

Optimal Neighborhood Preserving Visualization by Maximum Satisfiability

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Abstract. We present a novel approach to low-dimensional neighbor embedding for visualization, based on formulating an information retrieval based neighborhood preservation cost function as Maximum satisfiability on a discretized output display. The method has a rigorous interpretation as optimal visualization based on the cost function. Unlike previous low-dimensional neighbor embedding methods, our formulation is guaranteed to yield globally optimal visualizations, and does so reasonably fast. Unlike previous manifold learning methods yielding global optima of their cost functions, our cost function and method are designed for low-dimensional visualization where evaluation and minimization of visualization errors are crucial. Our method performs well in experiments, yielding clean embeddings of datasets where a state-of-the-art comparison method yields poor arrangements. In a real-world case study for semi-supervised WLAN signal mapping in buildings we outperform state-of-the-art methods.

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