

# Tutorial 5 - Performance Metrics

Victoria Ajila, MSc Computer Engineering  
Carleton University

Monday 18<sup>th</sup> October, 2021

# Disclaimer: Recorded Tutorials will be Recorded

## Privacy Preservation:

- Ask questions in the chat<sup>1</sup>
- Keep video off

**Note:** If the above *hinders your ability to learn  $\wedge$  violates your privacy*, please let me/Dr. Green know ASAP and video will be post-processed accordingly.

---

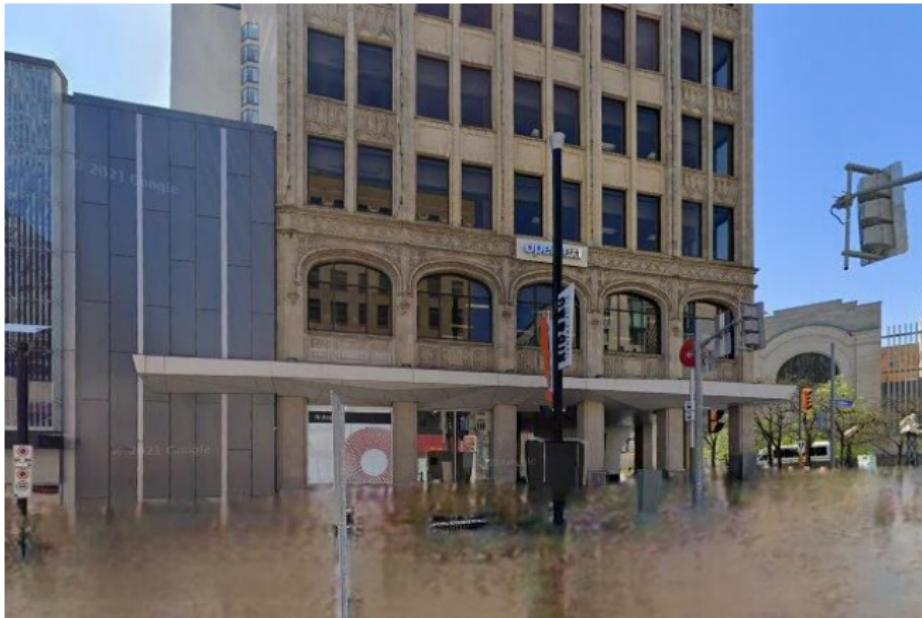
<sup>1</sup>I encourage unmuted/voice-based questions at any time, but know that this isn't explicitly privacy-preserving

# ML Weekly

## Recent news events from the ML community

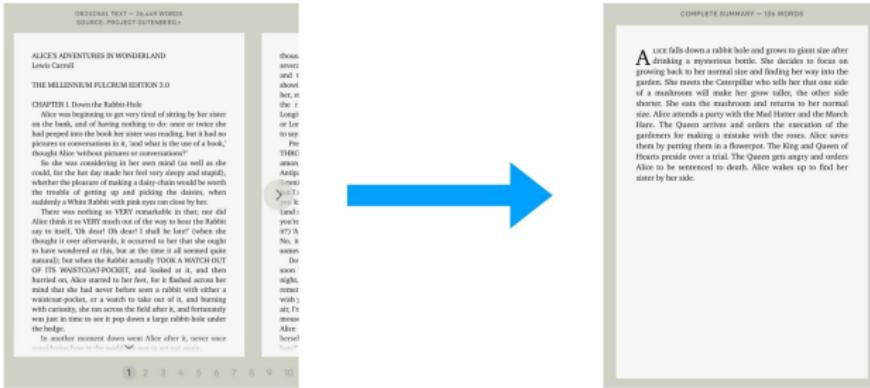
# ML Weekly

1. **(Vision)** Montreal-made website uses AI to depict impacts of climate change anywhere in the world



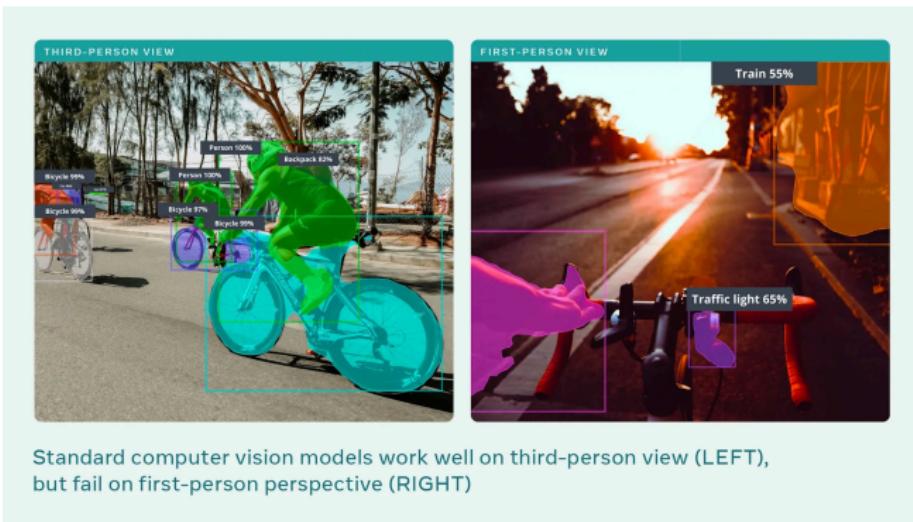
# ML Weekly

1. **(Vision)** Montreal-made website uses AI to depict impacts of climate change anywhere in the world
2. **(NLP)** OpenAI's latest model can summarise those tl;dr books



