Dimension Reduction for Time Series with Score-based generative modeling

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Dimension reduction with score-based generative modeling

Problem: Given a multivariate time series. The task is to perform dimensionality reduction by removing the components that are independent of the other components. We also assume that most components are pairwise dependent.
Data: synthetic dataset: MNIST (2 modalities) + CIFAR 10
References: DIMENSION REDUCTION FOR TIME SERIES WITH VARIATIONAL AUTOENCODERS, 2022
Score-Based Multimodal Autoencoders, 2023
Base Solution: pairwise CCA. Delete the component if it does not share the information between most of the components.
Proposed Solution: learn the structure of the score function $s(\mathbf{x}_{1:M}) = s(\mathbf{x}_{i\in\mathcal{I}}) + \sum_{i\notin\mathcal{I}} s(\mathbf{x}_i)$ with heuristic Add-Del algorithm
Novelty: "However, the use of variational autoencoders on time series as a dimension reduction technique is not yet well studied or compared to other methodologies". Precise contributions should be clearly formulated.