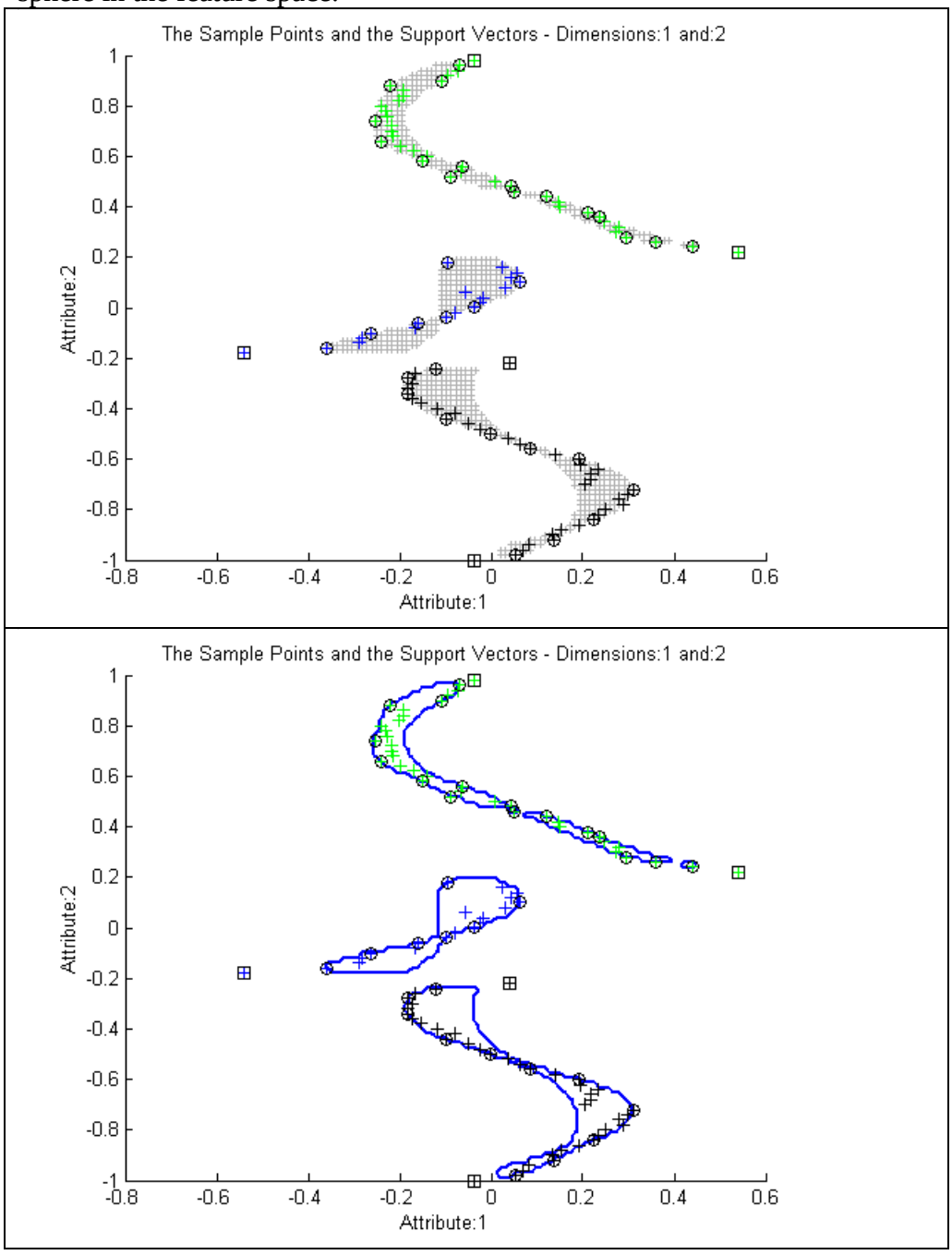
Example I.

