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# Self-Representation Unsupervised Feature Selection based on Non-negative Matrix Factorization

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**Abstract**

Non-negative matrix factorization (NMF) and self-representation are widely employed for dimensionality reduction and extracting intrinsic structures from high-dimensional data. However, integrating these techniques for effective unsupervised feature selection remains a complex challenge. In this article, we propose a novel method, Self-Representation Feature Selection based on Non-Negative Matrix Factorization (SRFSNMF), which bridges this gap. SRFSNMF uses the Gram matrix, built from the basis matrix of samples obtained through NMF, combined with a self-representation technique. This aims to capture the structural relationships between samples and uncover intrinsic data relationships, enhancing the selection of relevant features in complex datasets. To solve the SRFSNMF model, we develop an efficient iterative optimization algorithm with guaranteed convergence. Experimental results on multiple benchmark datasets demonstrate that SRFSNMF outperforms state-of-the-art methods, achieving superior effectiveness in unsupervised feature selection tasks. Additionally, we conduct a sensitivity analysis of the model's parameters and assess its robustness against noise, further validating the reliability and stability of our approach.

**Keywords:** Self-Representation, Non-negative Matrix Factorization, and Feature Selection

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