Machine Learning

Evaluation Metrics 5

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False Positive Rate (FPR)

- It quantifies the proportion of **negative** instances that are **incorrectly** classified as positive by the model
  - Provide insights into the model's tendency to generate FP errors

$$\mathrm{FPR} = \frac{\mathrm{FP}}{\mathrm{N}} = \frac{\mathrm{FP}}{\mathrm{FP} + \mathrm{TN}}$$

- It is the **probability** of the model to make a false positive
- This metric holds significant importance in industrial contexts
- Assume a supermarket has daily 500 customers plus some shoplifters (thieves). The supermarket can only tolerate a maximum of 10 false alarms As an ML engineer, can you work backwards to determine the acceptable maximum FPR?

- Given N events and some FPR, then N * FPR represents our expected FP events
- Working backward 500 x FPR = 10, then FPR = 0.02
- Before signing an agreement, you must think if this is achievable FPR or not

False Negative Rate (FNR)

- Similar concept to FPR, FNR is used when false negative event is more critical than false positive
- It quantifies the proportion of positive instances that are **incorrectly** classified as **negative** by the model
- Notice, these are single metrics
  - Don’t use solely
- Other concepts:
  - true positive rate
  - true negative rate
  - false discovery rate
  - false omission rate
  - See wiki

$$\frac{\mathrm{FN}}{\mathrm{P}} = \frac{\mathrm{FN}}{\mathrm{FN} + \mathrm{TP}}$$

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."