2D Image Processing

Exercise Sheet 4

Statistical Methods

Deadline	01.07.2021 @ 23:59
Contact	kumail.raza@dfki.de

- Make a ***.zip*** (with the naming convention below) containing the following:
  1. A folder for the coding task.
  2. A PDF file with the answer to the questions and the output of the coding exercise.
- Submit the zip file with the name:
  2DIP21_<exerciseno>_<CamelCasedLastName1>_<CamelCasedLastName2>.zip
- For programming tasks:
  - You can use existing functions from Numpy or OpenCV.
  - Please analyze your results and present it in your report.

1. K - Nearest Neighbour

The K-nearest neighbors (KNN) algorithm is supervised machine learning algorithm that can be used to solve both classification and regression problems.

1. What is supervised method w.r.t classification?
2. See Figure 1, can you briefly explain the workflow of K-Nearest Neighbor (K-NN)?

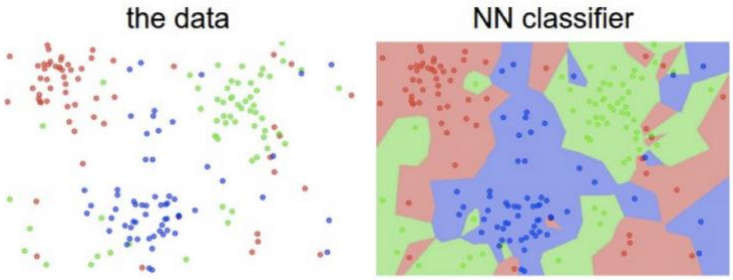
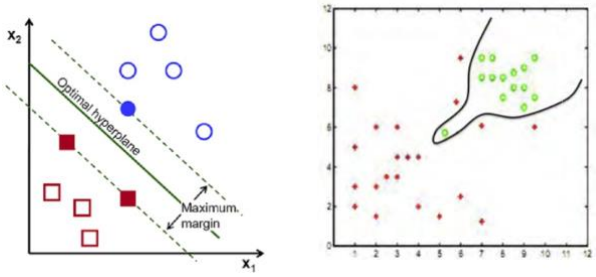


Figure 1

2. Support Vector Machine (SVM)

SVM is a type of classifier which classifies positive and negative examples, here blue and red data points. As shown in the Figure 2 (a), the max margin is found in order to avoid overfitting and the optimal hyperplane is at the maximum distance from the positive and negative examples (equal distant from the boundary lines).



(a) (b)

Figure 2

1. What the intuition of a max margin classifier?
2. What is a kernel in SVM? Why do we use kernels in SVM?
3. See the given Figure 2 (b) and explain the phenomenon that SVM may suffer.