CS754 Project Proposal

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1 Group members

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2 Research Paper Chosen

We have chosen the following paper -
sLLE: Spherical locally linear embedding with applications to tomography
The paper introduces Spherical Locally Linear Embedding (sLLE), an extension of the Locally Linear Embedding (LLE) method. Tomographic reconstruction of an object when projection data is collected from unknown and random angles is a problem widely discussed (even in class). Based on experiments done by the authors, traditional dimensionality reduction methods like LLE fail to account for the spherical nature of such data and reconstruct poor images. sLLE algorithm introduces a spherical constraint and effectively estimates unknown view angles and facilitates high-quality image reconstruction, even in the presence of noise, albeit with a rotational shift.

3 Datasets

In the paper, they have used the following datasets:

1. CT elliptic phantoms (eg. Shepp-Logan Phantom)
2. `http://www.med.harvard.edu/AANLIB/` - MRI dataset
3. `http://www.pdbj.org/emnavi/` - cryoEM dataset

4 Evaluation Strategy

In the paper, the authors have used evaluation metrics such as PSNR (Peak Signal to Noise Ratio) and MSE (Mean square error) between the ground truth images in the dataset and the reconstructed images from both sLLE method and LLE method. We intend to use the same metrics and more other like RRMSE to test our implementation.