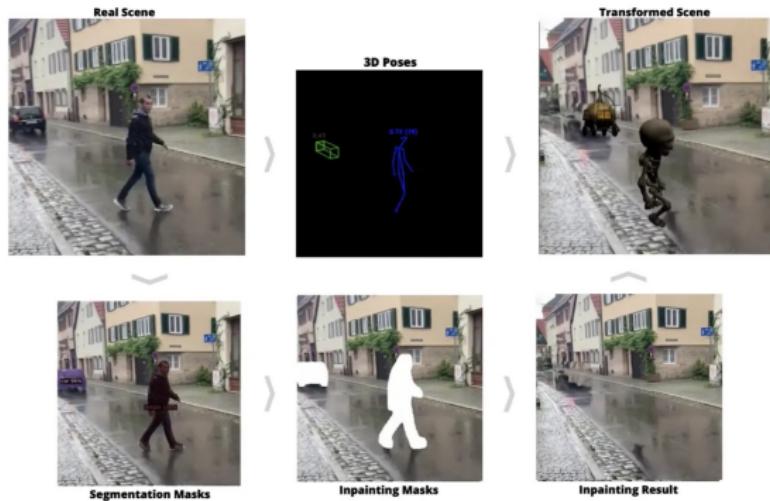
# ML Weekly

1. **(Vision)** Montreal-made website uses AI to depict impacts of climate change anywhere in the world
2. **(NLP)** OpenAI's latest model can summarise those tl;dr books
3. **(AI)** Facebook is researching AI systems that see, hear, and remember everything you do



# ML Weekly

1. **(Vision)** Montreal-made website uses AI to depict impacts of climate change anywhere in the world
2. **(NLP)** OpenAI's latest model can summarise those tl;dr books
3. **(AI)** Facebook is researching AI systems that see, hear, and remember everything you do
4. **(Vision)** Why look at reality when you can edit what you see in real time?



# Tutorial Intuition

Building an Intuition for the Concepts of this Tutorial

# How Good is my Model?

Welcome to the *metric zoo*!

There exists several dozens of model evaluation metrics and it is critical that one pairs the **right metric** for the **right problem**.

# How Good is my Model?

Welcome to the *metric zoo*!

There exists several dozens of model evaluation metrics and it is critical that one pairs the **right metric** for the **right problem**.

- **Classification-Type:** accuracy, precision, recall, specificity, F1-score, ROC, AUC, ...
- **Regression-Type:** MSE, MAE, RMSE, ...

# How Good is my Model?

Welcome to the *metric zoo*!

There exists several dozens of model evaluation metrics and it is critical that one pairs the **right metric** for the **right problem**.

- **Classification-Type:** accuracy, precision, recall, specificity, F1-score, ROC, AUC, ...
- **Regression-Type:** MSE, MAE, RMSE, ...
- Rank-Aware Metrics
- Statistical-Type Metrics
- Computer Vision Metrics
- NLP Metrics
- Deep Learning-Related Metrics

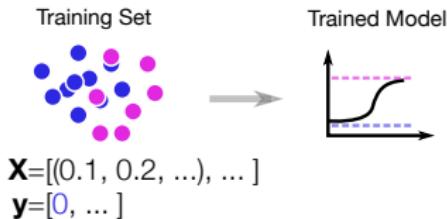
# How Good is my Model?

Training Set

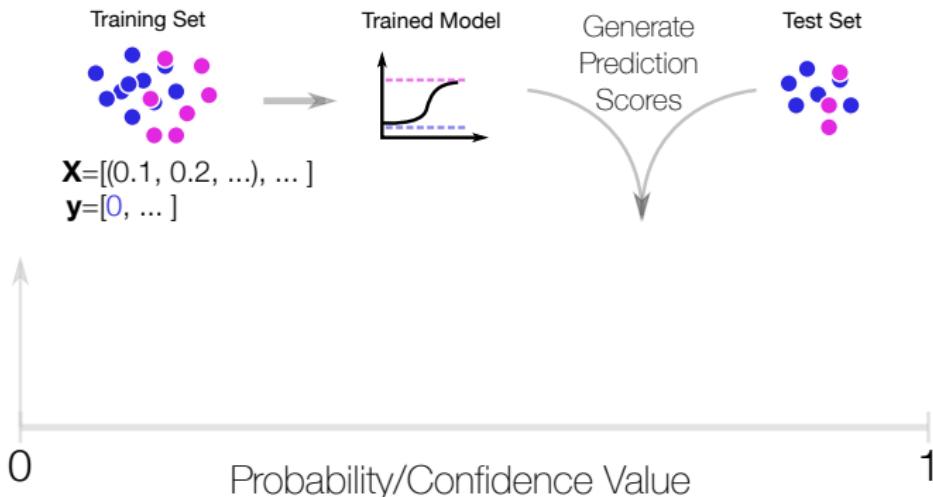


**X**=[(0.1, 0.2, ...), ... ]  
**y**=[0, ... ]

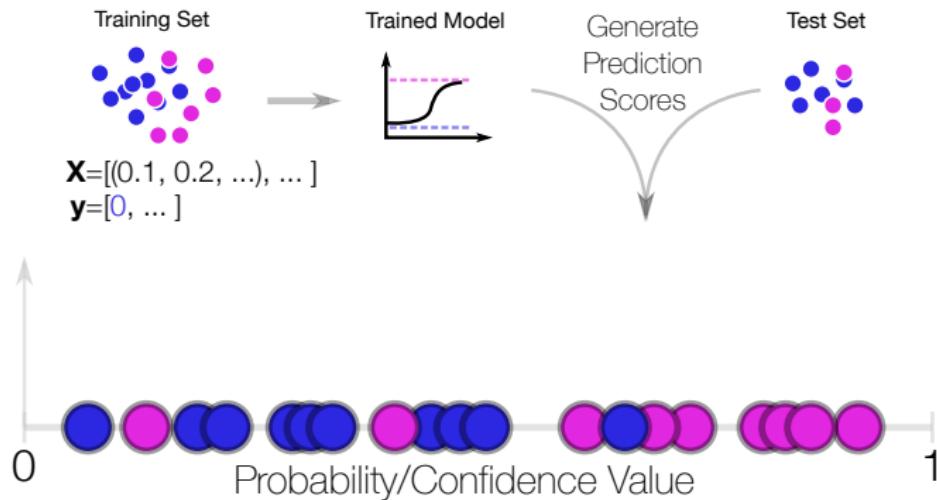
# How Good is my Model?



