

Exercise

Problem 0.1 (Paper Summary) (20 P.) Read the paper “Identifying Qualitatively Different Experiences: Experiments with a Mobile Robot.” by Tim Oates, Matthew D. Schmill, and Paul R. Cohen (oates00.pdf in StudIP). The described approach will be applied to robotic data in a later exercise.

- Summarize the paper in your own words.
- What are possible applications of the proposed methodology? How can it be used in these applications?
- Why is it desirable to apply machine learning methods in the described setting?
- Which additional information would have to be supplied to apply a supervised method? Why is it more desirable to apply an unsupervised approach?
- Why is the use of a sophisticated similarity measure such as dynamic time-warping required?

Problem 0.2 (Dynamic Time-Warping) (10 P.)

Evaluate the DTW-algorithm given in the `dtw.py` by aligning two one-dimensional time series. As distance metric you should use the euclidian distance (`lambda x, y: numpy.linalg.norm(x-y)`)

- The first time series should be $\cos(x)$ and the second one $\sin(x)$ for $x \in [0.0, 0.05, 0.1, \dots, 22.0]$. Plot the two time series and the first time series after applying the alignment. Explain the results.
- Plot a distance curve for the $\sin(x)$ and $\cos(x + t)$ for different t between $[0, 2\pi]$. Explain the results.

On the hand-in date **02.11.2016**, you must hand-in the following:¹

- your code for Problem **0.2**,
- your solutions / answers / plots to Problems **0.1** and **0.2**,
- and a text file stating how much time you (all together) used to complete this exercise sheet

¹upload via StudIP (if there are problems with the upload contact me **beforehand**: krell@uni-bremen.de)