# Topographic vector quantization in non-Euclidean spaces

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Unsupervised and supervised vector quantization is frequently realized as prototype based approaches, i.e. prototypes represent data, data classes or borders between them. The vector quantization task can be considered under restrictions like visualization abilities, hierarchical data information or other requirements depending on task. Powerful methods origin from biologically motivated models for prototype adaptation usually denoted as learning in this context. Famous examples are the self-organizing map (SOM) and the neural gas (NG) as unsupervised models or the family of learning vector quantizers (LVQ) for supervised problems (classification). Usually, the methods base on the Euclidean space for the data and the Euclidean distance as the dissimilarity measure between the objects. However, this assumption is not realistic in many applications. For example, molecule structures in bioinformatics, sentences in text processing maybe inadequate to capture dissimilarity proper ! ties such that more sophisticated dissimilarity measures are required for data processing. Thus, the models developed under the Euclidean assumptions need to be extended for those problems.

The talk will give an overview about recent trends and developments for neural vector quantization approaches for non-Euclidean data. It will be shown, how the existing models can be redefined such that a respective data processing is possible preserving the biologically motivated idea of the algorithms. In particular we will focus on self-organizing maps and variants thereof as a widely ranged model for topographic vector quantization, i.e. a similarity preserving vector quantization approach. The basic properties of the model are discussed in the light of non-Euclidean assumptions. Exemplary applications will illustrate the usability of the approaches.

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