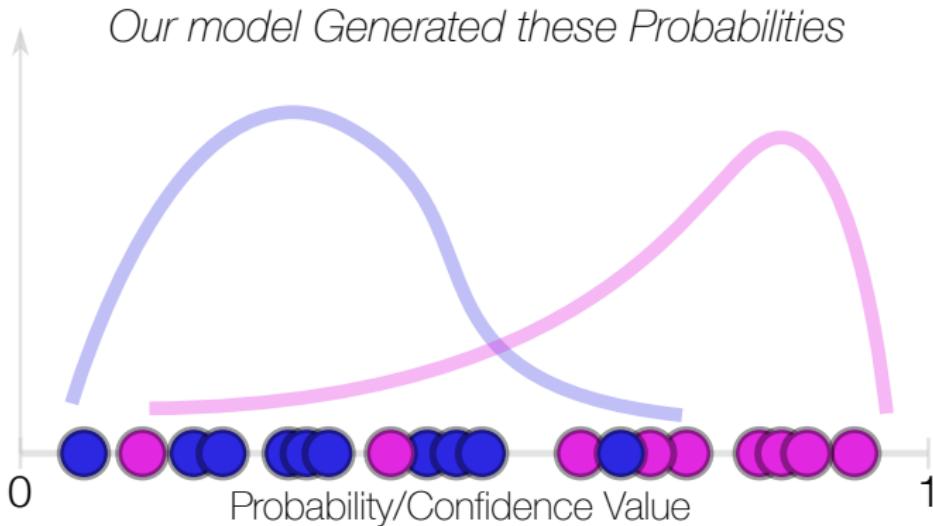
# How Good is my Model?



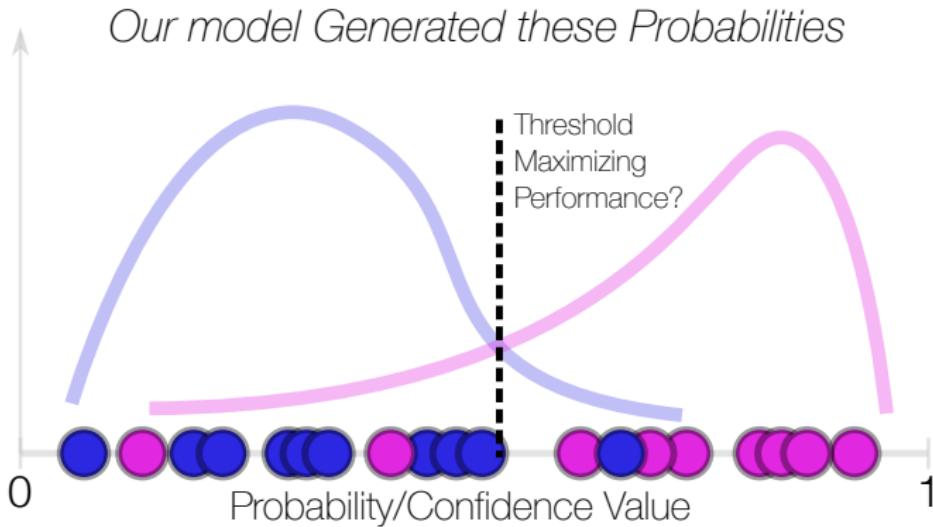
# How Good is my Model?



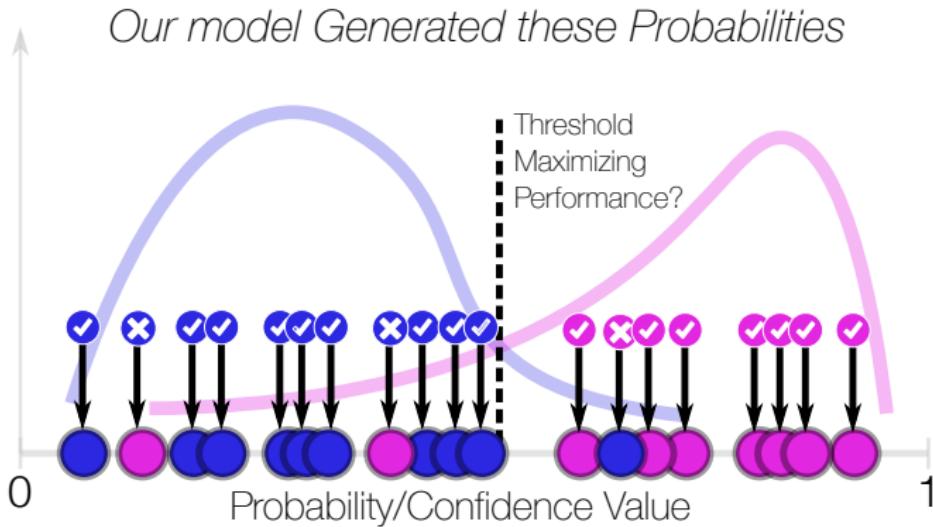
# How Good is my Model?



