Classical MDS algorithm

1. Set up squared proximity matrix
2. Apply double-centering
   1. Where
3. Determine the largest eigenvalues and corresponding eigenvectors of (where is the number of dimensions desired for the output)
4. Now, where is the matrix of eigenvectors and is the diagonal matrix of eigenvalues of

FastMDS algorithm

1. Start with large matrix , which has columns and rows. The desired result has rows but columns, where
2. Partition into smaller matrices , still each with columns but with rows where . Each matrix may have different numbers of rows if there is a remainder after division. There should be no overlap between the partitions. Apply Classical MDS on each partition to get results
3. Take a sample from each matrix where each sample still has columns but has rows where . A typical choice is for .
4. Stack all samples vertically to produce the matrix , where still has columns. Apply Classical MDS on the matrix to get the result **.**
5. The sample now has two MDS scalings: is embedded in the solution and also is embedded in the solution . Find the linear least squares solution that fulfills where:
   1. is the mapping of with an extra column of ones appended to the end (intercept term)
   2. is the mapping of
6. Take and add a column of ones (intercept term) to create . Find the solution .
7. Stack all matrices vertically to get the solution