Setting (a)

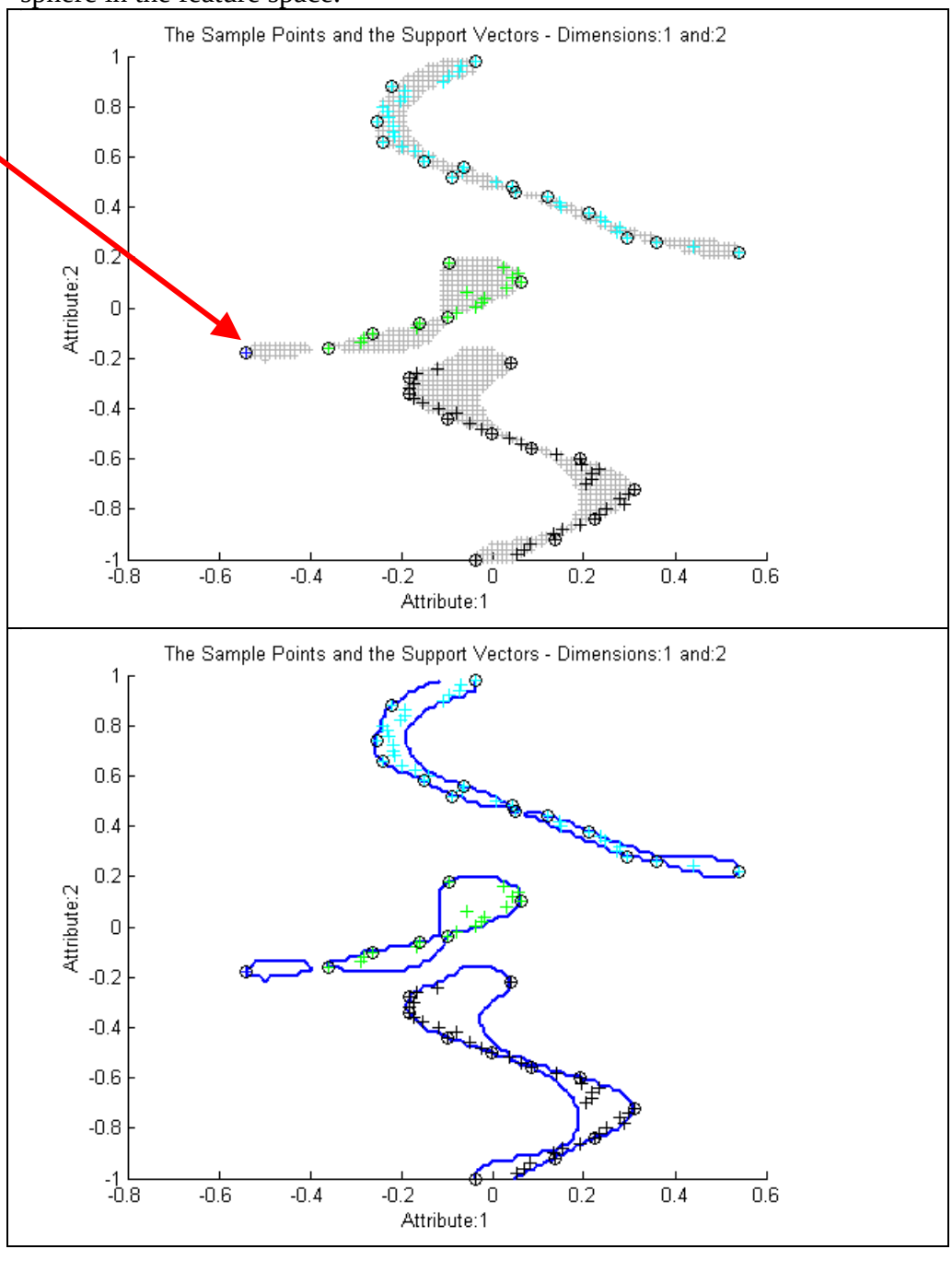
C = 0.05 (i.e. the maximum proportion of outliers could be p=1/(98*0.05) =0.2), q = 40

Data points are denoted by '+'. The support vectors (SVs) are circled, the bounded support vectors (BSVs) which are outliers are squared. The cluster of a outlier can be assigned to the cluster of the nearest neighbor of the outlier. The clusters of the data points are indicated in different colors. The grey '+' represents the data point inside the sphere in the feature space.



