[320] Classification

Department of Computer Sciences
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Accuracy, Recall, and Precision

Confusion Matrix

what does the model think?

what is it actually?

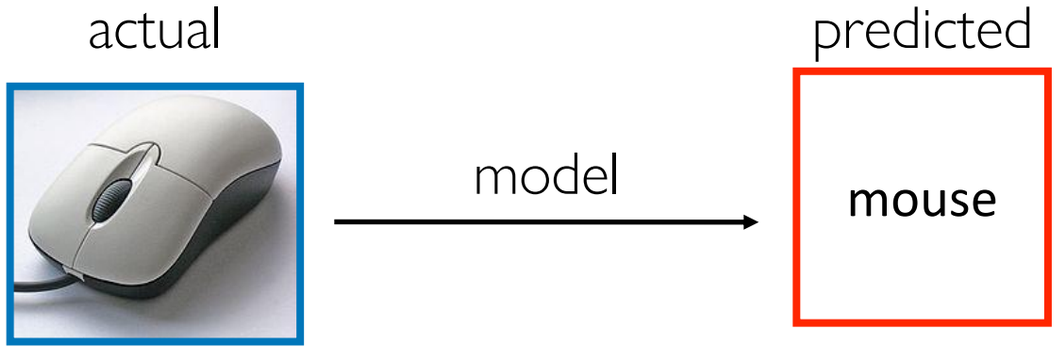
	dog	cat	mouse
dog	0	0	0
cat	0	0	0
mouse	0	0	0

Confusion Matrix

what does the model think?

what is it actually?

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



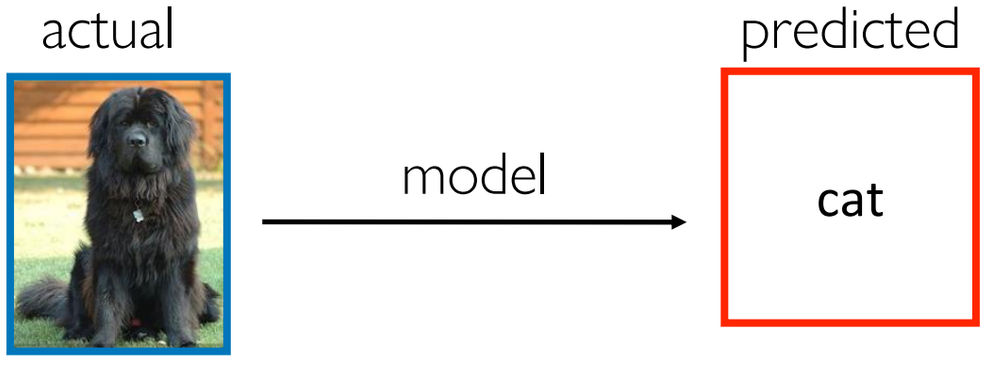
https://en.wikipedia.org/wiki/Computer_mouse

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



https://en.wikipedia.org/wiki/Dog

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

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?

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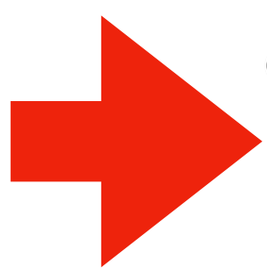
	dog	cat	mouse
dog	4	0	0
cat	2	2	0
mouse	0	0	2

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



observations

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	dog	cat	mouse
dog	4	0	0
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cat recall: when we **actually** have a cat (row!), what percentage of the time is the model right? $\frac{2}{4}$

Confusion Matrix

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

dog recall: ????

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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?

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? $\frac{4}{6}$

Confusion Matrix

what does the model think?

what is it actually?	dog	cat	mouse
dog	4	0	0
cat	2	2	0
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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: ????

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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? $\frac{2}{2}$

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F1 score = 2 * (precision * recall) / (precision + recall)