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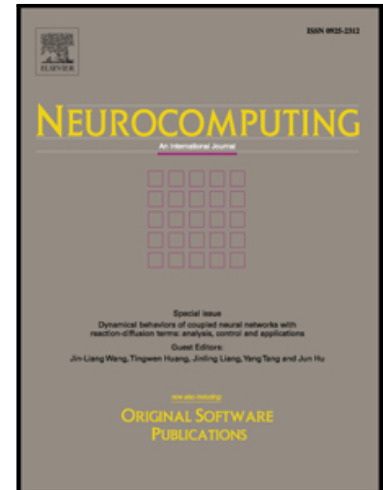
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# Quasi-curvature Local Linear Projection and Extreme Learning Machine for Nonlinear Dimensionality Reduction

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## Abstract

As one of the classical nonlinear dimensionality reduction algorithms, Locally Linear Embedding (LLE) has shown powerful performance in many research fields. However, there are still two limitations in LLE: 1) traditional LLE is sensitive to high-curvature noise; 2) the computation is too expensive. To solve these problems, we present Quasi-curvature LLE (QLLE) through taking the curvature of local neighborhoods into consideration when mapping local configuration into low-dimensional coordinates. And then a novel learning framework called Quasi-curvature Local Linear Projection (QLLP) is proposed for efficient dimensionality reduction. This framework first selects small landmarks from original data to obtain the low-dimensional coordinates in QLLE, and then adopts Extreme Learning Machine (ELM) to learn the explicit mapping function from original data to low-dimensional coordinates for nonlinear dimensionality reduction. The extensive experiments in synthetic and Frey facial expression datasets demonstrate that this framework can greatly improve the efficiency in nonlinear dimensionality reduction.

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