COMMENTS ON FIGURES

PCA: The principal component method is a linear geometrical method that identify the iper-plane that retains most of the variance once the data are projected into it. In this case the "S shape" has ben cut in the middle by the hyperplane and it is still visible. The distances does not respect the distance on the manifold, but the Euclidean distance in $\mathbb{R}^3$. For example one extrema of the yellow points is closer to the blue points than the green one, the contrary of what happens in the geodesic distance on the manifold.

LLE: Locally linear embedding finds a lower-dimensional projection of the data which preserves distances within local neighbor point. It is basically a series of local Principal Component Analyses which are globally compared to find the best non-linear embedding. The distances here capture a little bit more the geodesic distance structure on the manifold

Isomap: By design isomap looks for lower-dimensional embedding which maintains geodesic distances between all points. For this reason we can see here that the distances are very close to what we would have on the S manifold itsels. It is basically flatting the manifold.

Laplacian Eigenmap: The spectral embedding technique obtains a results that is closer to the LLE one.