

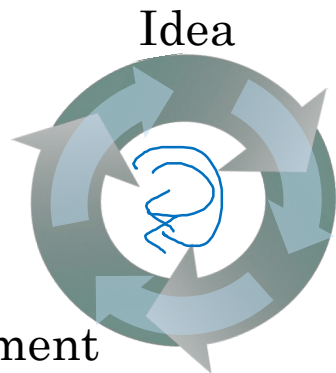


deeplearning.ai

Setting up
your goal

Single number
evaluation metric

Using a single number evaluation metric



→ Of examples recognized as cert,
what % actually are certs?
→ what % of actual certs
are correctly recognized

Classifier	Precision	Recall
A	95%	90%
B	98%	85%

F1
92.4%
91.0%

F1 score = "Average" of P and R.

$$\left(\frac{2}{\frac{1}{P} + \frac{1}{R}} \right) \cdot \text{"Harmonic mean"}$$

Dev set + Single number evaluation metric
↑
real Speed up iterating

Another example

Algorithm	US	China	India	Other	Average
A	<u>3%</u>	7%	5%	9%	6%
B	5%	6%	5%	10%	6.5%
C	2%	3%	4%	5%	3.5%
D	5%	8%	7%	2%	5.25%
E	4%	5%	2%	4%	3.75%
F	7%	11%	8%	12%	9.5%

Single number evaluation metric

To choose a classifier, a well-defined development set and an evaluation metric speed up the iteration process.

Example : Cat vs Non- cat

y = 1, cat image detected

Predict class \hat{y}	Actual class y	
	1	0
1	True positive	False positive
0	False negative	True negative

Precision

Of all the images we predicted $y=1$, what fraction of it have cats?

$$\text{Precision (\%)} = \frac{\text{True positive}}{\text{Number of predicted positive}} \times 100 = \frac{\text{True positive}}{(\text{True positive} + \text{False positive})} \times 100$$

Recall

Of all the images that actually have cats, what fraction of it did we correctly identifying have cats?

$$\text{Recall (\%)} = \frac{\text{True positive}}{\text{Number of predicted actually positive}} \times 100 = \frac{\text{True positive}}{(\text{True positive} + \text{True negative})} \times 100$$

Let's compare 2 classifiers A and B used to evaluate if there are cat images:

Classifier	Precision (p)	Recall (r)
A	95%	90%
B	98%	85%

In this case the evaluation metrics are precision and recall.

For classifier A, there is a 95% chance that there is a cat in the image and a 90% chance that it has correctly detected a cat. Whereas for classifier B there is a 98% chance that there is a cat in the image and a 85% chance that it has correctly detected a cat.

The problem with using precision/recall as the evaluation metric is that you are not sure which one is better since in this case, both of them have a good precision et recall. F1-score, a harmonic mean, combine both precision and recall.

$$\text{F1-Score} = \frac{2}{\frac{1}{p} + \frac{1}{r}}$$

Classifier	Precision (p)	Recall (r)	F1-Score
A	95%	90%	92.4 %
B	98%	85%	91.0%

Classifier A is a better choice. F1-Score is not the only evaluation metric that can be use, the average, for example, could also be an indicator of which classifier to use.