Master in Internet of Things for eHealth

M5. Smart Data Knowledge / Analytics

Machine Learning / Computer Vision Basics

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UAB Universitat Autònoma de Barcelona

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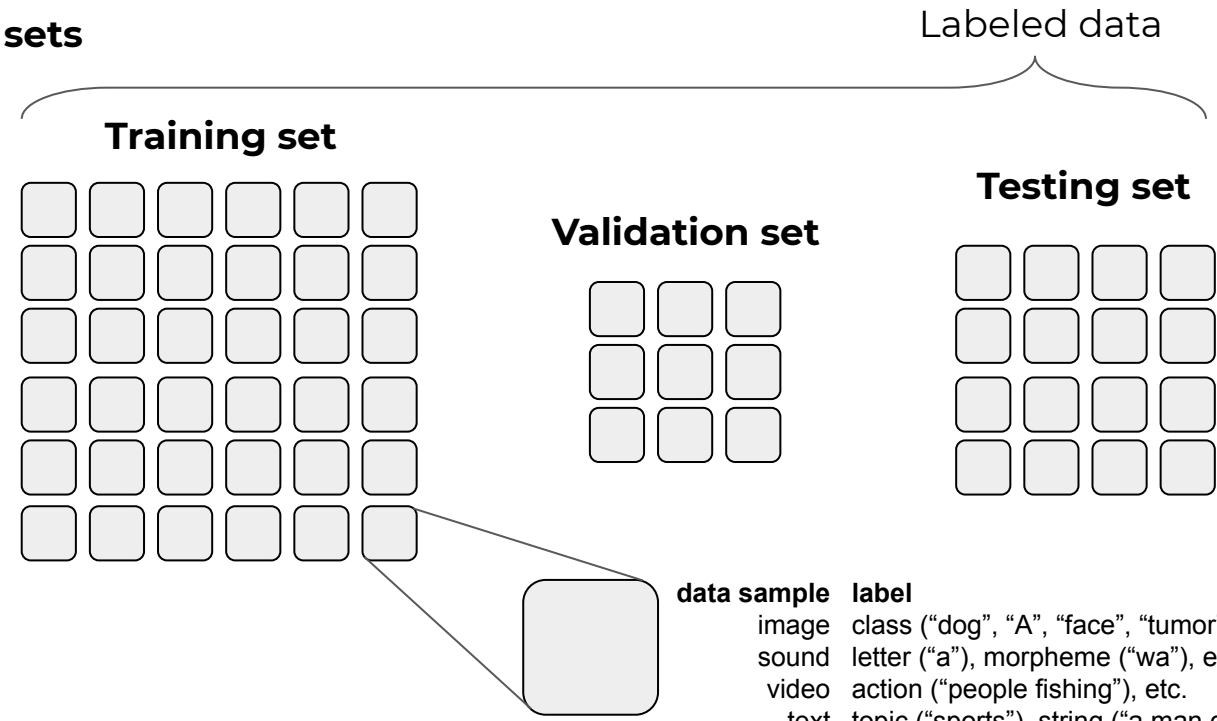
Train / Validation / Testing

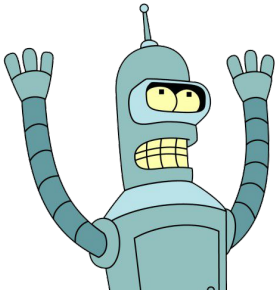
- **Data sets**



data sample	label
image	class (“dog”, “A”, “face”, “tumor”)
sound	letter (“a”), morpheme (“wa”), etc.
video	action (“people fishing”), etc.
text	topic (“sports”), string (“a man goes”)

Performance Measurements

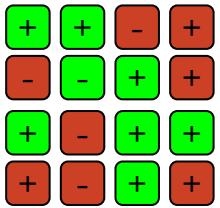
- **How do we measure the accuracy of our model?**



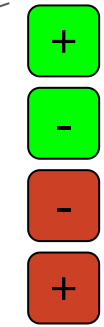
ML model

Classify!

Testing set



Data samples



True Positive

False ~~Positive~~ Negative

True Negative

False Positive

Groundtruth

Positive

Negative

Prediction

\+ Positive

\- Negative

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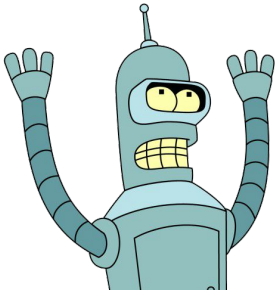

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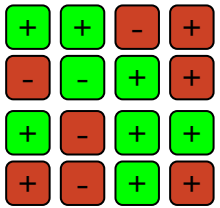

Data samples

Groundtruth		**Prediction**	
	Positive	+	Positive
	Negative	-	Negative

How reliable is the model?

