
Supplementary Material for “Generalized Unsupervised Manifold Alignment”

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1 GUMA Algorithm

We conclude the generalized unsupervised manifold alignment algorithm in the following Alg.2.

Algorithm 2 GUMA algorithm

Input: Two datasets \mathbf{X} and \mathbf{Z} , dimension d of embedding space.

- 1: Initialize: matching matrix $\mathbf{F} \in \Pi$ and linear transforms $\mathbf{P}_x, \mathbf{P}_z$;
- 2: Compute $\mathbf{K}_x, \mathbf{K}_z$ with global geometry structures;
- 3: **repeat**
- 4: Solve \mathbf{F} by Alg.1;
- 5: Solve $\mathbf{P}_x, \mathbf{P}_z$ by eigenvalue decomposition on Eqn.(11);
- 6: **until** convergence

Output: \mathbf{F} and $\mathbf{P}_x, \mathbf{P}_z$

2 Examples of Face Image Sets Alignment

In Fig.1, we give some aligned examples of face image sets from Multi-PIE [1]. Red box marks a mismatch of facial expressions, and blue box marks a mismatch of facial poses. As a whole, mismatched images are very similar in our intuition.

3 Alignment Results of Protein Structures

Here we use three sequences, *i.e.*, 1G7O-01, 1G7O-10, and 1G7O-21, which are provided by the authors of [3], Fig.2, 3 and 4 provide visual aligned results in 3D, 2D and 1D space by performing manifold alignment of any two protein sequences among 1G7O-01, 1G7O-10 and 1G7O-21.

References

- [1] R. Gross, I. Matthews, J. Cohn, T. Kanade, and S. Baker. Multi-pie. *Image and Vision Computing*, 28(5):807–813, 2010.
- [2] Y. Pei, F. Huang, F. Shi, and H. Zha. Unsupervised image matching based on manifold alignment. *T-PAMI*, 34(8):1658–1664, 2012.
- [3] C. Wang and S. Mahadevan. Manifold alignment without correspondence. In *IJCAI*, 2009.

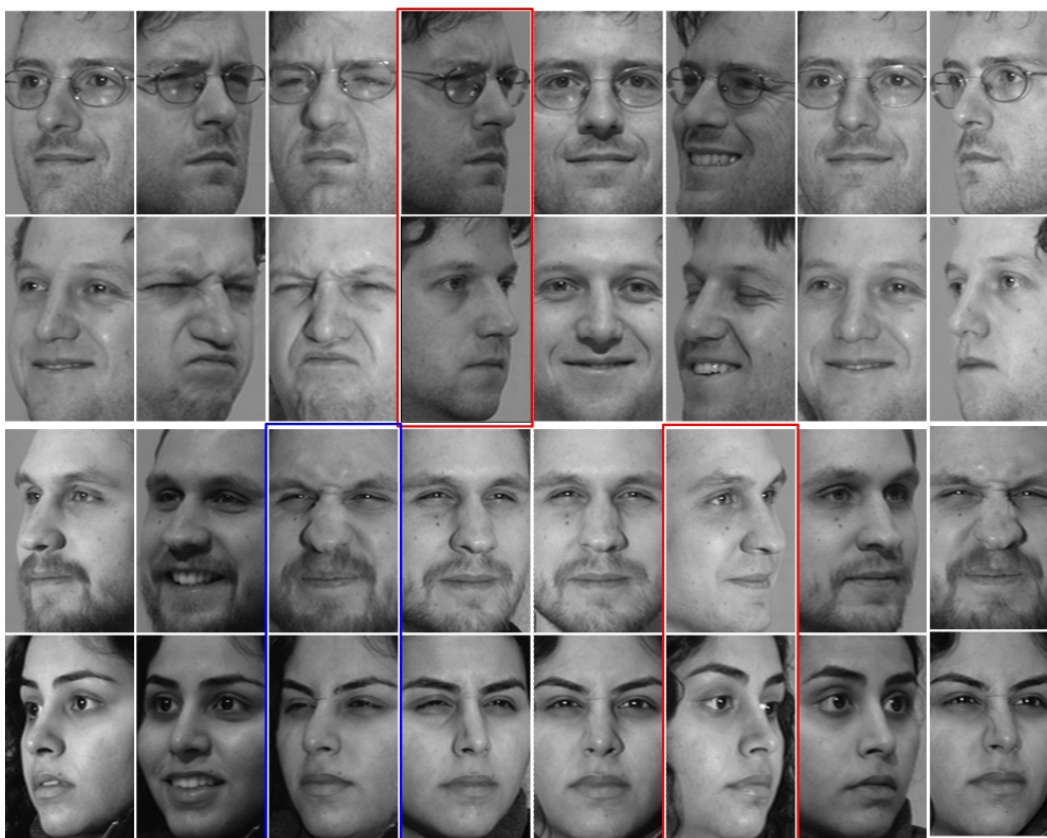


Figure 1: Examples of facial pose and expression matching. Red box marks a mismatch of facial expressions. Blue box marks a mismatch of facial poses.

