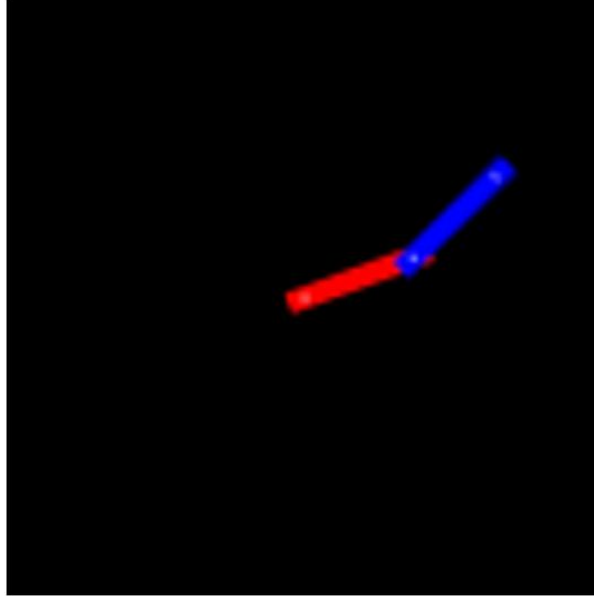
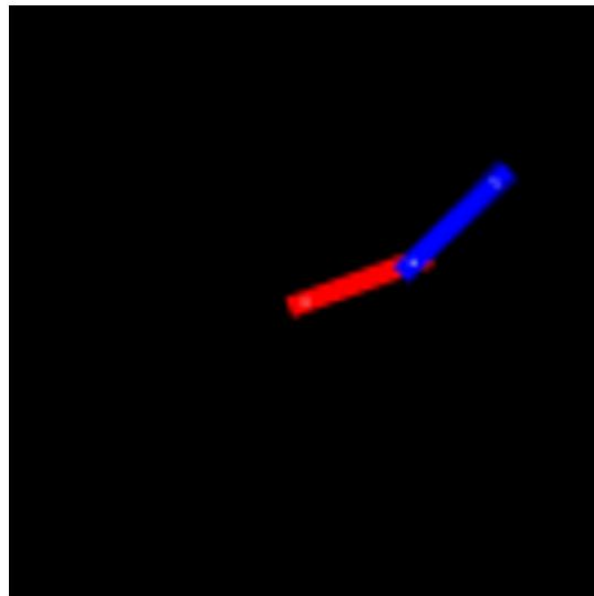


3. LLE

- a. The following was obtained when LLE was performed on the given data and then the points corresponding to the images 1 and 2 were averaged out and reconstructed using the weighted average of the 10 nearest neighbours.



- b. The following image was obtained after constructing the Isomap and performing reconstruction tasks similar to those described above.



- c. Both LLE and Isomap based reconstruction of images worked well. The PCA based reconstruction strategy seemed to represent the superposition of two different theta2 angles. In general non-linear methods seem to work better than their linear counterpart as the linear method suffers from calculations based on the global geometry, whereas both non-linear methods characterise the local geometry of the data points. Due to this flexibility, the residual error in general decreases as we are no longer dealing with a fixed set of axes. Although both LLE and Isomap performed well, it must be noted that the time required to run lle.m was visibly greater than that to run Isomap.m.

The data is stored in PCA as coefficients in a new lower dimensional space with the principal components being the axes. In Isomap, the data is stored as geodesic distances from the nearest neighbours (in this space). In LLE, a point is represented as a weighted average of its nearest neighbours in n dimensional space.