Tuning employee turnover classifier

HUMAN RESOURCES ANALYTICS: PREDICTING EMPLOYEE CHURN IN PYTHON

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Overfitting

Existence of overfitting:

- Training accuracy: 100%
- Testing accuracy: 97.23%

Methods to fight it:

- Limiting tree maximum depth
- Limiting minimum sample size in leafs

Pruning the tree

Limiting Depth

```
model_depth_5 = DecisionTreeClassifier(
                max_depth=5, random_state=42)
# Train set Accuracy: 97.71%
# Test  set Accuracy: 97.06%
```

Limiting Samples

```
model_sample_100 = DecisionTreeClassifier(
                   min_samples_leaf=100, random_state=42)
# Train set Accuracy: 96.58%
# Test set Accuracy: 96.13%
```

Let's practice!

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Evaluating the model

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Prediction errors

Confusion Matrix		Reality	
		0	1
Predicted	0	TN	FN
	1	FP	TP

Evaluation metrics (1)

- If target is leavers, focus on FN
  - Recall score = TP/(TP+FN)
  - Lower FN, higher Recall score
  - Recall score - % of correct predictions among 1s (leavers)
- If target is stayers, focus on FP
  - Specificity = TN/(TN+FP)
  - Lower FP, higher Specificity,
  - Specificity - % of correct predictions among 0s (stayers)

Evaluation metrics (2)

- Even if target is leavers, you may still focus on FP:
  - Precision score = TP/(TP+FP)
  - Lower FP, higher Recall score
  - Precision score - % of leavers in reality, among those predicted to leave

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Targeting both leavers and stayers

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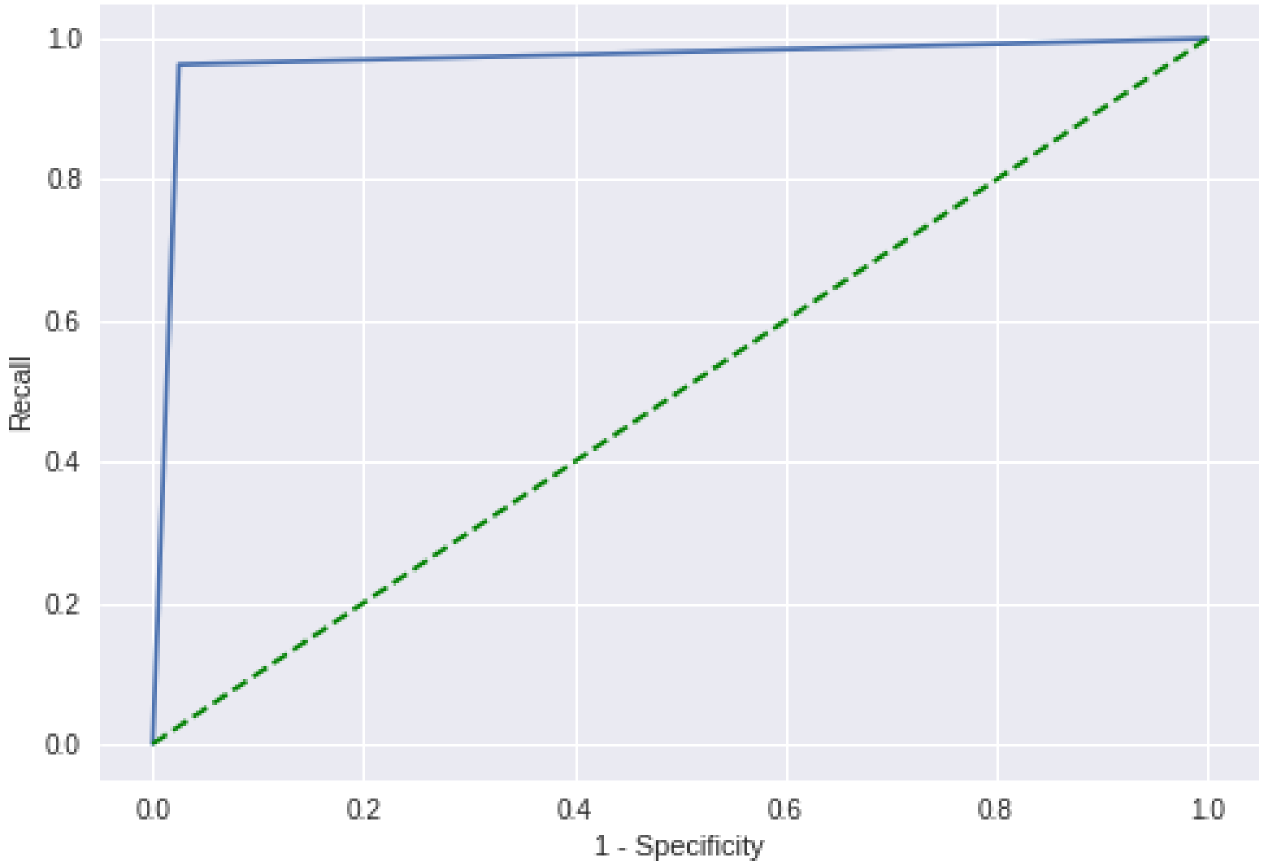
AUC score



- Vertical axis: Recall
- Horizontal axis: 1 - Specificity
- Blue line: ROC
- Green line: baseline
- Area between blue and green: AUC

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Class imbalance

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Prior probabilities

Without balance

- $P_0 = 0.76$
- $P_1 = 0.24$
- $Gini = 0.36$

With balance

- $P_0 = 0.5$
- $P_1 = 0.5$
- $Gini = 0.5$

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