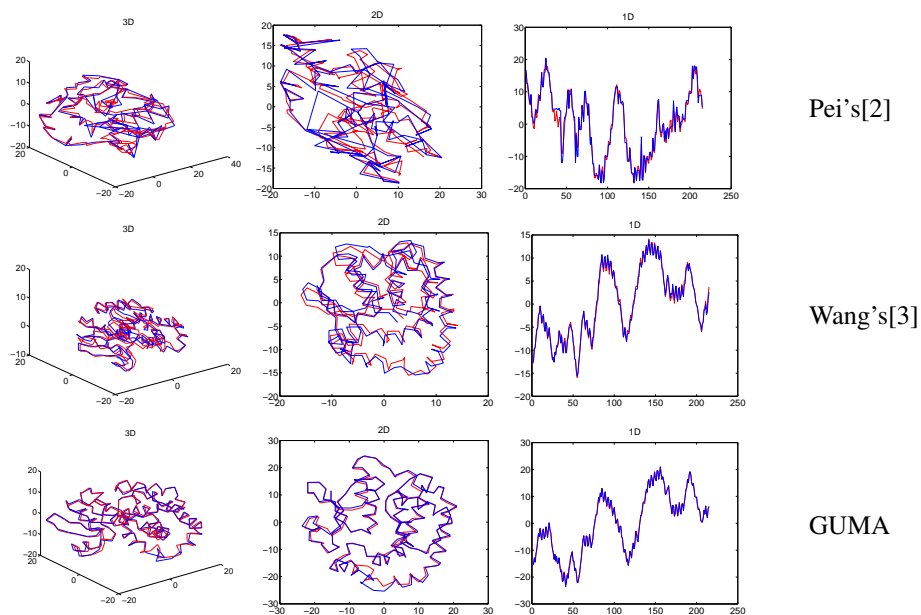


Figure 2: The alignment of protein sequences: 1G7O-01 and 1G7O-10. After alignment, the overlapping of two sequences in 3D, 2D and 1D space are shown by columns from left to right.

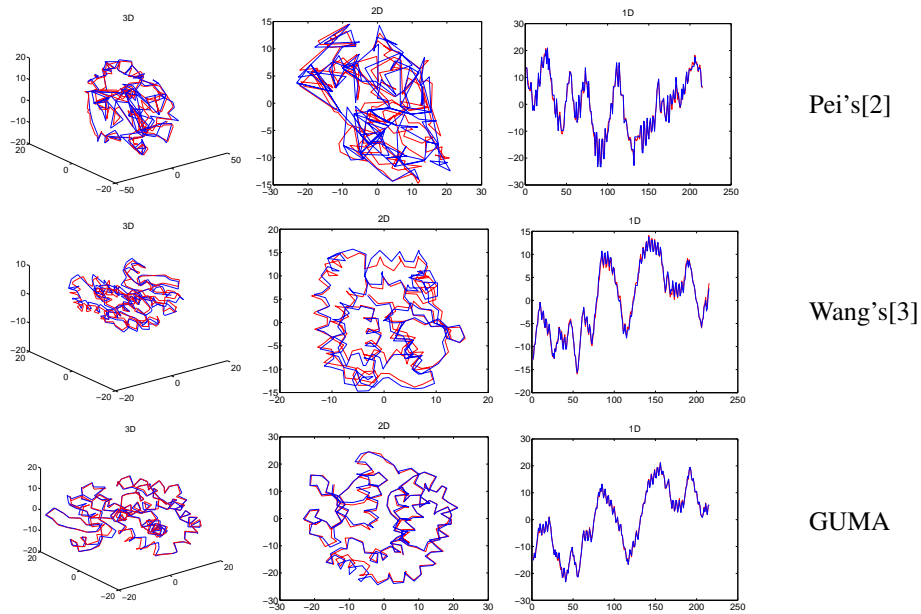


Figure 3: The alignment of protein sequences: 1G7O-01 and 1G7O-21. After alignment, the overlapping of two sequences in 3D, 2D and 1D space are shown by columns from left to right.

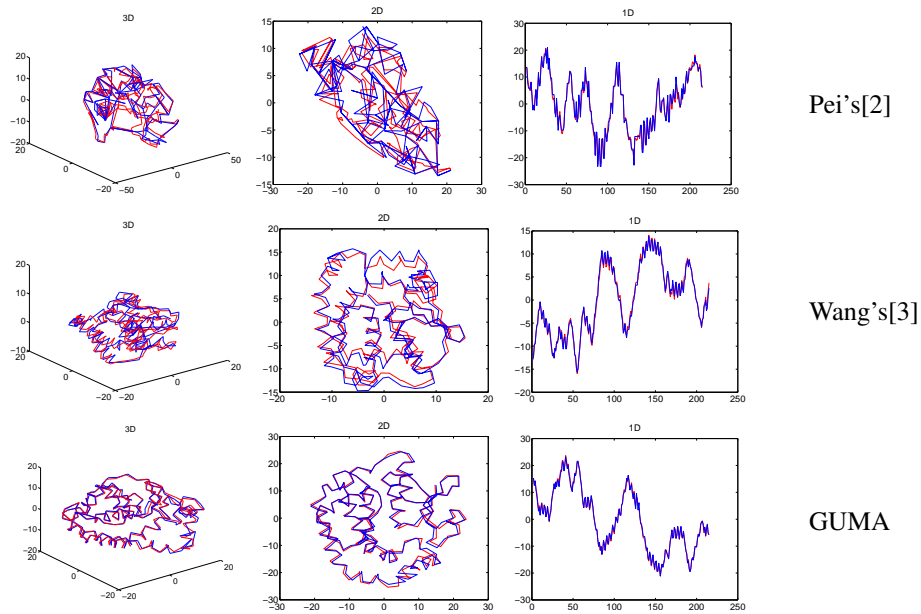


Figure 4: The alignment of protein sequences: 1G7O-10 and 1G7O-21. After alignment, the overlapping of two sequences in 3D, 2D and 1D space are shown by columns from left to right.