Dictionary Learning for Sparse Representation and Classification of Neural Spikes

Abstract—Spike sorting is the problem of identifying and clustering neurons spiking activity from recorded extracellular electro-physiological data. This is important for experimental neuroscience. Existing approaches to solve this problem consist of three steps: spike detection, feature extraction, and clustering. In our method, we use Fisher discriminant based dictionary learning to learn dictionary, whose sub-dictionaries are class specific, and estimate discriminative sparse coding coefficients by minimizing the within class scatter and maximizing the between class scatter. Both the reconstruction error and coding coefficients are used for clustering the testing data. The dictionary learn the proper features specific to this problem. The proposed method has high reconstruction power and high clustering accuracy of testing data.

I.