Main purpose in all algorithms is reduce number of features.Some features will be lost due to size reduction.The missing properties should contain very little information about the population. Computation is faster with less number of features and visualisation is easier. The computation time for each method depends heavily on the software and the implementation used.

**PCA** is a linear dimension reduction method that is designed to preserve the variability of a data set. It creates a low-dimensional projection of the original data.The data is projected onto the directions in the data with the most variance. Hence the “spread” of the data is roughly conserved as the dimensionality decreases Specifically it is based on eigen-decomposition of data covariance matrix.

**MDS** is actually done by transforming distances into similarities and performing PCA (eigen-decomposition or singular-value-decomposition) on those.PCA might be called the algorithm of the simplest MDS.The input to MDS is the pairwise distances between points and the output of MDS is dimensional projection of the points where distances are preserved.

PCA minimizes dimensions, preserving covariance of data.  
MDS minimizes dimensions, preserving distance between data point

**ISOMAP** algorithm attempts to recover original embedding of hidden data. It discover the intrinsic degrees of freedom in the data.Isomap uses the same basic idea as PCA, the difference being that linearity is only preserved locally. In PCA we try to preserve covariance. Here we try to do the same thing in a nonlinear way and our approach is to try to preserve interpoint distance on the manifold.

**Locally Linear Embedding (LLE)** does the same basic thing as Isomap – it finds a nonlinear manifold by stitching together small linear neighborhoods. The difference between the two algorithms is in how they do the stitching. Isomap does this by doing a graph traversal. In contrast, LLE does it by finding a set of weights that perform local linear interpolations that closely approximate the data.

In our climate data we can see that,LLE gives us maximum number of outliers. Data points in ISOMAP ,MDS and PCA techniques is like clusters.In ISOMAP and PCA it is like we have two clusters. ISOMAP has more separated data points than MDS and PCA. In MDS Data points are more together than other algorithms.