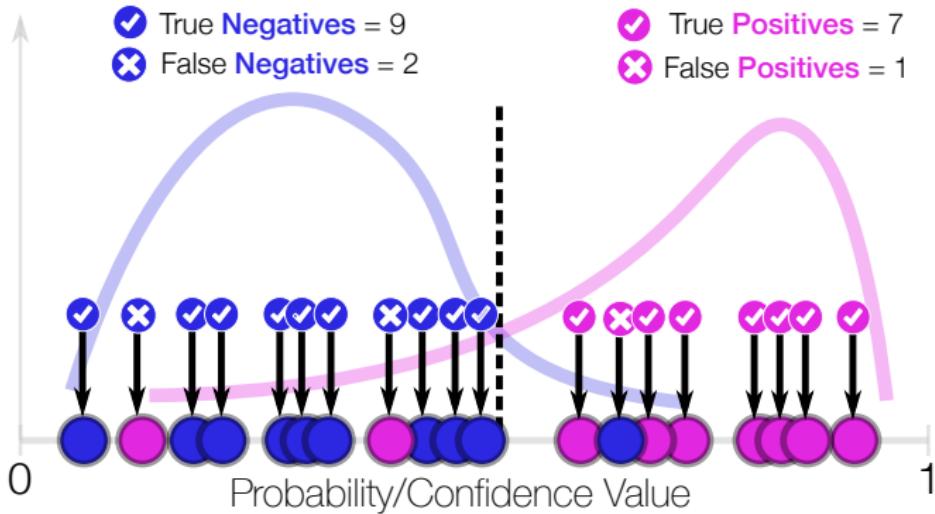
# How Good is my Model?



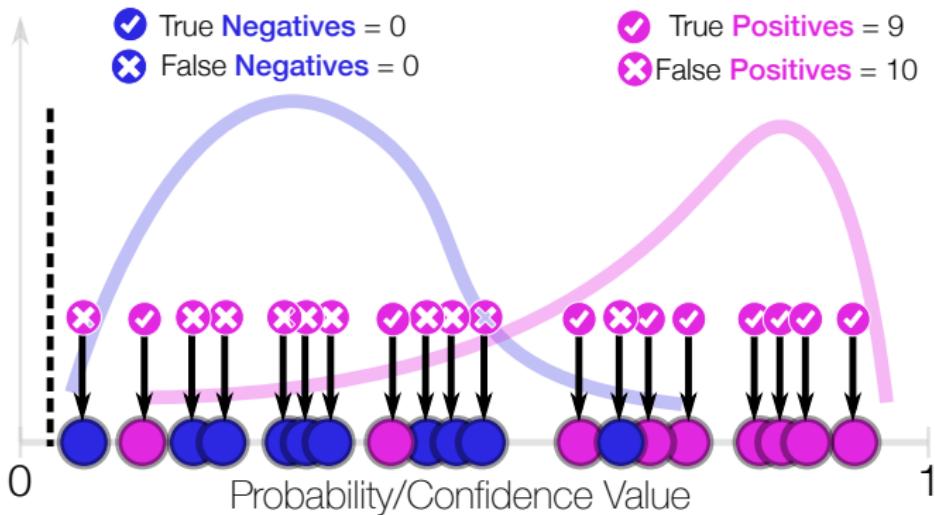
# How Good is my Model?



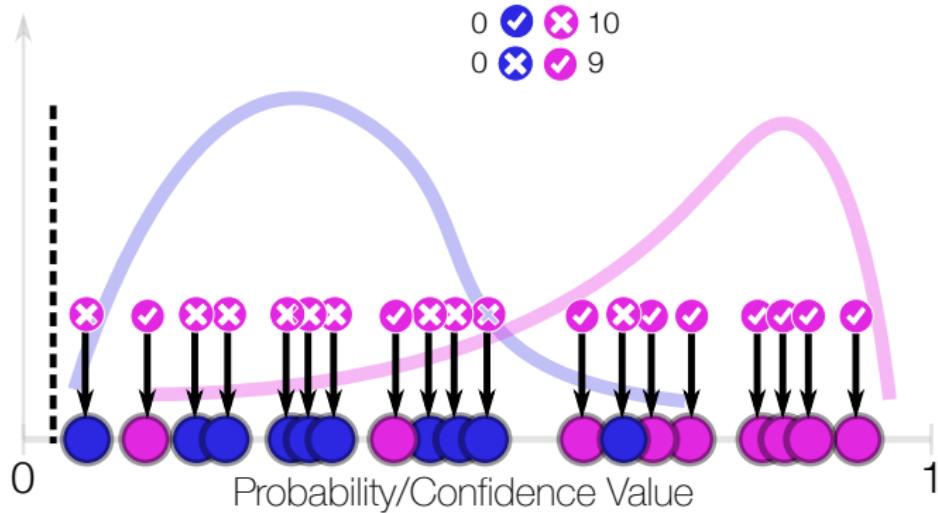
# How Good is my Model?



