Wang, Zhanliang; Liu, Xinguo
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Summary: Low rank matrix restoration problem has important applications in many fields. Existing works mainly seek its substitute functions to solve the corresponding relaxation problems due to the complexity of the rank function. The nuclear norm is one of the most commonly used alternative functions, but its recovery performance is limited. We propose a new relaxation model to solve low rank matrix restoration problems, develop its proximal gradient algorithm and present the convergence analysis of the algorithm. Experimental data illustrate that our method performs much better than the methods using the kernel norm. This algorithm can be also applicable to the noise case, compared with the kernel norm, it still has advantages.

MSC:
49M20 Numerical methods of relaxation type
65F55 Numerical methods for low-rank matrix approximation; matrix compression

Keywords:
low-rank matrix; nuclear norm; proximal operator; relaxation model; rank function

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