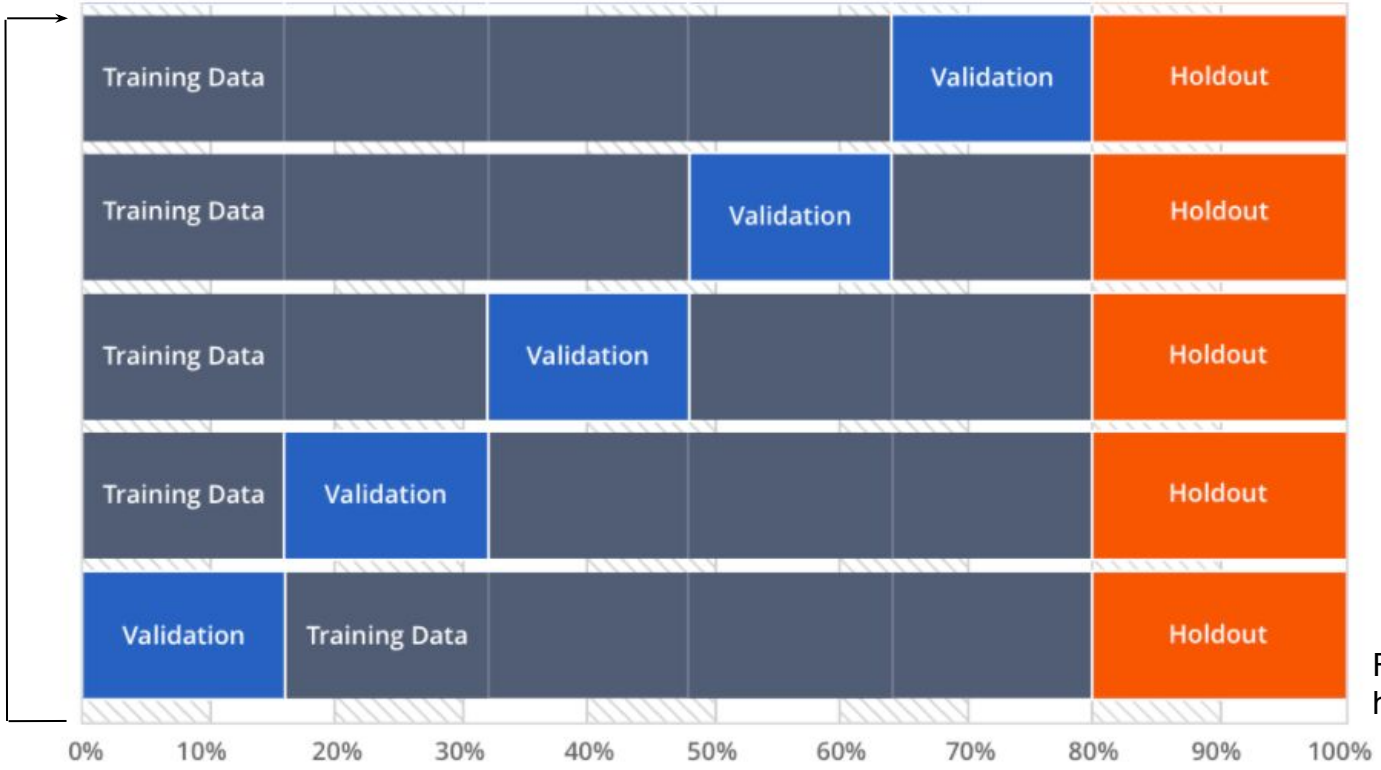
2. Split do Dataset: K-Fold+Validação Cruzada



