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Nuclear Norm Minimization using Schatten-p norm

The newly implemented algorithm, inspired by the research paper "Some empirical advances in matrix completion," presents a superior matrix completion strategy suitable for highly sparse matrices. This algorithm deviates from conventional approaches by adopting the Schatten-p norm instead of the L1 norm, resulting in enhanced performance.

By leveraging the Schatten-p norm, the algorithm achieves improved matrix completion results by effectively exploiting the low-rank structure and capturing underlying patterns in extremely scarce matrices. This alternative norm provides a more robust framework for handling the challenges posed by incomplete and sparsely populated data.

Overall, the algorithm introduced in the research paper represents a significant advancement in the field of matrix completion. Its utilization of the Schatten-p norm enables more effective matrix completion strategies, offering promising outcomes even for matrices with a high degree of sparsity.

Results

During our observations and experimentation, we found that the NMAE (Normalized Mean Absolute Error) values varied in the range of 0.2 to 0.3 for different values of p (0.1, 0.5, and 1) in the implemented algorithm. These variations in NMAE suggest that the choice of the Schatten-p norm parameter has an impact on the accuracy of the matrix completion results.

This finding demonstrates the algorithm's effectiveness across various values of p, providing flexibility to select the parameter that best suits the characteristics of the data and desired trade-offs between accuracy and computational complexity. Further analysis and experimentation can help determine the optimal value of p for specific applications and datasets.

Results

For p = 0.1 Arg Order: NN_folds(fold_index, lambda_, max_iter, p)

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[74] NN_folds(1,0.2,20,0.1)

     NMAE for fold 1 is: 0.3051678369803183
     Rounded off-ratings: NMAE for fold 1 is: 0.3051678369803183
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Reference to Research Paper:

https://www.academia.edu/1990551/Some_empirical_advances_in_matrix_completion