

# PSY9511: Seminar 1

## Introduction to machine learning

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## Plan for the day

- Round of introductions
- Course information
- Introduction to machine learning
- Presentation of assignment 1

# Introduction to machine learning

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# Introduction: Model performance

Regression

Classification



# Introduction: Model performance

## Regression

$y$
18
15
18
16
17

## Classification

$y$
cat
cat
dog
cat
dog

# Introduction: Model performance

## Regression

$y$	$\hat{y}$
18	15.3
15	16.1
18	17.2
16	16.8
17	19.5

## Classification

$y$
cat
cat
dog
cat
dog

# Introduction: Model performance

## Regression

$y$	$\hat{y}$
18	15.3
15	16.1
18	17.2
16	16.8
17	19.5

Mean squared error (MSE):

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

## Classification

$y$
cat
cat
dog
cat
dog

# Introduction: Model performance

## Regression

$y$	$\hat{y}$
18	15.3
15	16.1
18	17.2
16	16.8
17	19.5

$$(18 - 15.3)^2 = 7.29$$

$$(15 - 16.1)^2 = 1.21$$

$$(18 - 17.2)^2 = 0.64$$

$$(16 - 16.4)^2 = 0.16$$

$$(17 - 19.5)^2 = 6.25$$

3.11

Mean squared error (MSE):

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

## Classification

$y$
cat
cat
dog
cat
dog





# Introduction: Model performance

## Regression

$y$	$\hat{y}$	
18	15.3	$(18 - 15.3)^2 = 7.29$
15	16.1	$(15 - 16.1)^2 = 1.21$
18	17.2	$(18 - 17.2)^2 = 0.64$
16	16.8	$(16 - 16.4)^2 = 0.16$
17	19.5	$(17 - 19.5)^2 = 6.25$
		<u>3.11</u>

Mean squared error (MSE):

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

## Classification

$y$
cat
cat
dog
cat
dog

# Introduction: Model performance

## Regression

$y$	$\hat{y}$	
18	15.3	$(18 - 15.3)^2 = 7.29$
15	16.1	$(15 - 16.1)^2 = 1.21$
18	17.2	$(18 - 17.2)^2 = 0.64$
16	16.8	$(16 - 16.4)^2 = 0.16$
17	19.5	$(17 - 19.5)^2 = 6.25$
		<u>3.11</u>

## Classification

$y$	$\hat{y}$
cat	cat
cat	dog
dog	dog
cat	cat
dog	cat

Mean squared error (MSE):

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$



# Introduction: Model performance

## Regression

$y$	$\hat{y}$	
18	15.3	$(18 - 15.3)^2 = 7.29$
15	16.1	$(15 - 16.1)^2 = 1.21$
18	17.2	$(18 - 17.2)^2 = 0.64$
16	16.8	$(16 - 16.4)^2 = 0.16$
17	19.5	$(17 - 19.5)^2 = 6.25$
		<u>3.11</u>

Mean squared error (MSE):

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

## Classification

$y$	$\hat{y}$
cat	cat
cat	dog
dog	dog
cat	cat
dog	cat

Accuracy:

$$\frac{1}{n} \sum_{i=1}^n \mathbb{1}(y = \hat{y})$$



# Introduction: Model performance

## Regression

$y$	$\hat{y}$	
18	15.3	$(18 - 15.3)^2 = 7.29$
15	16.1	$(15 - 16.1)^2 = 1.21$
18	17.2	$(18 - 17.2)^2 = 0.64$
16	16.8	$(16 - 16.4)^2 = 0.16$
17	19.5	$(17 - 19.5)^2 = \underline{6.25}$
		3.11

Mean squared error (MSE):

$$\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

## Classification

$y$	$\hat{y}$	
cat	cat	$\text{cat}=\text{cat} \implies 1$
cat	dog	$\text{cat} \neq \text{dog} \implies 0$
dog	dog	$\text{dog}=\text{dog} \implies 1$
cat	cat	$\text{cat}=\text{cat} \implies 1$
dog	cat	$\text{dog} \neq \text{cat} \implies \underline{0}$
		0.66

Accuracy:

$$\frac{1}{n} \sum_{i=1}^n \mathbb{1}(y = \hat{y})$$

# Introduction: Model performance

<http://localhost:8888/tree>