Measures

True Positive Rate
True Negative Rate
False Positive Rate
Precision / Recall
Accuracy
F-measure
etc.

Performance Measurements

- **How do we measure the accuracy of our model?**

Confusion Matrix

		Groundtruth	
		Positives	Negatives
Prediction	Positives	+ TP	+ FP
	Negatives	- FN	- TN

Precision = TP / (TP + FP)
Recall = TP / (TP + FN) <- a.k.a. TPR
FPR = FP / (FP + TN)
Specificity = 1 - FPR
Accuracy = (TP + TN) / (TP+FP+FN+TN)
F-measure = 2 (prec x recall) / (prec + recall)

Performance Measurements

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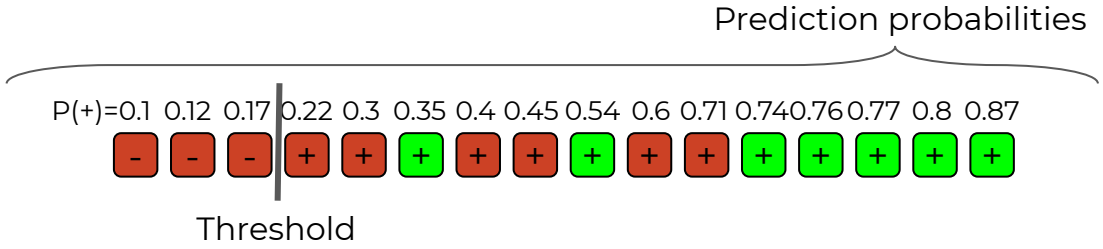

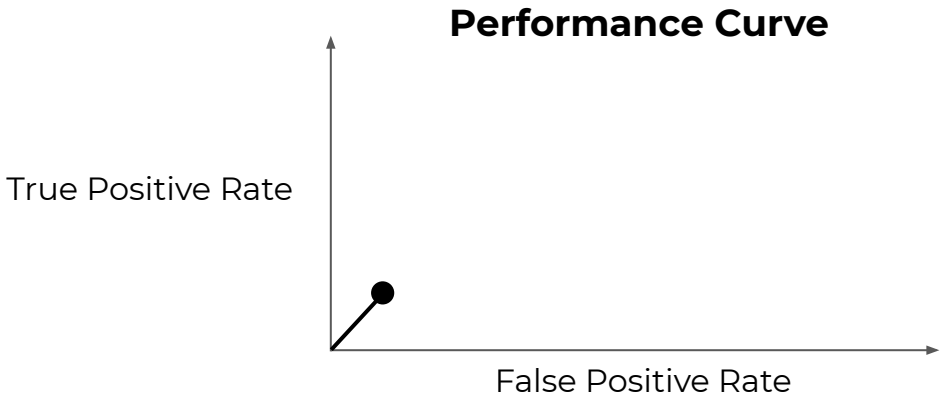

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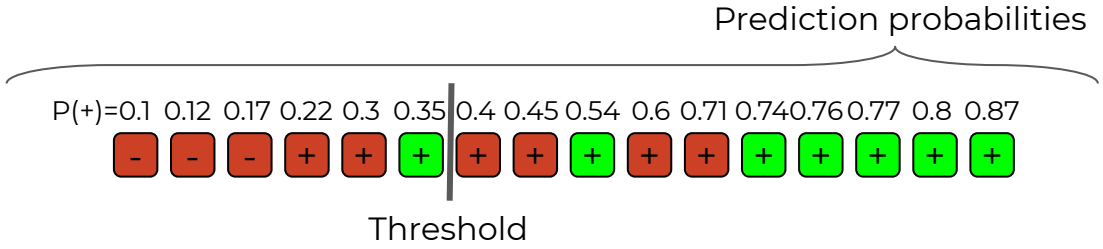

