

[320] Accuracy, Recall, and Precision

Confusion Matrix

what does the model think?

	dog	cat	mouse
dog	0	0	0
cat	0	0	0
mouse	0	0	0

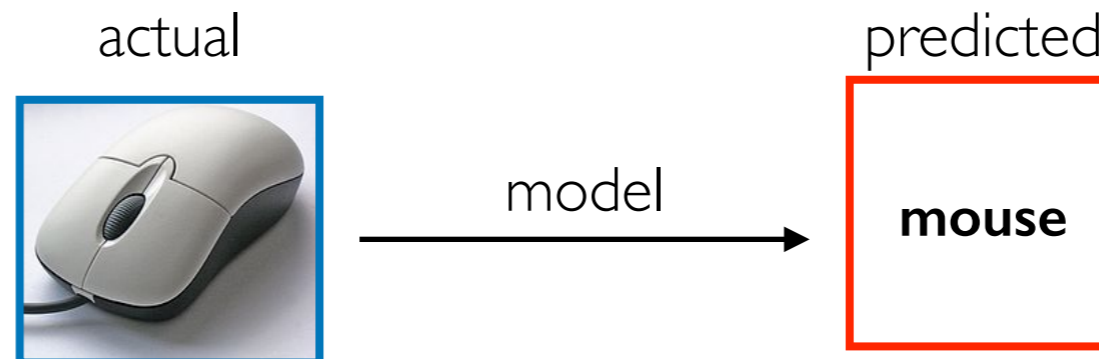
what is it actually?

Confusion Matrix

what does the model think?

	dog	cat	mouse
dog	0	0	0
cat	0	0	0
mouse	0	0	1

what is it actually?



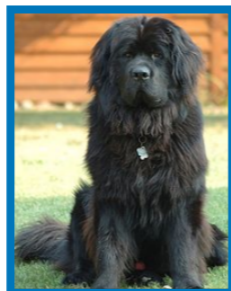
Confusion Matrix

what does the model think?

what is it actually?

	dog	cat	mouse
dog	0	1	0
cat	0	0	0
mouse	0	0	1

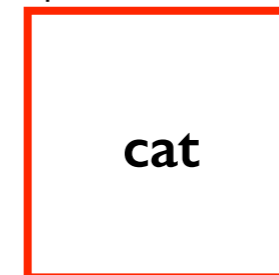
actual



model



predicted



Confusion Matrix

what does the model think?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

what is it actually?

accuracy: total correct (diagonal divided by whole)

$$\frac{8}{10}$$

observations

- fraction, so between zero and one
- "good" is in numerator, so one is best

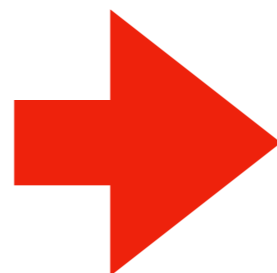
Confusion Matrix

what does the model think?

what is it actually?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

precision and recall have these properties, but focus on subsets of the confusion matrix



observations

- fraction, so between zero and one
- "good" is in numerator, so one is best

Confusion Matrix

what does the model think?

what is it actually?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right?

$$\frac{2}{4}$$

Confusion Matrix

what does the model think?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

what is it actually?

cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right?

$$\frac{2}{4}$$

dog recall: ????

Confusion Matrix

what does the model think?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

what is it actually?

cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right? $\frac{2}{4}$

dog recall: when we **actually** have a dog (row!), what percentage of the time is the model right? $\frac{4}{4}$

Confusion Matrix

what does the model think?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

what is it actually?

cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right? $\frac{2}{4}$

dog recall: when we **actually** have a dog (row!), what percentage of the time is the model right? $\frac{4}{4}$

dog precision: when the model **predicts** a dog (column!), what percentage is it right? $\frac{4}{6}$

Confusion Matrix

what does the model think?

		what does the model think?		
		dog	cat	mouse
what is it actually?	dog	4	0	0
	cat	2	2	0
	mouse	0	0	2

cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right? $\frac{2}{4}$

dog recall: when we **actually** have a dog (row!), what percentage of the time is the model right? $\frac{4}{4}$

dog precision: when the model **predicts** a dog (column!), what percentage is it right? $\frac{4}{6}$

cat precision: ????

Confusion Matrix

what does the model think?

what is it actually?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right? $\frac{2}{4}$

dog recall: when we **actually** have a dog (row!), what percentage of the time is the model right? $\frac{4}{4}$

dog precision: when the model **predicts** a dog (column!), what percentage is it right? $\frac{4}{6}$

cat precision: when the model **predicts** a cat (column!), what percentage is it right? $\frac{2}{2}$

Confusion Matrix

what does the model think?

what is it
actually?

	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

$$F1 \text{ score} = 2 * (\text{precision} * \text{recall}) / (\text{precision} + \text{recall})$$