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Class: Machine Learning

Nearest-neighbour methods

Instructor: Matteo Leonetti

Learning outcomes

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- Describe the difference between parametric and non-parametric approaches
- Apply k-nearest neighbour to a small dataset (without using KD-trees)

Parametric methods

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Parametric approach: choose a parametrized function with a certain structure, and learn the parameters.

Example: we want a separating hyperplane, and learn its parameters.

Example: we model the data with a gaussian, and learn its parameters

Non-parametric methods

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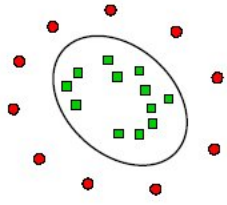
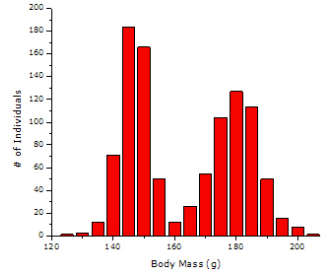


No separating hyperplane!



Bimodal data!

The chosen structure may not fit the data very well

Non-parametric: focus on the data rather than a particular structure

K-nearest neighbour

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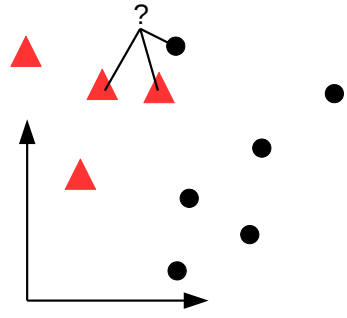
Look at the k-closest points (here k=3):



Classify like the majority of the points: ▲

If k=1 it's just called *nearest neighbour*

KD-trees

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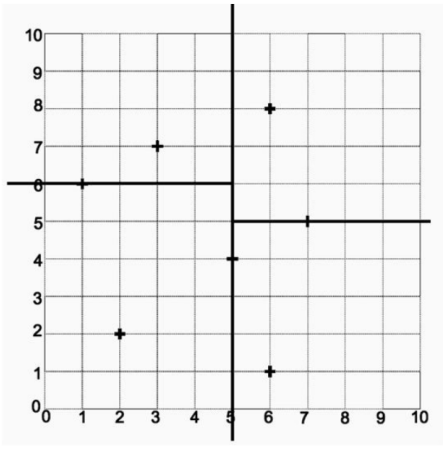
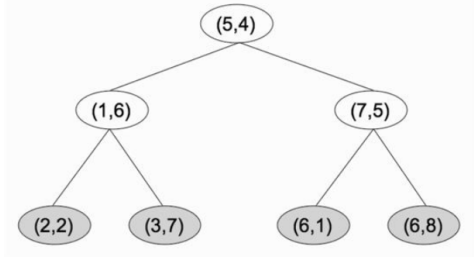
An efficient way to identify points that are close





Effect of k

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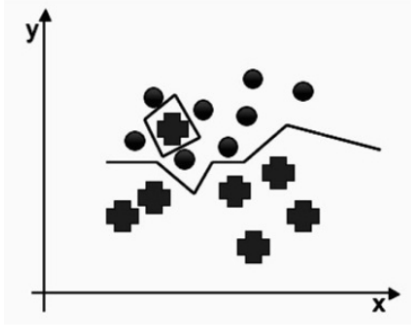
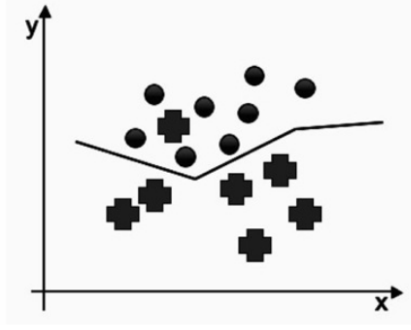


k=1



k=2

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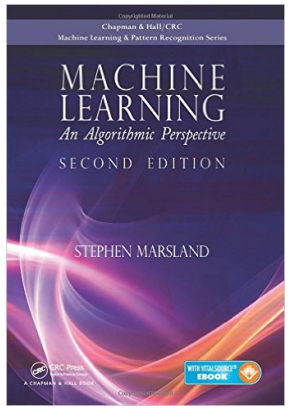

Chapter 7.2