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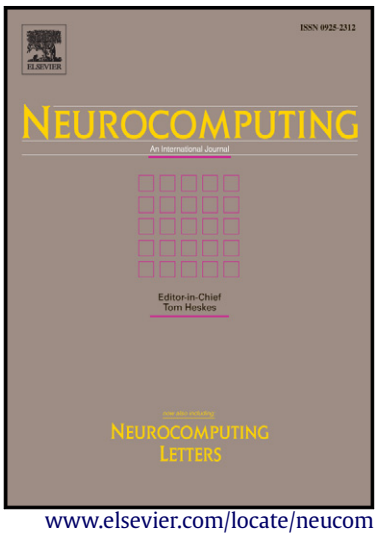

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Unsupervised Feature Selection through Gram-Schmidt Orthogonalization — A Word Co-occurrence Perspective

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Abstract

Feature selection is a key step in many machine learning applications, such as categorization, clustering etc. Especially for text data, the original document-term matrix is high-dimensional and sparse, which affects the performance of feature selection algorithms. Meanwhile, labeling training instance is time-consuming and expensive. So unsupervised feature selection algorithms have attracted more attention. In this paper, we propose an unsupervised feature selection algorithm through **R**andom **P**rojection and **G**ram-**S**chmidt **O**rthogonalization (RP-GSO) from the word co-occurrence matrix. The RP-GSO algorithm has three advantages: (1) it takes as input dense word co-occurrence matrix, avoiding the sparseness of original document-term matrix; (2) it selects "basis features" by Gram-Schmidt process, guaranteeing the orthogonalization of feature space; and (3) it adopts random projection to speed up GS process. Extensive experimental results show our proposed RP-GSO approach achieves better performance comparing against supervised and unsupervised feature selection methods in text classification and clustering tasks.

Keywords: `Feature Selection, Random Projection, Gram-Schmidt Orthogonalization, Basis Features, Word Co-occurrence Matrix`

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