Fonte: https://bit.ly/2JnwjHJ

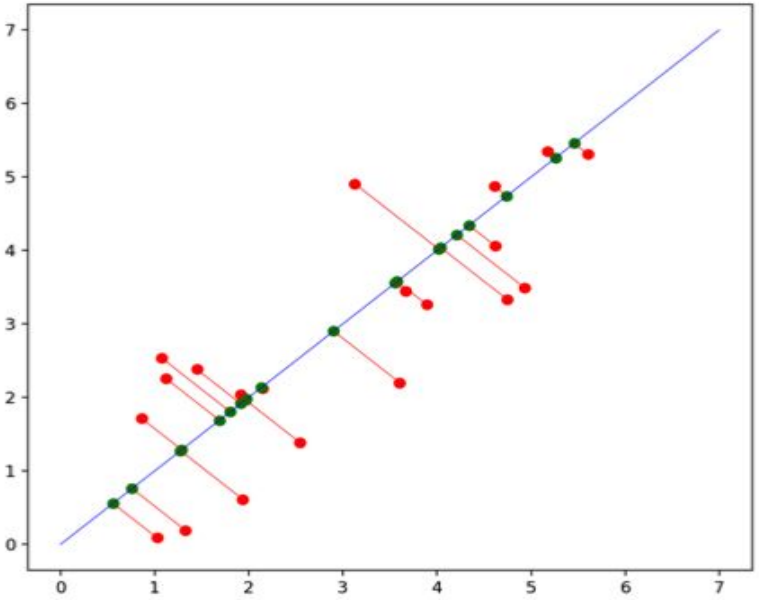
2. Split do Dataset: RSKF+Validação Cruzada

Randomize Dataset

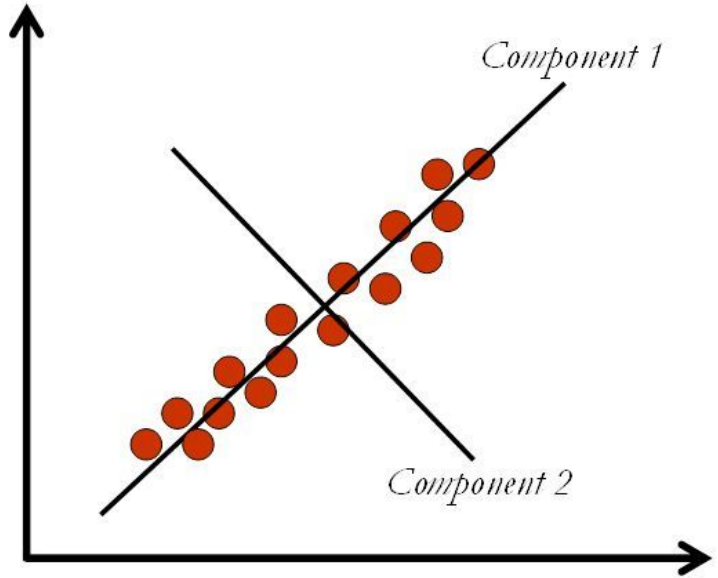


Fonte: https://bit.ly/2JnwjHJ

3. PCA - Principal Component Analysis



Fonte: https://bit.ly/2J0PVSi



Fonte: https://bit.ly/2Y5ytj1

4. Métricas de Validação

$$\text{Acurácia} = \frac{tp + tn}{tp + tn + fp + fn}$$

$$\text{Precisão} = \frac{tp}{tp + fp}$$

$$\text{Revocação} = \frac{tp}{tp + fn}$$

$$F = 2 \cdot \frac{\text{precis} \cdot \text{revoc}}{\text{precis} + \text{revoc}}$$

Fonte: https://bit.ly/2ZXLYDi

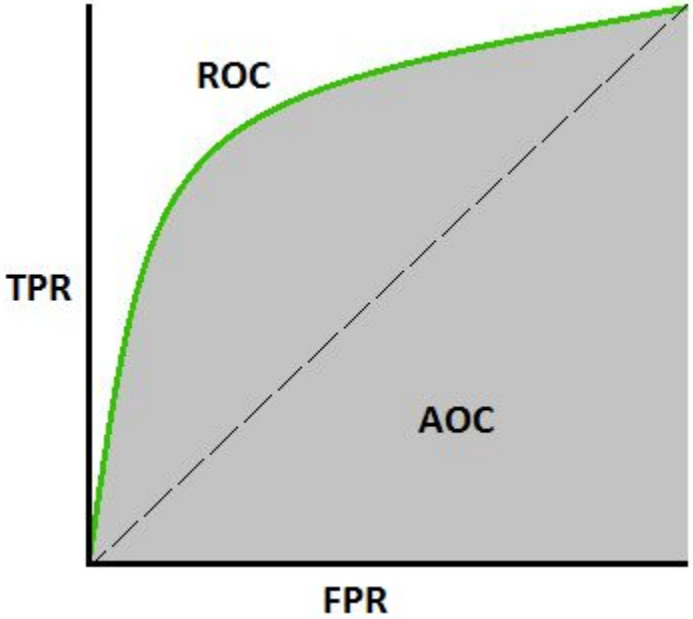
True Positive (TP)