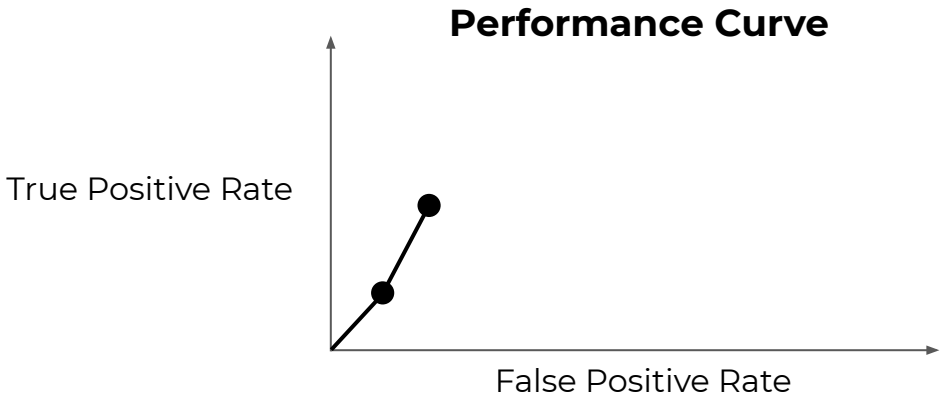

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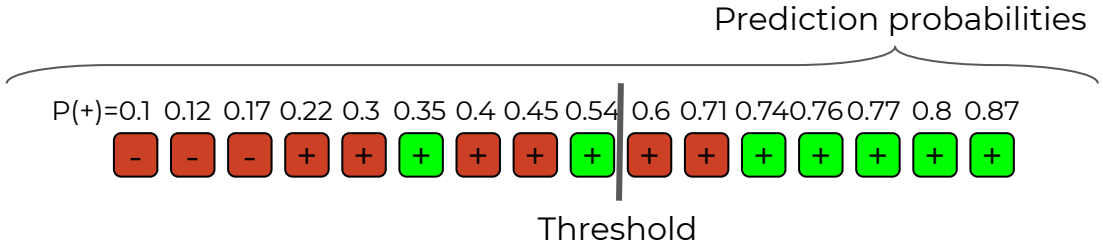

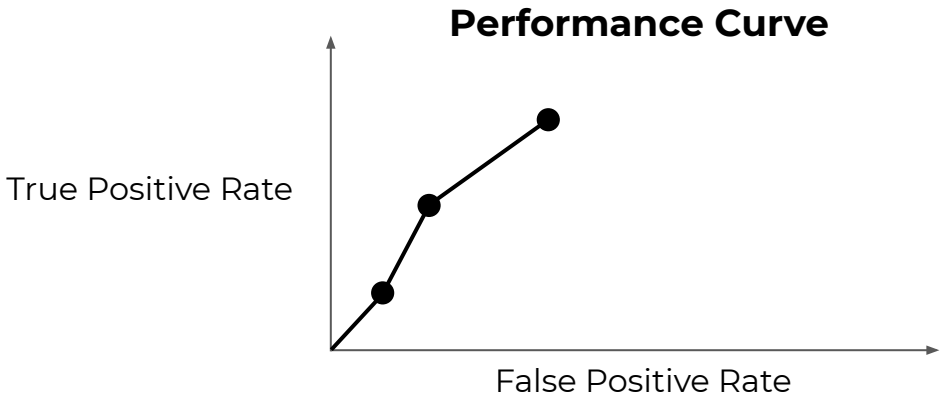

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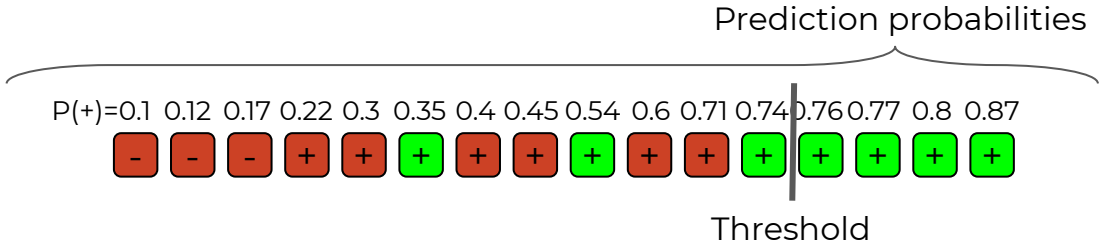