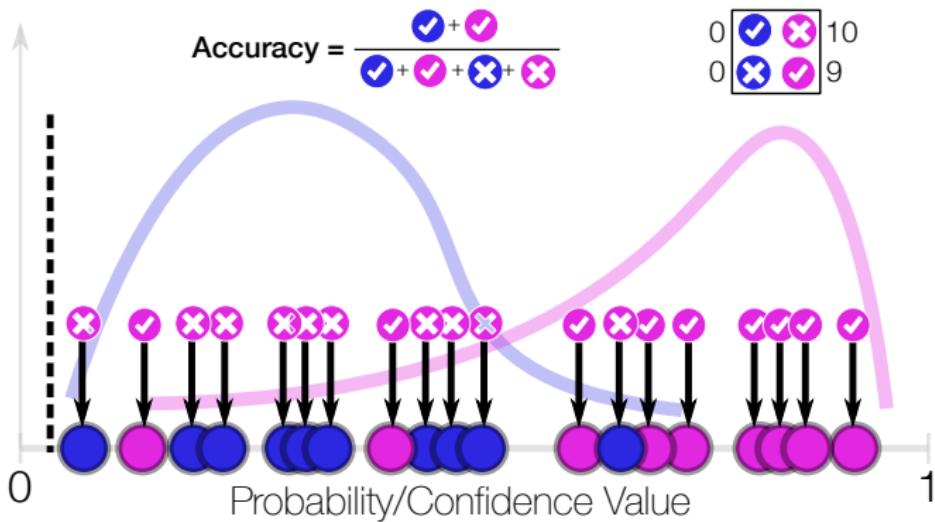
# How Good is my Model?



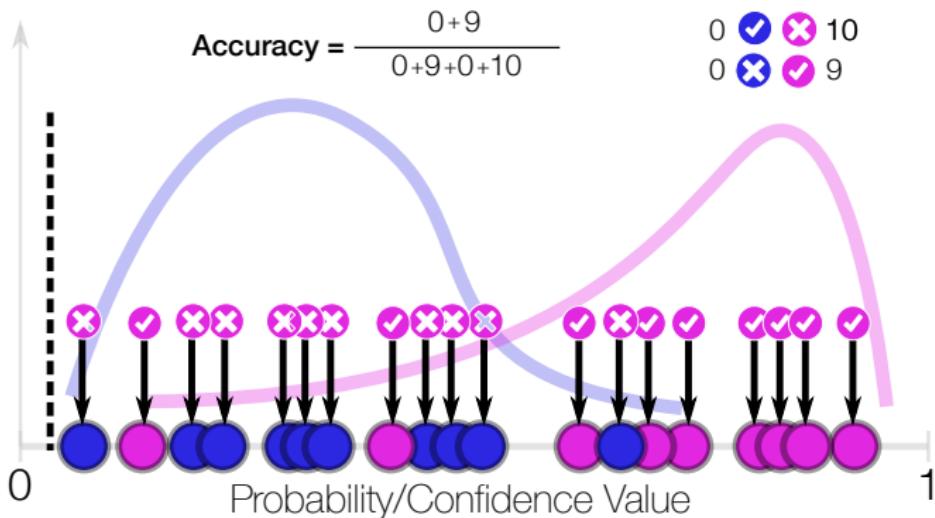
# How Good is my Model?



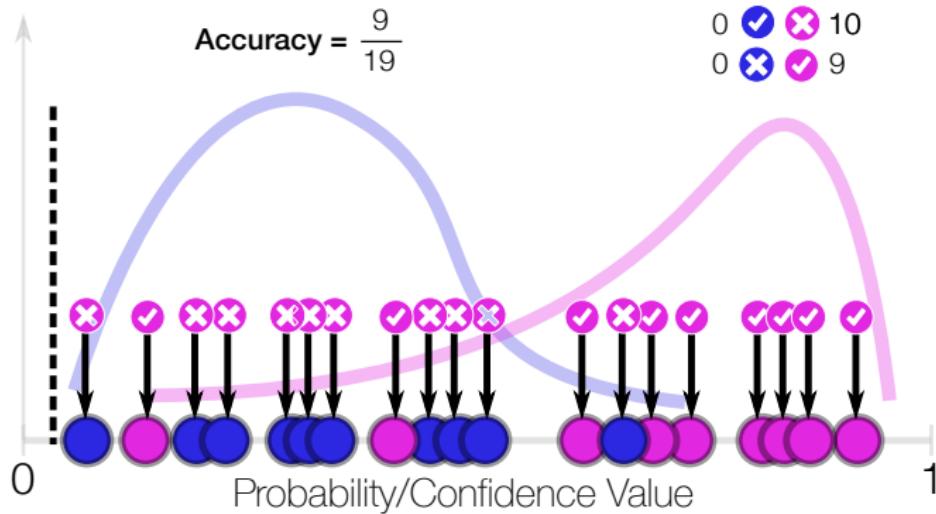
# How Good is my Model?



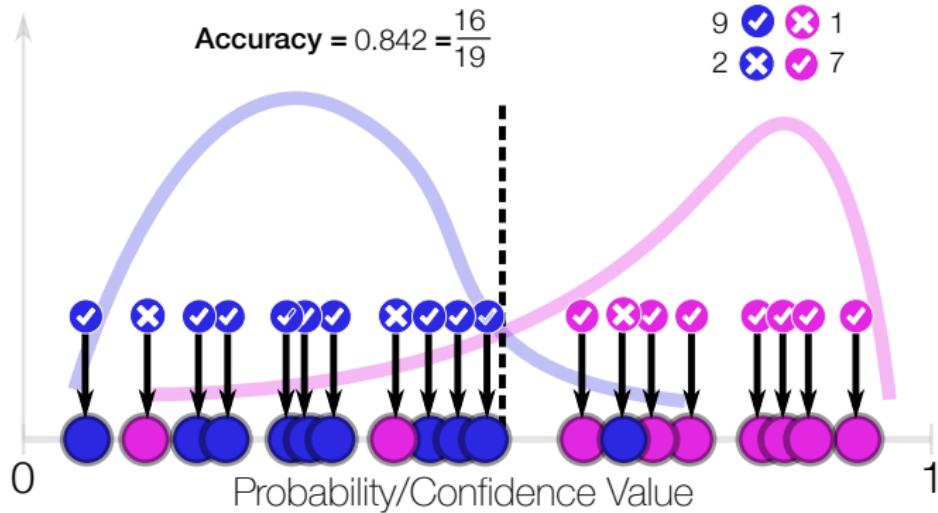
# How Good is my Model?



