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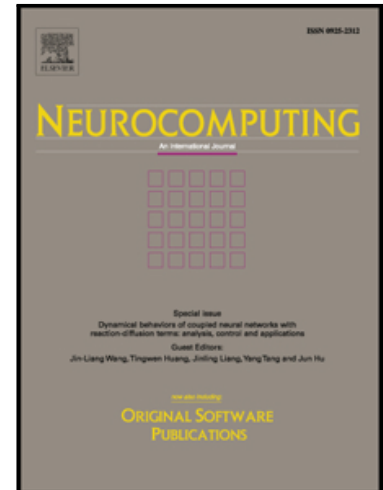
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# Greedy method for robust linear regression

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## Abstract

In this paper, we propose a greedy method to estimate the unknown vector from linear observation with sparse noise. We prove that the algorithm can reconstruct the vector provided the sampling matrix satisfies certain condition and the noise is sparse. We also prove that such a condition holds with high probability for random matrix if its scale satisfies certain assumption. Numerical results are provided to demonstrate the efficiency of the algorithm. And we also consider using the algorithm for salt&pepper noise removal in signal processing.

*Keywords:* Greedy method; robust linear regression; sparse noise

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## 1. Introduction

Linear regression is old but important problem which finds interests in data analysis, signal processing and statistics [1, 2]. Given a pair sequence  $\{(\mathbf{A}_i, b_i)\}_{i=1,2,\dots,M}$ , it is routinely assumed that

$$b_i = \langle \mathbf{A}_i, \mathbf{x} \rangle + e_i^*, \quad (1)$$

where  $\mathbf{A}_i \in \mathbb{R}^N$ , and  $b_i \in \mathbb{R}$ , and  $e_i^* \in \mathbb{R}$  is the noise, and  $\mathbf{x} \in \mathbb{R}^N$  is unknown vector. In information theory, procedure (1) is also called as sampling.

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