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Masterarbeit

Comparison of classical and neural network approaches to estimate Gaussian mixtures

Motivation

The current research project Circular factory aims to realize the vision of the perpetual product by integrating used products into production to reuse them in new product generations. In this broad project, used products are disassembled, measured by different sensors, and, if necessary, remanufactured so that they can be reused in new product generations. This process involves uncertainties regarding the used condition of the product, as well as the measured values and their measurement models. To capture and quantify these uncertainties, probability density functions are employed, represented as Gaussian mixtures.

task

The task is to estimate Gaussian mixture models from given data points. Neural network–based approaches will be compared with classical methods, such as the Expectation-Maximization (EM) algorithm. The methods will be evaluated across multiple dimensions, and their performance will be assessed in terms of computational time, stability (e.g., overfitting), and accuracy, using metrics such as the Kullback–Leibler divergence and the integrated squared error.

Preknowledge

– Knowledge in programming in Python

Research area

– Data processing
– Neural network

Course of studies

- [x] Elektro- und Informationstechnik
- [x] Informatik
- [x] Mechatronik

Direction

- [x] Method development
- [ ] Measurement
- [x] Development
- [x] Implementation
- [ ] Signal analysis
- [x] Research

Start

immediately

Links

Forschungsprojekt
Mitarbeiter

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