

EVML3

REGRESSION

HANDS-ON

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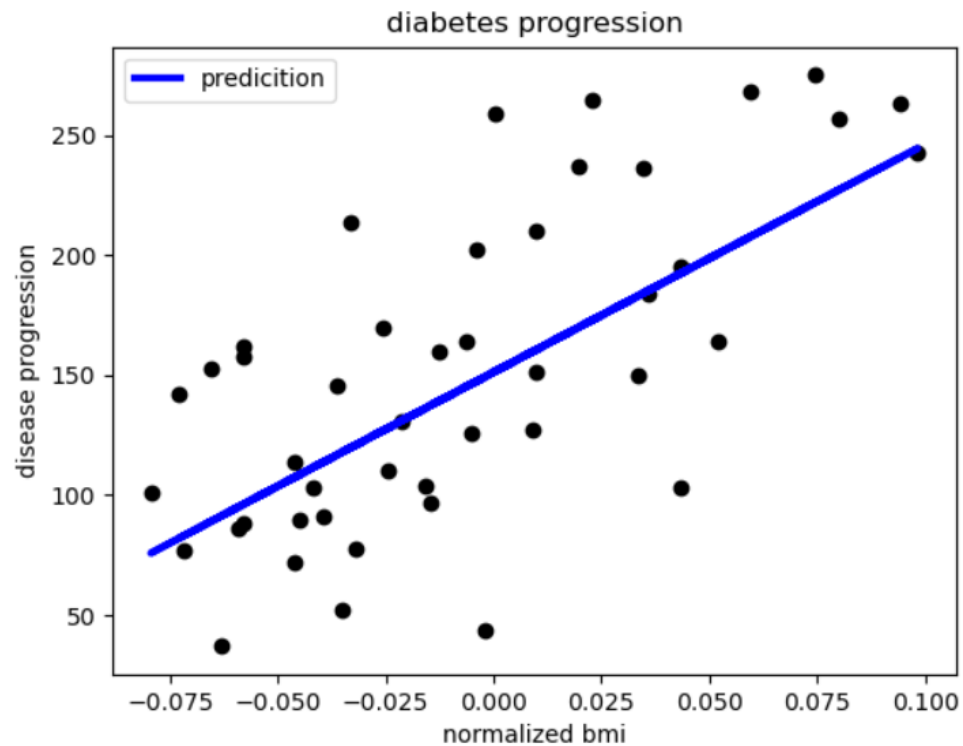
CONTENTS

- Linear regression exercise
- Polynomial regression exercise

SCIKIT LEARN INTERFACE DESIGN

- Estimators
 - estimation performed by the `fit()` method
 - dataset as a parameter (or two for supervised learning)
 - Any other parameter is considered a hyperparameter
- Transformers
 - performed by the `transform()` method
 - `fit_transform()` is equivalent to calling `fit()` and then `transform()`
(but sometimes `fit_transform()` is optimized and runs much faster)
- Predictors
 - prediction method performed by `predict()` method
 - quality of the predictions measured by `score()` method

LINEAR REGRESSION EXAMPLE



See Regression_01.py

POLYNOMIAL REGRESSION

- Exercise 1: Can you improve the model by polynomial regression?
- Try out generating your own regression example:
https://scikit-learn.org/stable/modules/generated/sklearn.datasets.make_regression.html
- Build on Regression_01.py
and see Géron, page 129 (114 in new ed.)

LOGISTIC REGRESSION

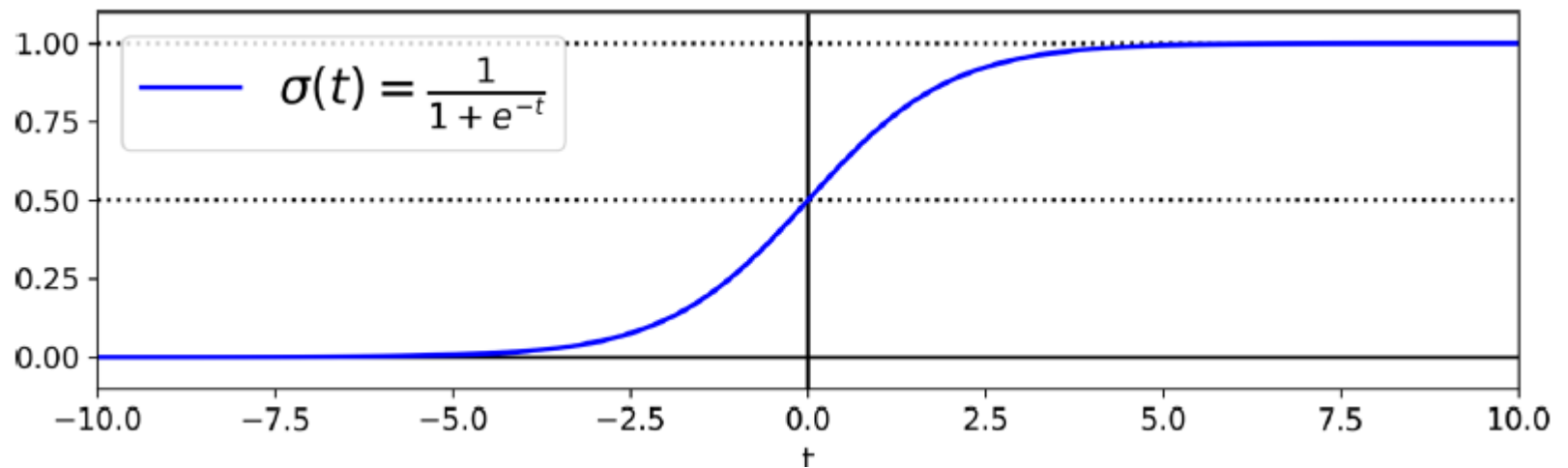
- Estimate the probability that an instance belongs to a particular class
- Binary classifier
- Baseline for evaluating more complex classification methods