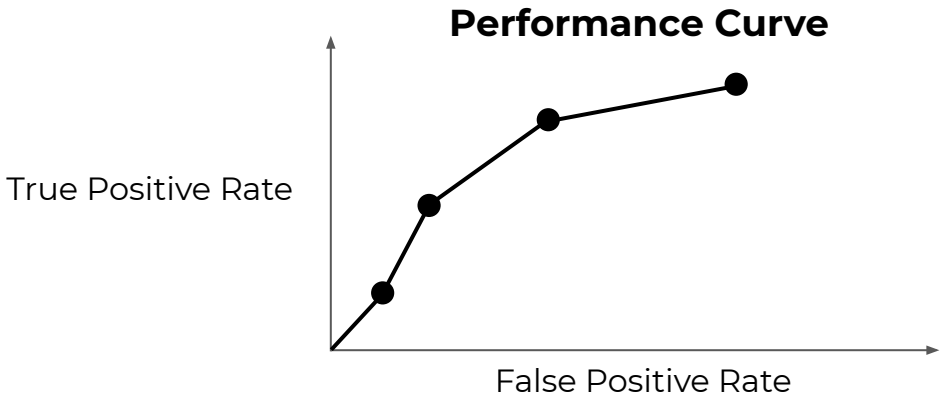

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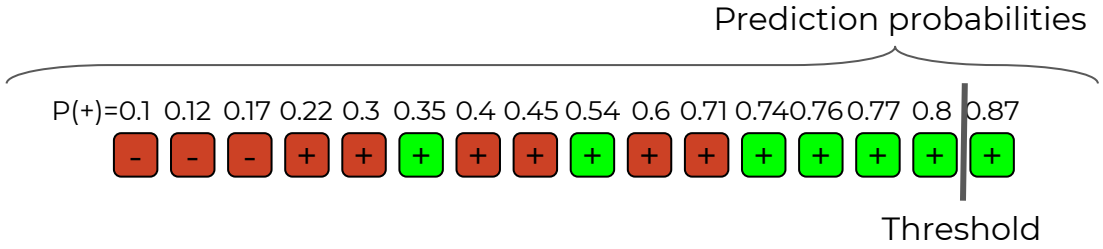

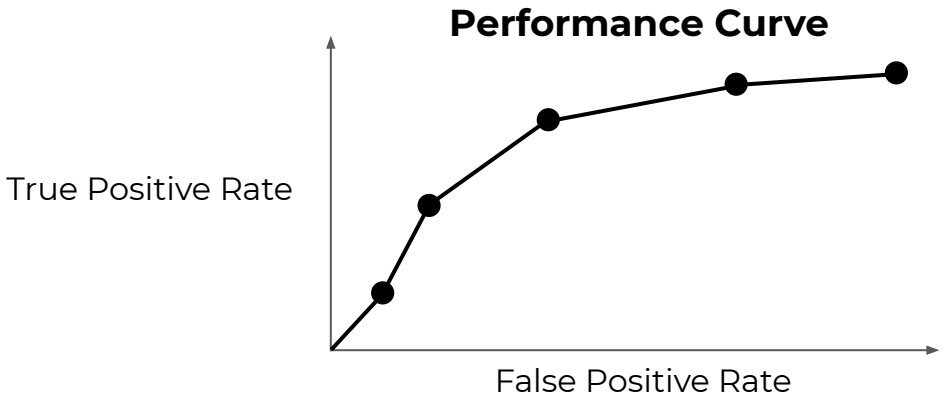

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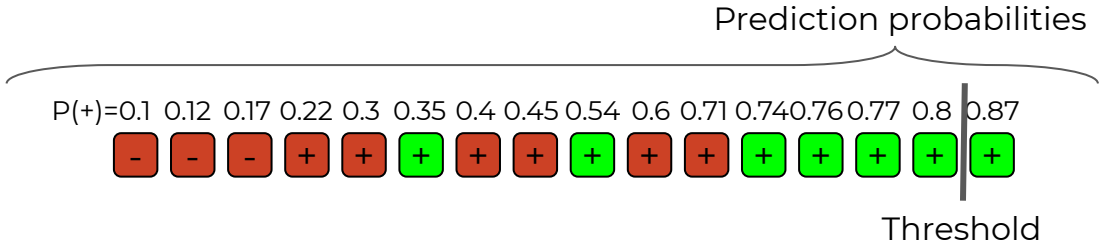

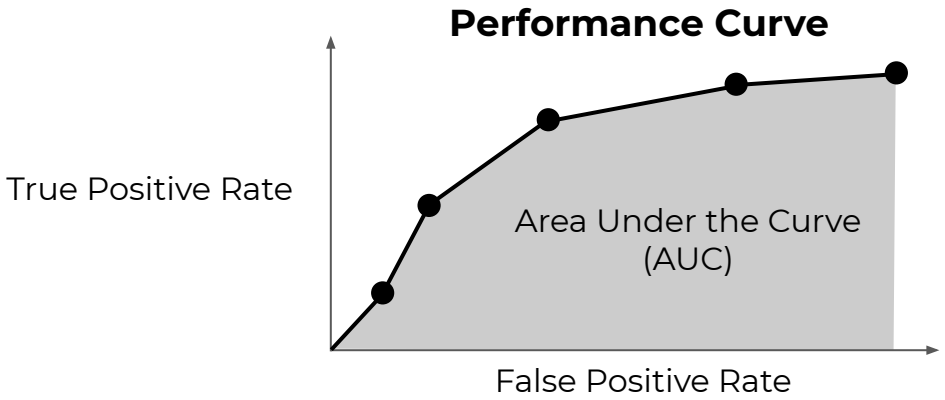

Computer Vision Traditional Applications

Classification

class: dog

Segmentation

foreground

background

Detection

coords: (20, 2, 789, 422)