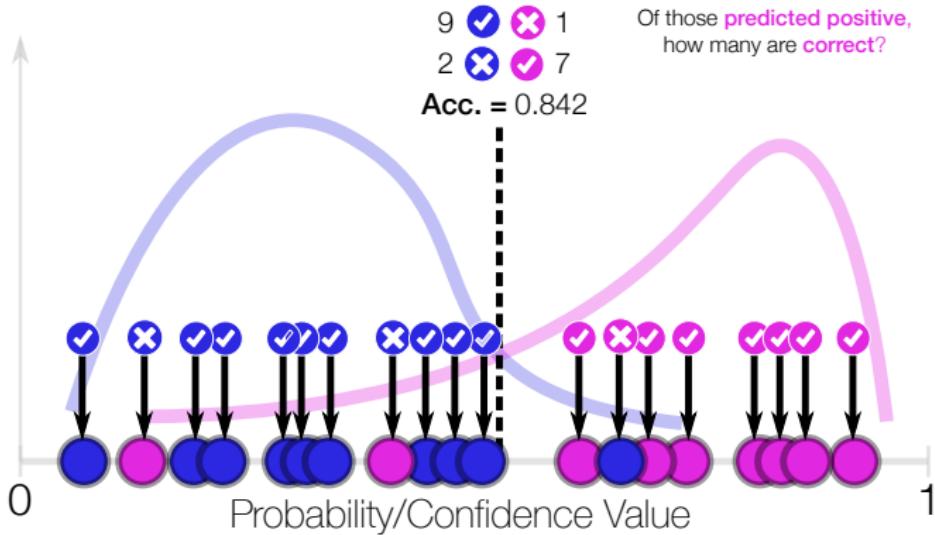
# How Good is my Model?



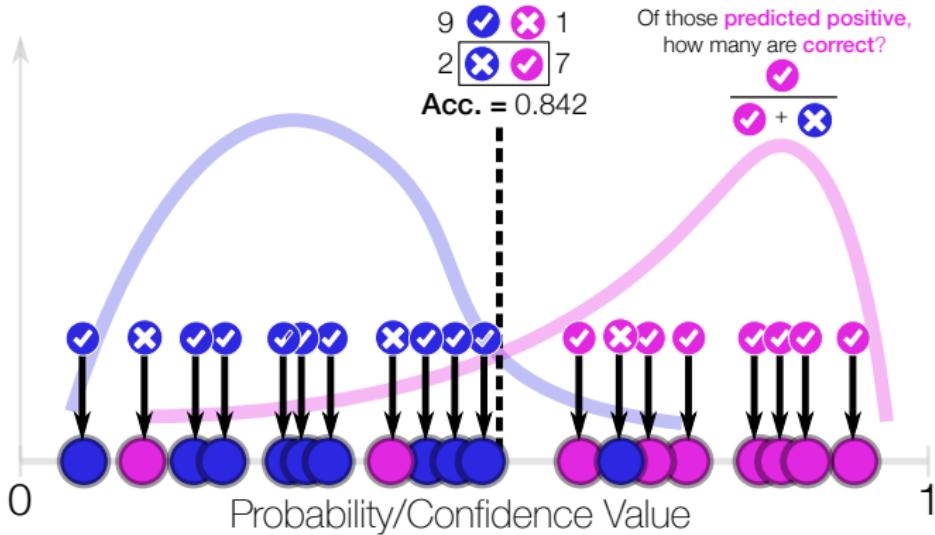
# How Good is my Model?



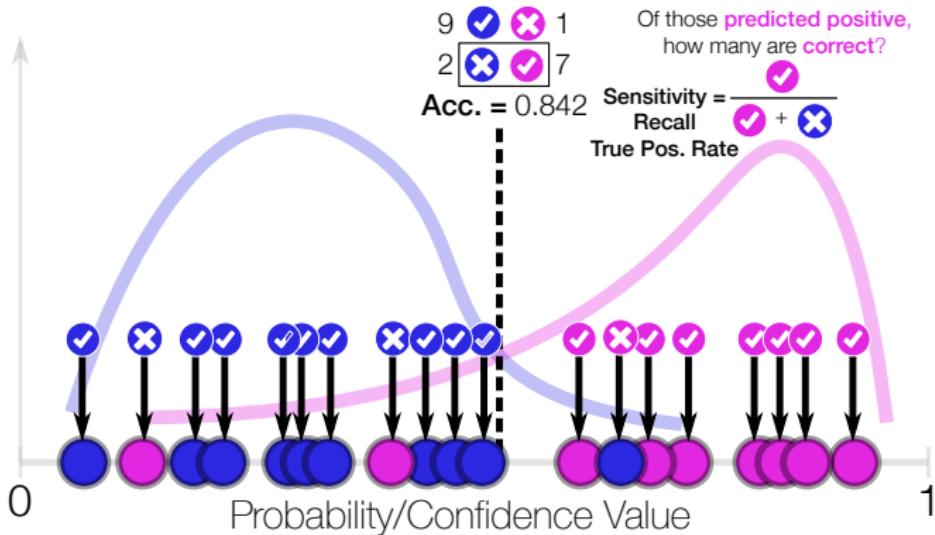
# How Good is my Model?



