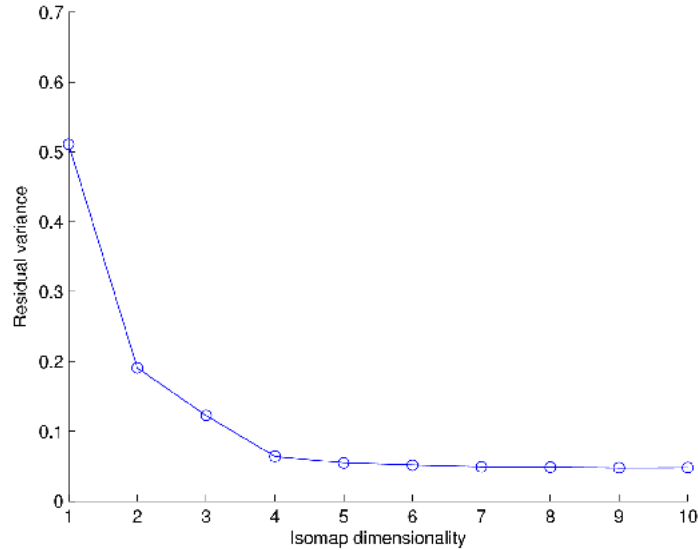


PARTA Question 1 Part D

As obtained from the isomap, the residual variance curve



Intrinsic dimensionality of the handwritten numerals of 1,7 revealed is almost 4. Because in the residual variance curve, variance almost diminishes to 0.

This 4 dimensionality is as followed:

1) The thickness of the figures (since isomap is made by embedding the Euclidian Distances it will matter, in tangent distance, it won't). This is represented by the parameter T having value (0,1) written on the side of some sample numerals selected from MNIST database on which isomap is applied.

2) This one is the horizontal cut in the middle or in the lower of figures. Like some people used make an horizontal cut in the middle of 7 and some in the bottom portion of 1. This is parametrized by the parameter C of value [0,1) on the side of the figures. 0 means no horizontal cut being made in middle of 7 and in the lower portion of 1.

3) The length and the slope of the upper portion. This dimension separates out 1 to the right having no upper portion usually and 7 on left and among them, as we go from right to left along the x axis, slope of upper portion decreases.

4) The slope of the straight segment which appear in both 7 and 1 and hence both are dispersed along the y axis direction. In the lower portions, straight segment is slant towards left, in the middle almost straight and in the upper portion straight segment is slant towards right.