True Negative (TF)

False Positive (FP)

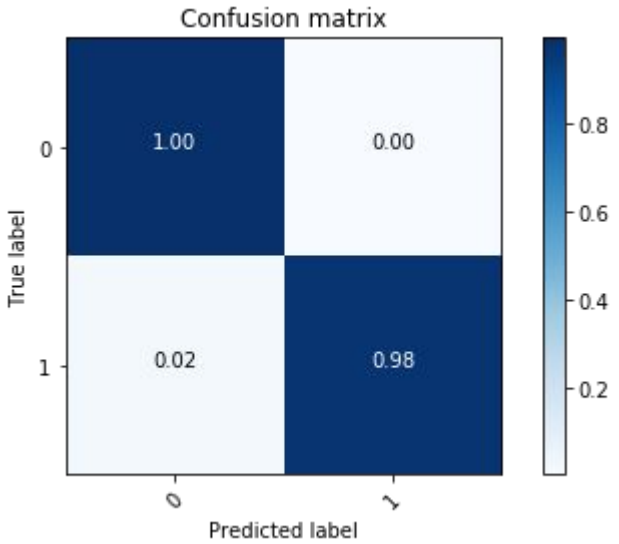
False Negative (FN)

4. Métricas de Validação - AUC



AUC - Area Under the Curve

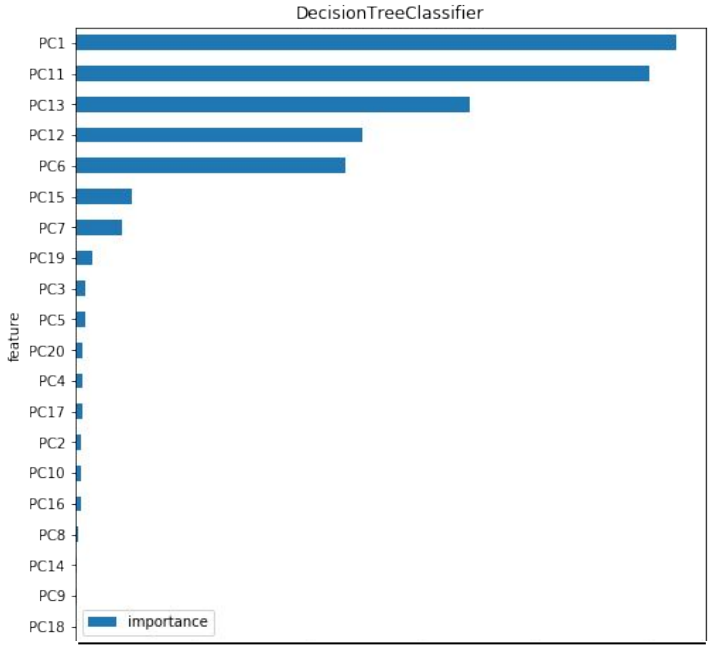
4. Métricas de Validação - Confusion Matrix