Source: Mathworks, Applying Supervised Learning

ESTIMATING PROBABILITY

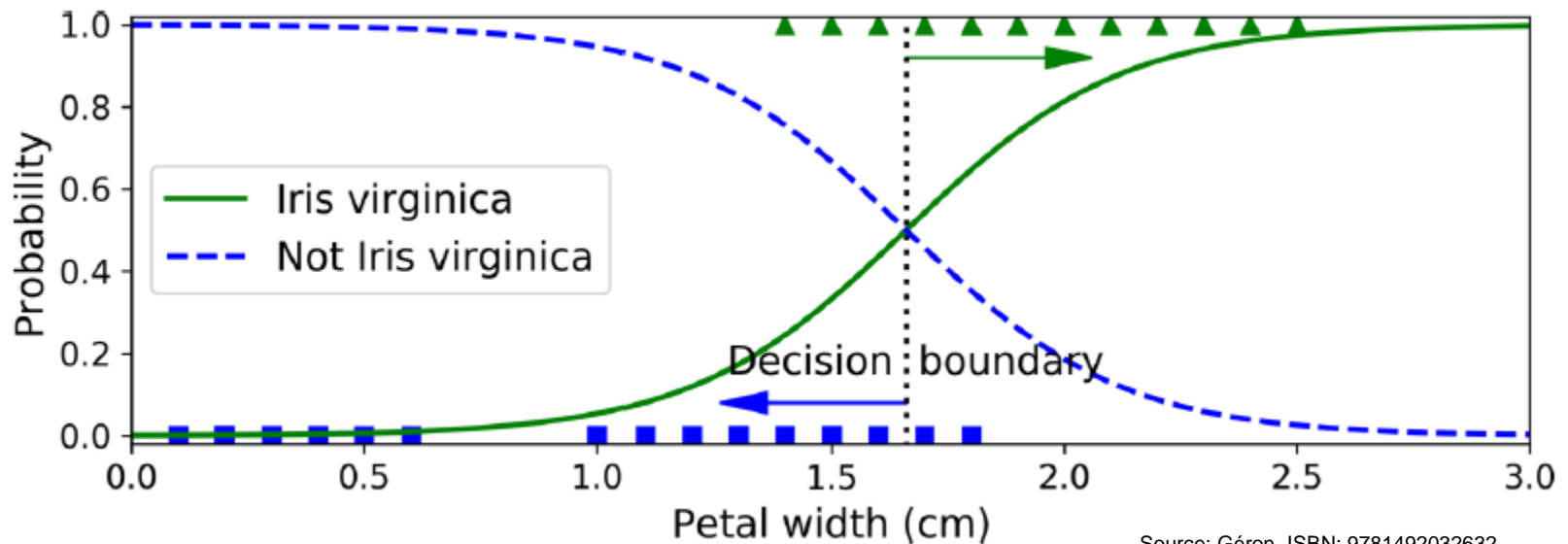
- Logistic functions maps prediction result to probability
- Sigmoid function



<https://developers.google.com/machine-learning/crash-course/logistic-regression/calculating-a-probability>

