

Linear Regression

After this video you will be able to..

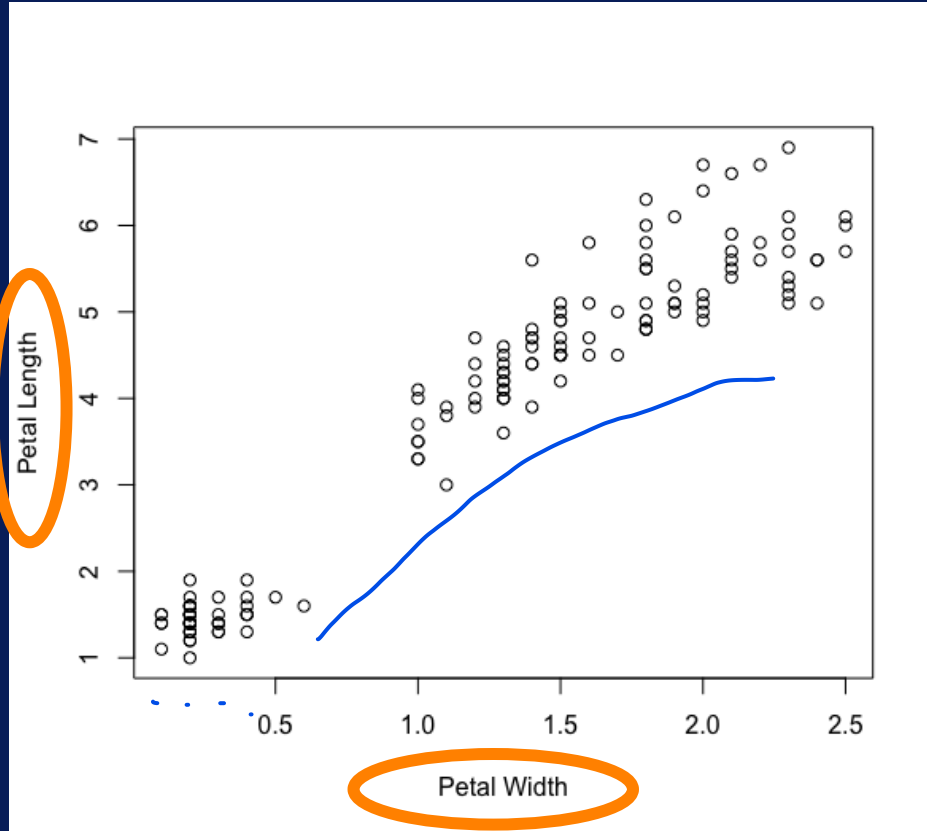
- Describe how linear regression works
- Discuss how least squares is used in linear regression
- Define simple and multiple linear regression

Linear Regression

- Captures relationship between numerical output and input variables
- Relationship is modeled as linear



Linear Regression Model



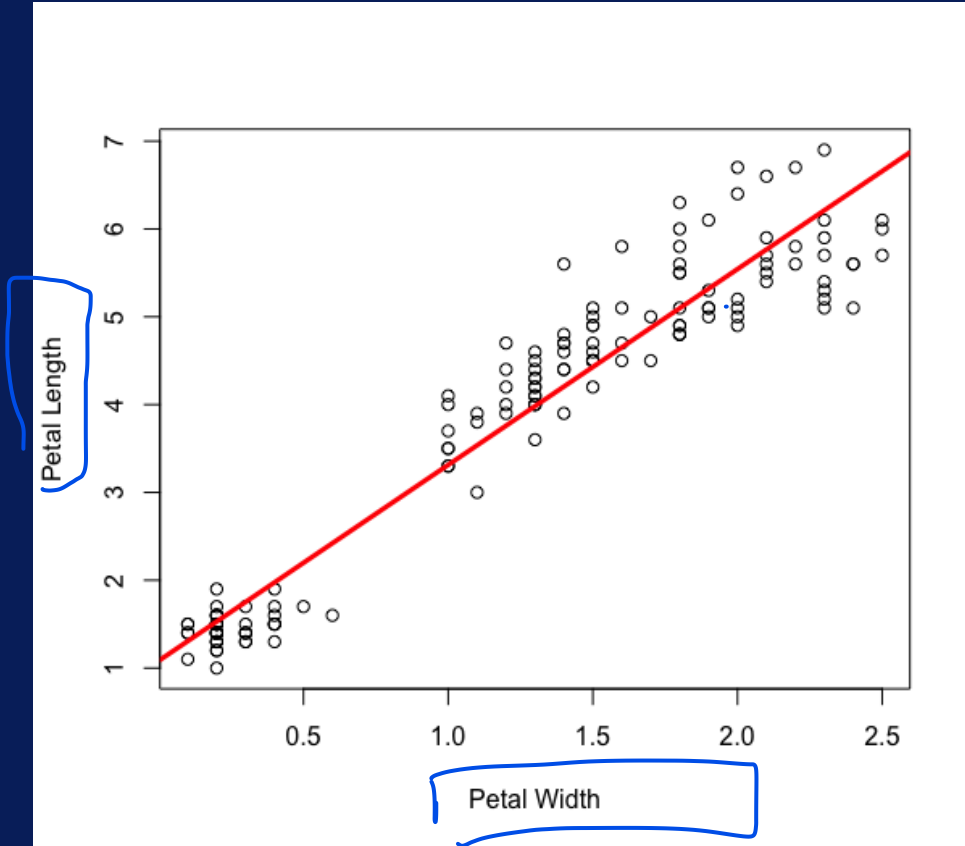
Regression Task:

Given petal width, predict petal length.

← Iris dataset

S.L	S.V	Class
3.4	4.3	5
3.5	4.3	5
3.6	4.3	5
3.7	4.3	5
3.8	4.3	5
3.9	4.3	5
4.0	4.3	5
4.1	4.3	5
4.2	4.3	5
4.3	4.3	5
4.4	4.3	5
4.5	4.3	5
4.6	4.3	5
4.7	4.3	5
4.8	4.3	5
4.9	4.3	5
5.0	4.3	5
5.1	4.3	5
5.2	4.3	5
5.3	4.3	5
5.4	4.3	5
5.5	4.3	5
5.6	4.3	5
5.7	4.3	5
5.8	4.3	5
5.9	4.3	5
6.0	4.3	5
6.1	4.3	5
6.2	4.3	5
6.3	4.3	5
6.4	4.3	5
6.5	4.3	5
6.6	4.3	5
6.7	4.3	5
6.8	4.3	5
6.9	4.3	5
7.0	4.3	5

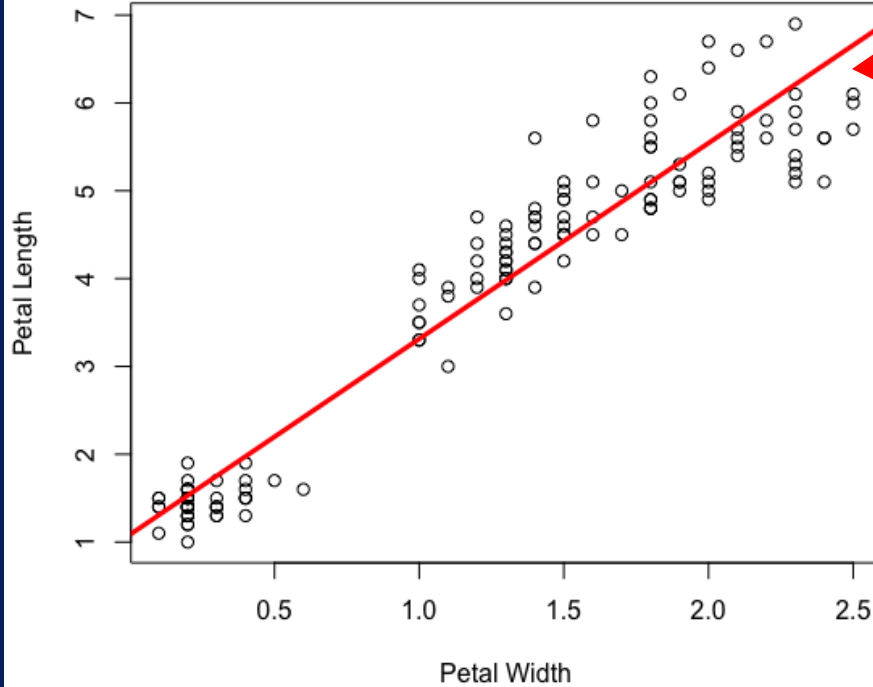
Linear Regression Model



Regression Task:

Given petal width, predict petal length.