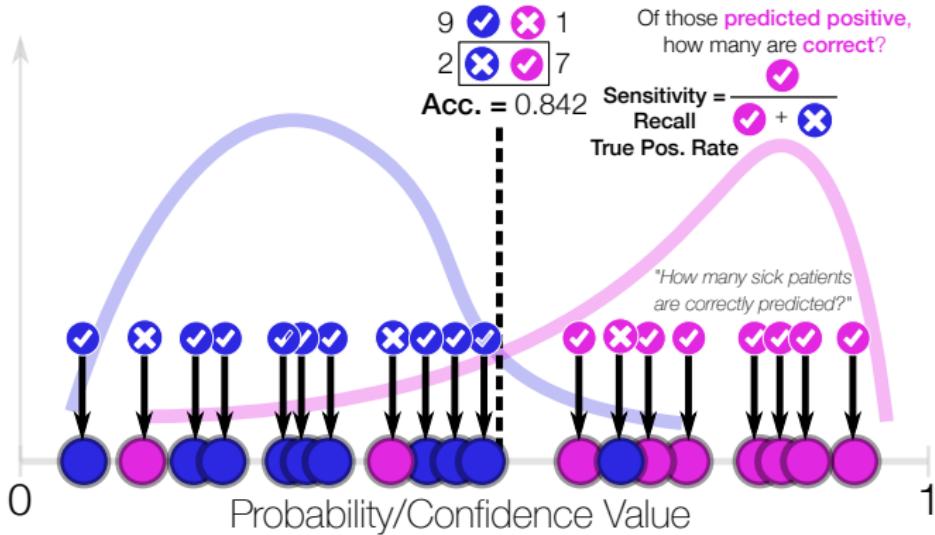
# How Good is my Model?



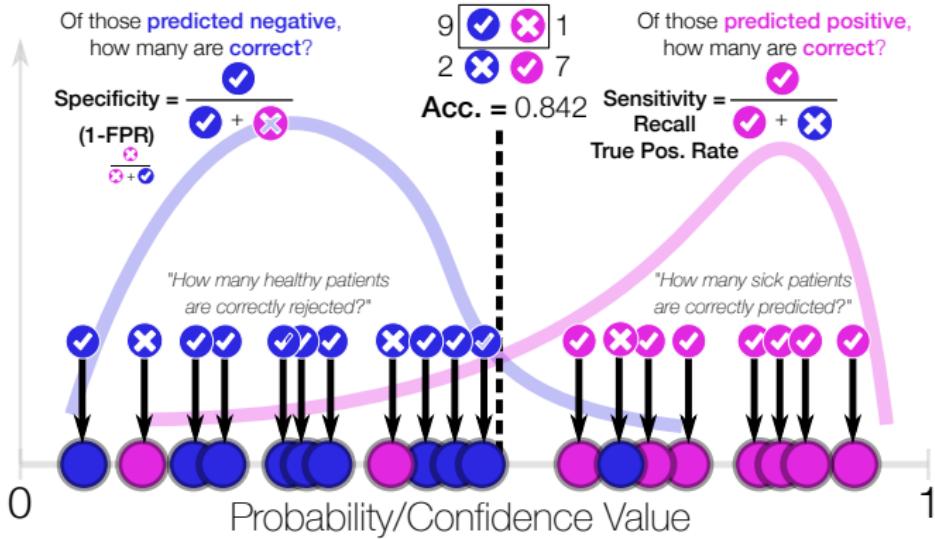
# How Good is my Model?



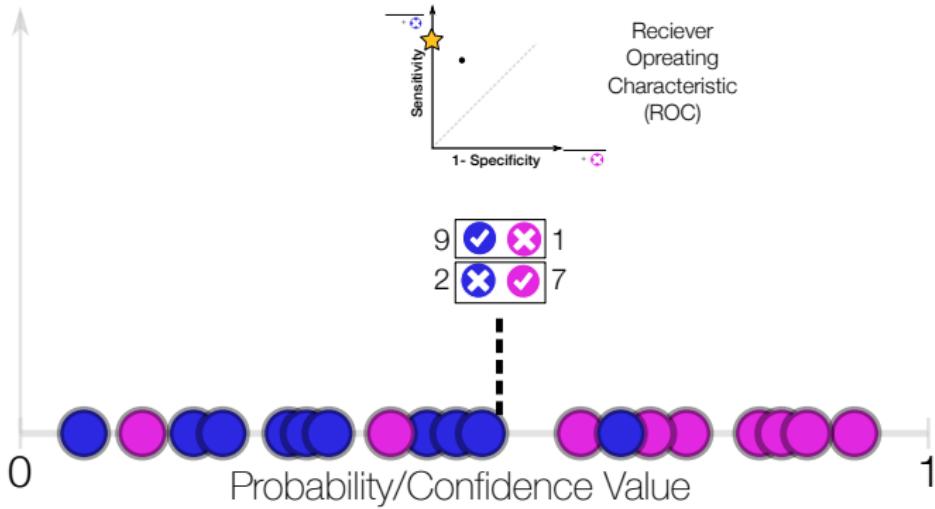
# How Good is my Model?