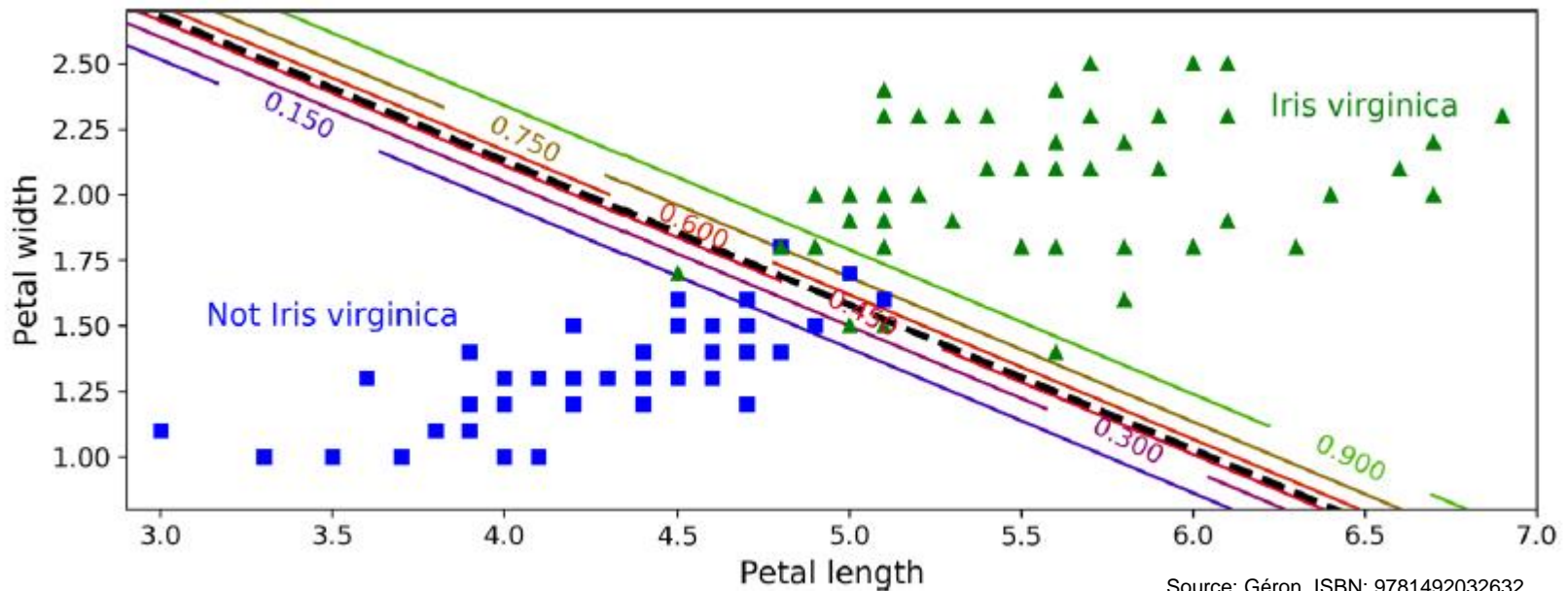
DECISION BOUNDARY

- Aka classification threshold
- Both probabilities are equal to 50% ?



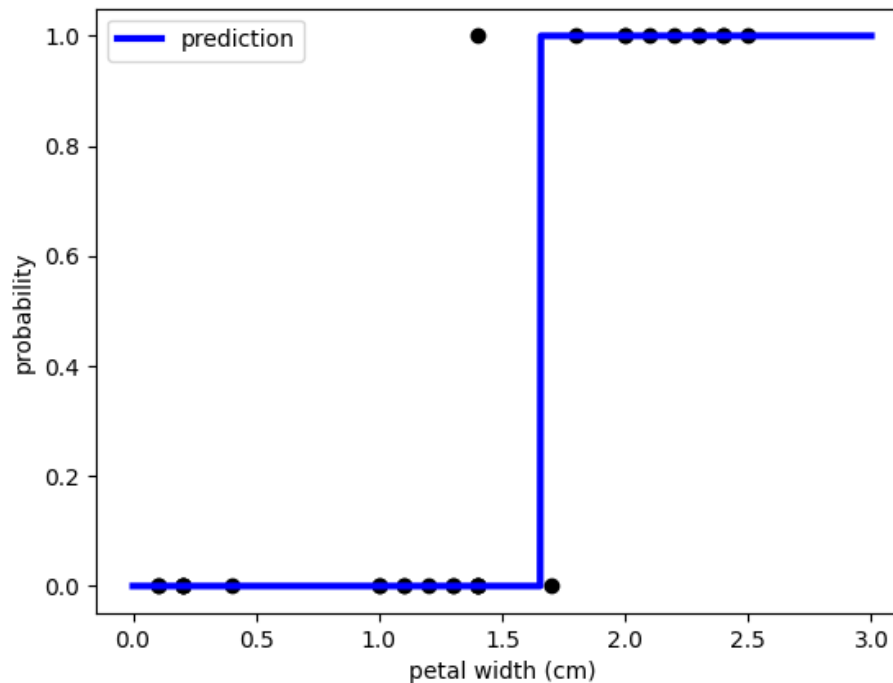
Source: Géron, ISBN: 9781492032632

LINEAR DECISION BOUNDARY



- Logistic Regression models can be regularized

LOGISTIC REGRESSION EXAMPLE



See Regression_02.py

LEARNING CURVES IN REGRESSION

- Exercise 02: Plot the learning curves for polynomial regression and experiment with various degrees
- Can you interpret the curves?
- Build on Regression_01.py
and see Géron, page 130-134