Lehrstuhl für Multimediakommunikation und Signalverarbeitung
Universität Erlangen-Nürnberg

Proposal for a Master Thesis

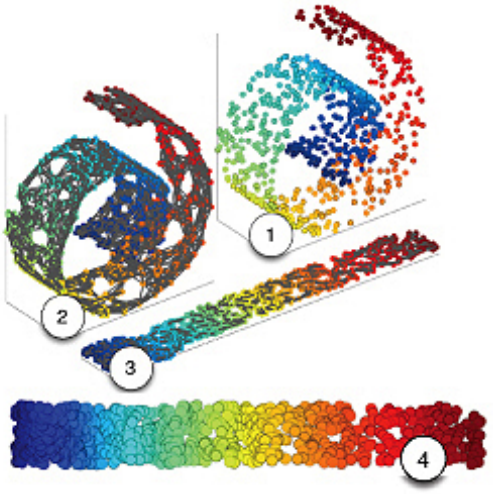
Topic: **Acoustic Scene Analysis with Manifold Learning**

Description: The knowledge of physical parameters describing the acoustics of a room is highly relevant for a multitude of applications, e.g., automatic speech recognition. The reverberation time T60 is one of the most important quantities thereof. It is defined as the time interval in which the sound energy decays by 60 dB after switching off the exciting sound source. Most of the state-of-the-art methods are based on statistical models of the room impulse response, which do not always fit in reality.

Recently, techniques for nonlinear dimensionality reduction, i.e., manifold learning techniques, gained popularity in signal processing as they allow to extract geometric structures of high dimensional datasets. It has been shown that acoustic room parameters obey these geometrical structures and thus learning a mapping function to a low-dimensional embedding can be highly beneficial.

The aim of this thesis is the implementation and evaluation of manifold learning-based metaparameter estimation algorithms starting with the T60 estimator [1]. An interpretation of the algorithm on a theoretical level is also part of this work.

As prerequisites, the student should have basic MATLAB programming experience and some affinity to math.



https://prateekvjoshi.com/2014/06/21/what-is-manifold-learning/

[1]: Talmon et al.: *Blind Reverberation Time Estimation by Intrinsic Modeling of Reverberant Speech*, ICASSP, Vancouver, Canada, 2013.

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Available: Immediately