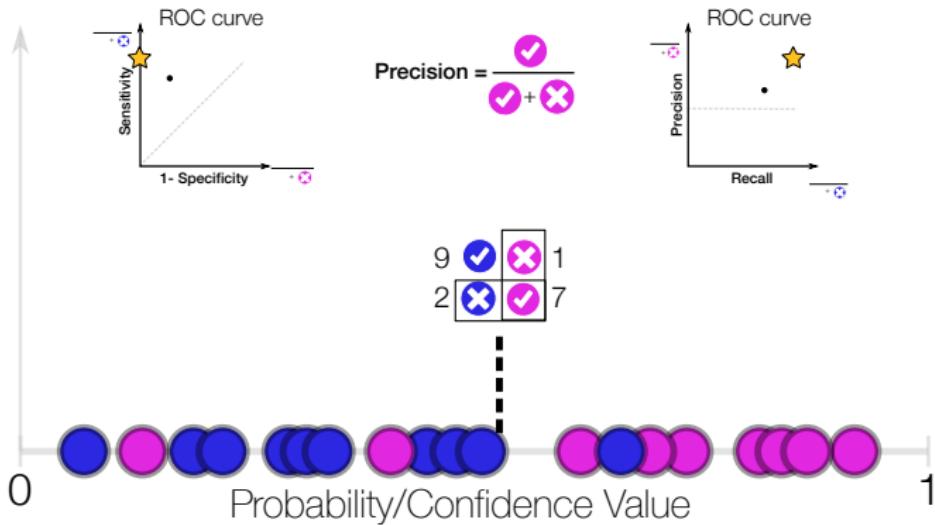
# How Good is my Model?



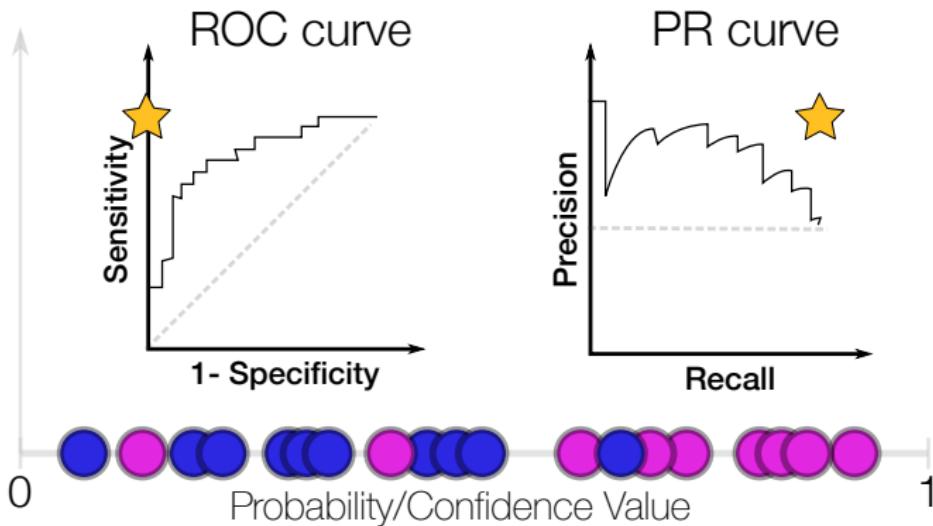
# How Good is my Model?



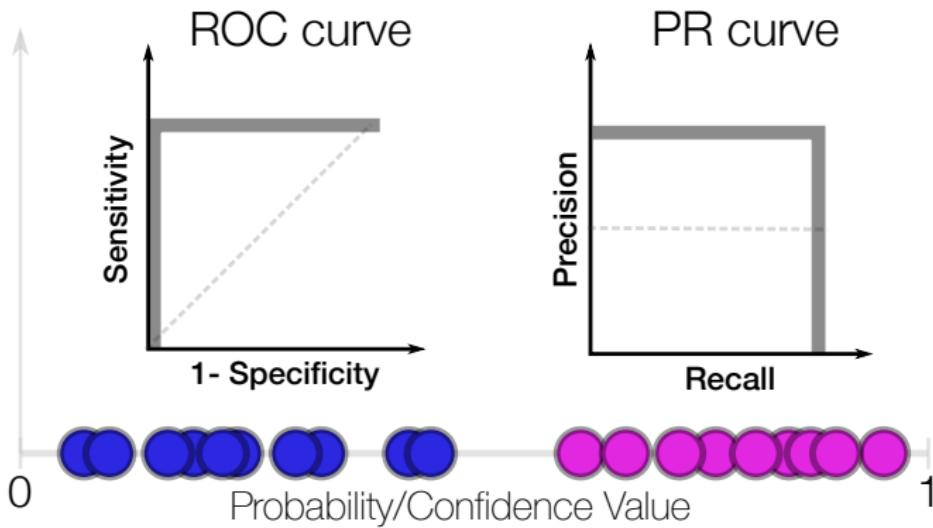
# How Good is my Model?



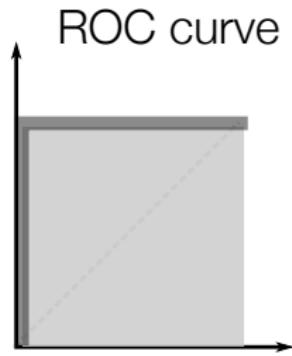
# How Good is my Model?



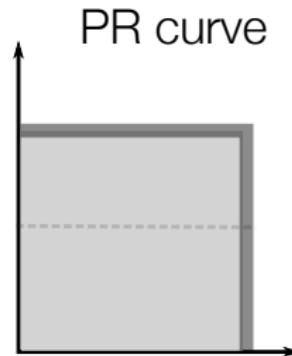
# How Good is my Model?



# How Good is my Model?



**AUC**  
**ROC = 1**



**AUC**  
**PR = 1**

# Animation: Variation in Threshold

# Animation: Improved Models by ROC Curve

# Animation: Improved Models by PR Curve

# Animation: Variation in Standard Deviation

# Animation: Variation in Class Imbalance

# Animation: Variation in Class Imbalance

# Into the Notebooks we Go...

We will cover one new notebook today!

## 1. Tutorial 5 - Performance Metrics

# Tutorial 5 - Performance Metrics

Victoria Ajila, MSc Computer Engineering  
Carleton University

Monday 18<sup>th</sup> October, 2021