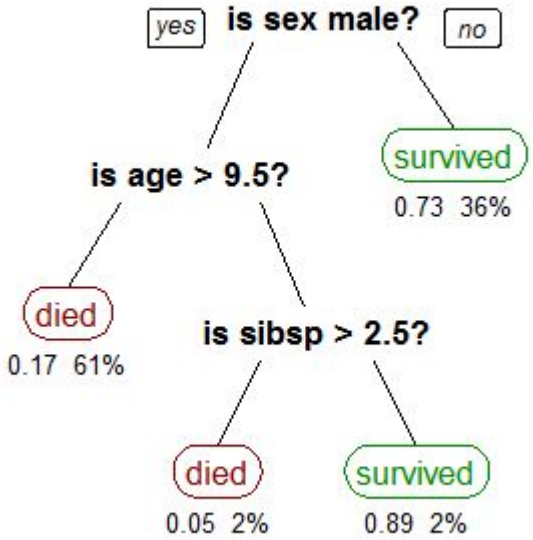
Fonte: própria

Confusion Matrix

5. Modelo

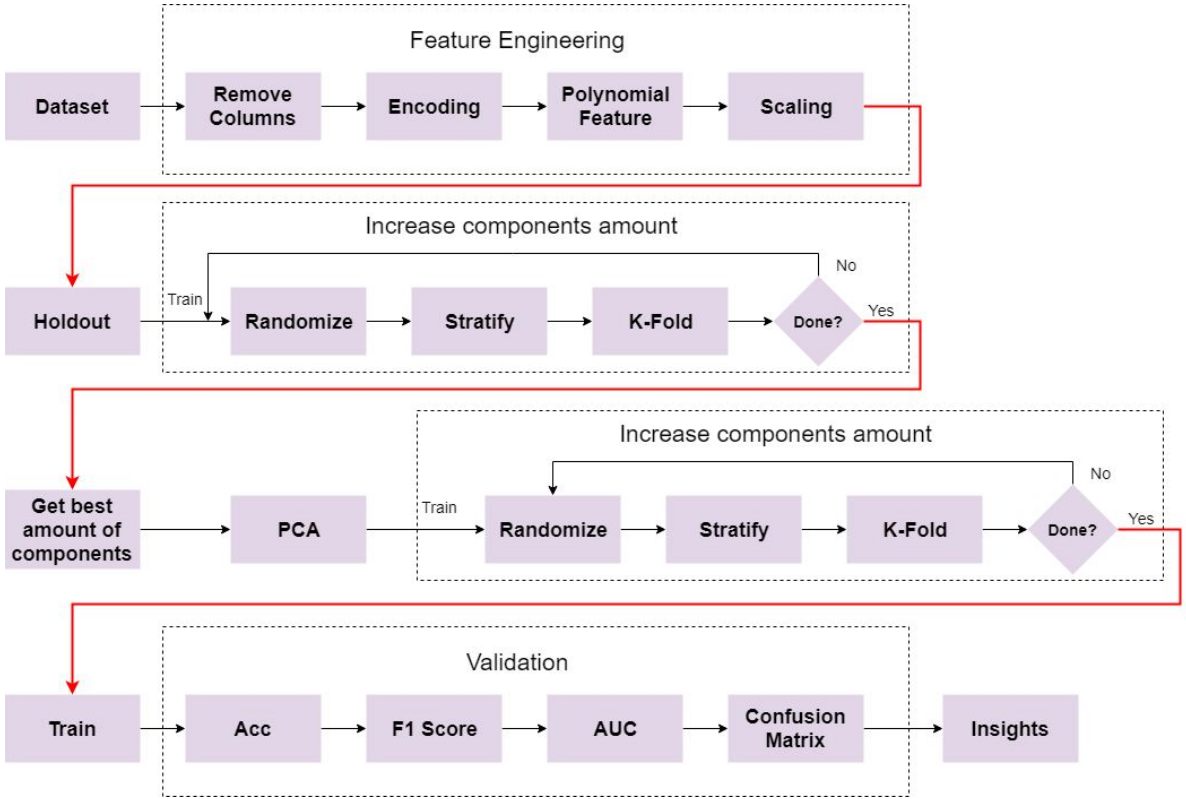


Fonte: Própria



Fonte: https://bit.ly/2jnSH5w

5. Overview


Feature Engineering
Dataset
Remove Columns
Encoding
Polynomial Feature
Scaling
Increase components amount
Holdout
Train
Randomize
Stratify
K-Fold
Done?
No
Yes
Increase components amount
Get best amount of components
PCA
Train
Randomize
Stratify
K-Fold
Done?
No
Yes
Validation
Train
Acc
F1 Score
AUC
Confusion Matrix
Insights

Bora codar?

Notebook