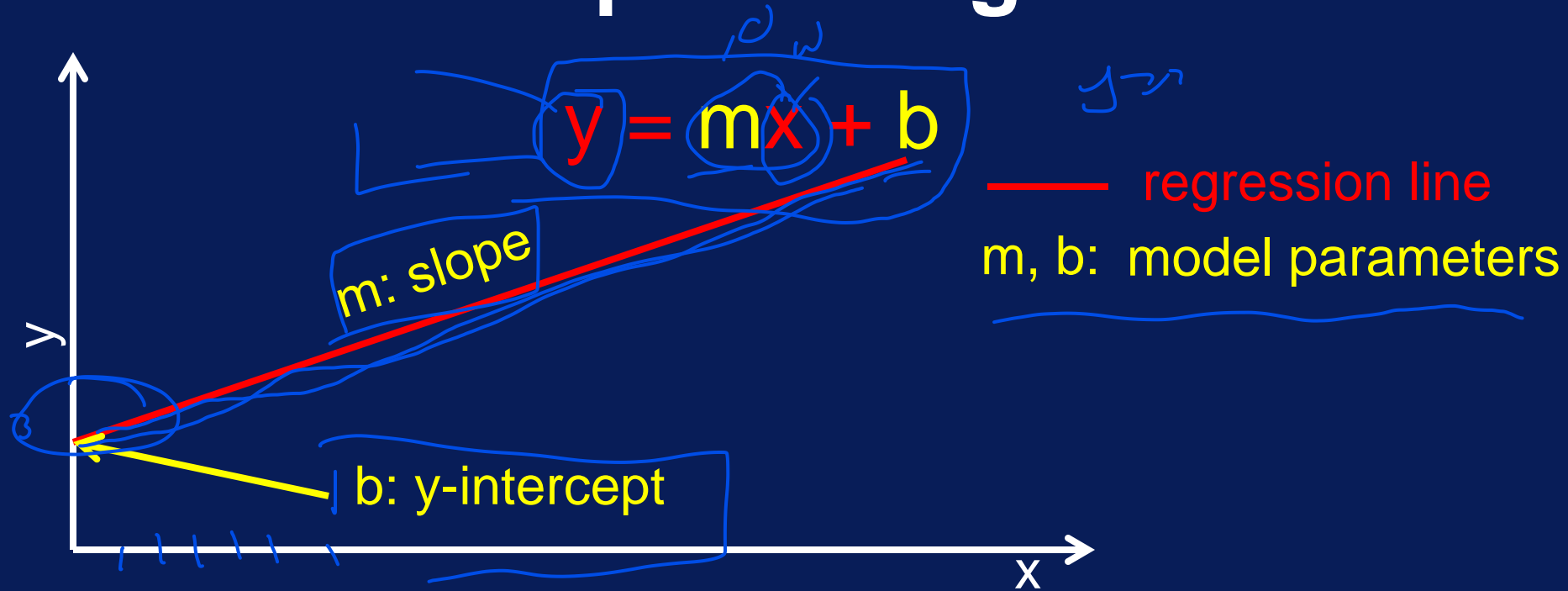
Linear Regression Model



regression line

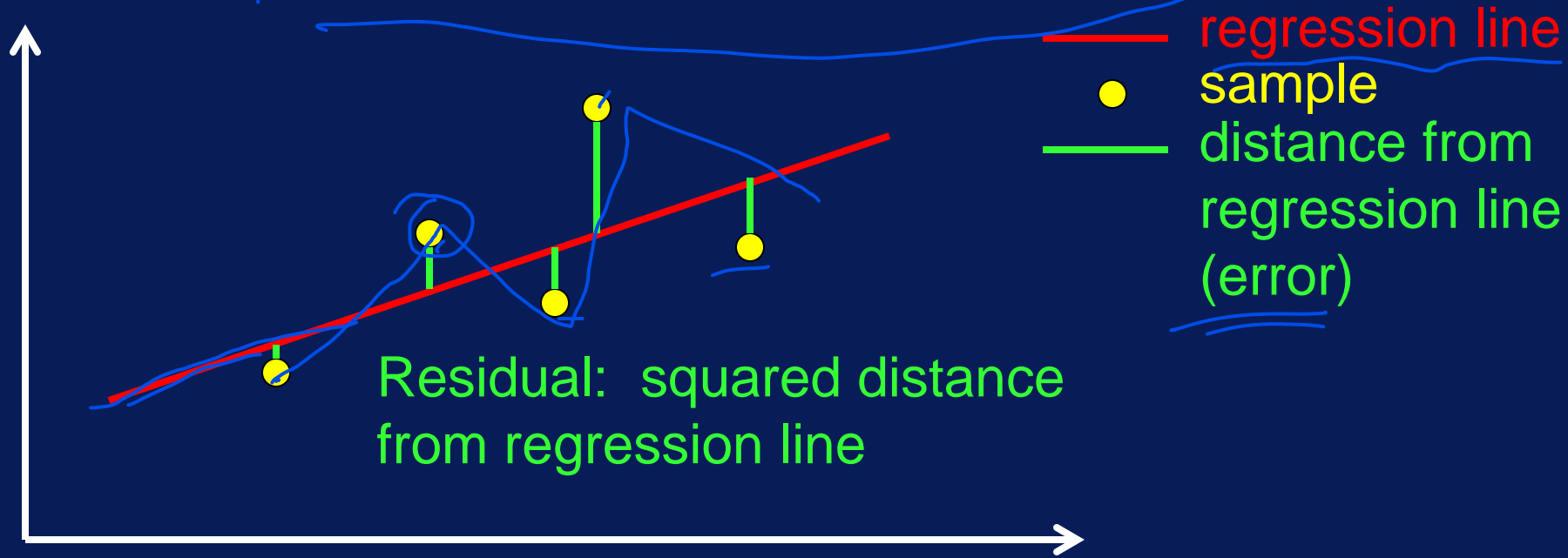


Least Squares Algorithm



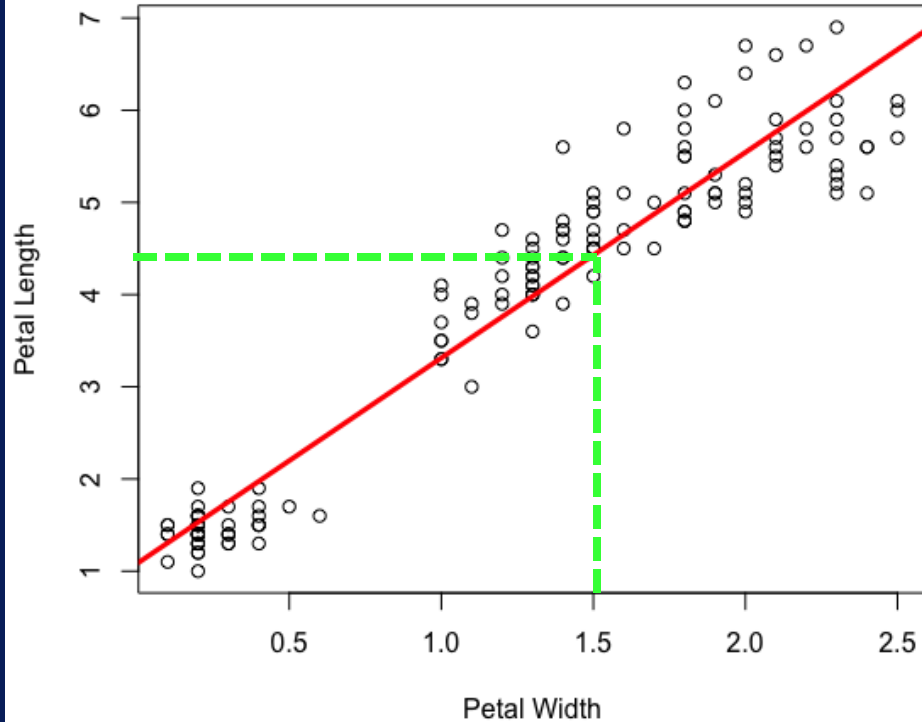
Training linear regression model adjusts
model parameters to fit samples

Least Squares Method



Goal: Find regression line that makes sum of residuals as small as possible

Linear Regression Model



Applying model:

Given petal width = 1.5,
prediction is
petal length = 4.5


Types of Linear Regression

Simple Linear Regression



var1

A light blue oval containing the text 'var1'.



Input has one variable

A white curly bracket underneath the 'var1' oval, spanning its width.

Multiple Linear Regression



var1

A light blue oval containing the text 'var1'.

var2

A light blue oval containing the text 'var2'.

...

Three small white dots representing an ellipsis.

varN

A light blue oval containing the text 'varN'.



Input has >1 variables

A white curly bracket underneath the row of ovals, spanning from 'var1' to 'varN'.

Linear Regression Summary

- Captures linear relationship between numerical output and input variables
- Model can be fitted using least squares