F1 score

All samples	As positive predicted	As negative predicted
Positive	tp (true positive)	fn (false negative)
Negative	fp (false positive)	tn (true negative)

$$\text{Accuracy} = \frac{\Sigma \text{ true pos} + \Sigma \text{ true neg}}{\Sigma \text{ all samples}}$$

Example

95 Dogs, 5 cats   (skewed classes)

Predictor (x) = dog

Accuracy = 95/100 = 95% ⇒ seems to be pretty good!

But we know, not really.

All samples	As positive predicted	As negative predicted
Positive	tp (true positive)	fn (false negative)
Negative	fp (false positive)	tn (true negative)

$$\text{Precision} = \frac{\Sigma \text{ true pos}}{\Sigma \text{ true pos} + \Sigma \text{ false pos}}$$

Ratio of truly positive predicted among all as positive predicted

$$\text{Recall} = \frac{\Sigma \text{ true pos}}{\Sigma \text{ true pos} + \Sigma \text{ false neg}}$$

Ratio of truly positive predicted among all positives.

$$\text{F1 score} = 2 \frac{\text{Precision} * \text{Recall}}{\text{Precision} + \text{Recall}}$$

Example

F1 score depends on the class, you are (more) interested in! For each class, the classifier has a different F1 score:

95 dogs, 5 cats

Precision_{dog} = 95 / (95 + 5) = 95/100

Recall_{dog} = 95 / (95 + 0) = 1

F1 score_{dog} = 2*95/100*1 / (1+95/100) = 2*95/195 = 0.97

$$0 <= \text{F1 score} <= 1$$

Example

F1 score depends on the class, you are (more) interested in! For each class, the classifier has a different F1 score:

95 dogs, 5 cats

$\text{Precision}_{cat} = 0 / (0 + 0) = 0$ (not defined)

$\text{Recall}_{cat} = 0 / (0 + 5)$

$\text{F1 score}_{cat} = 0$

$$0 <= \text{F1 score} <= 1$$