Robust Principal Component Analysis on Graphs

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Figure 1: Low-rank reconstruction of corrupted images using the proposed method of [1].

1 ABSTRACT

Principal Component Analysis (PCA) is a very popular method for dimensionality reduction, and is used by thousands accross the world to provide 2D or 3D visualisations and insights about high-dimension data.

However, its main drawback is that it is very sensitive to outliers, and thus cannot be used in many real-world applications. This issue has been solved by the introduction of a robust variants of PCA, RPCA [3]. However, this algorithm is very slow on large datasets, which makes it impractical for many applications. This motivated the introduction of another PCA variant called GLPCA [2] which uses graph Laplacian regularization to improve the robustness of the algorithm while keeping the computational cost low. Finally, a third variant of PCA similar to the previous ones has been proposed by the authors of [1] to improve the robustness of the algorithm while keeping the computational cost low.

This project aims to provide a simple and efficient implementation of those main variants of the PCA algorithm, as well as a benchmark of those methods on different tasks (clustering and low-rank recovery for corrupted data on real-life and artificial datsets).

2 INTRODUCTION

3 ALGORITHMS

4 EXPERIMENTAL SETUP

5 RESULTS

6 LIMITATIONS

7 CONCLUSION

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