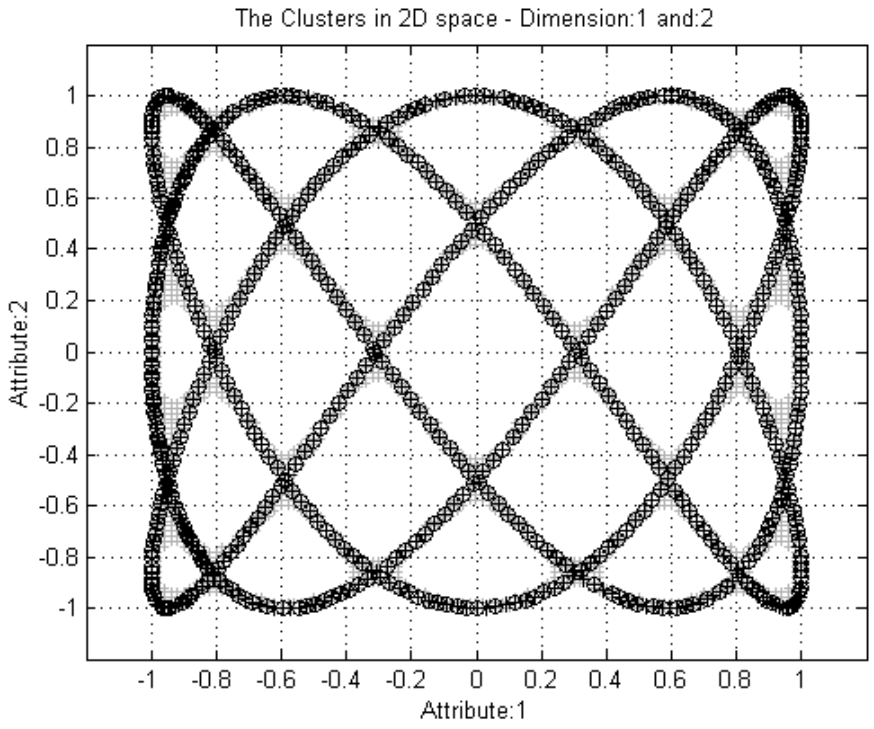
Setting (b)
C = 1 (no outliers allowed), q = 40. In this case, there are in total 4 clusters.

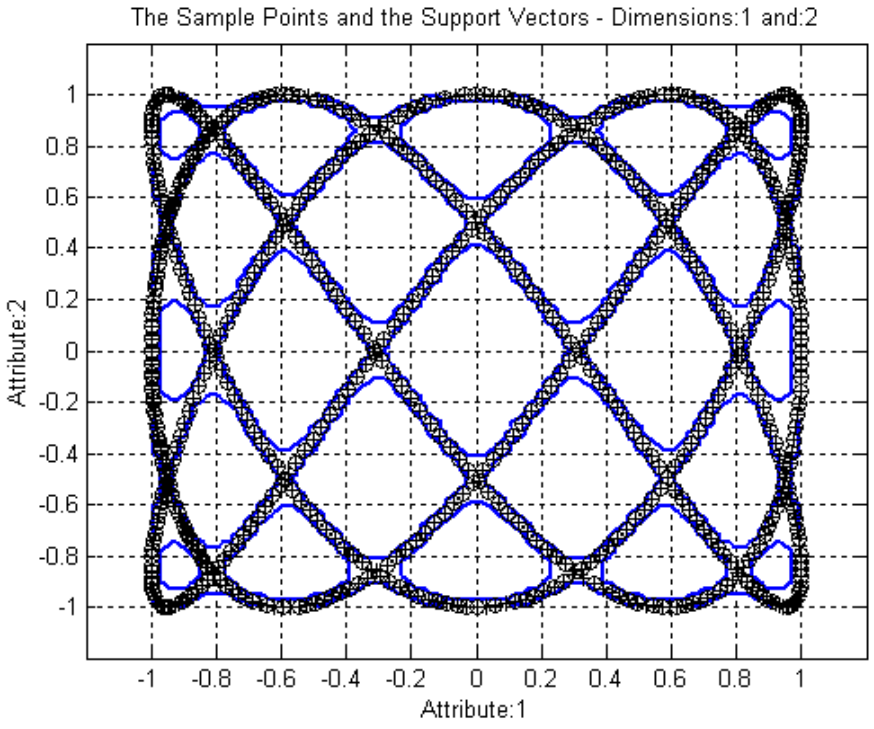
Data points are denoted by '+'. The support vectors (SVs) are circled, the bounded support vectors (BSVs) which are outliers are squared. The cluster of a outlier can be assigned to the cluster of the nearest neighbor of the outlier. The clusters of the data points are indicated in different colors. The grey '+' represents the data point inside the sphere in the feature space.

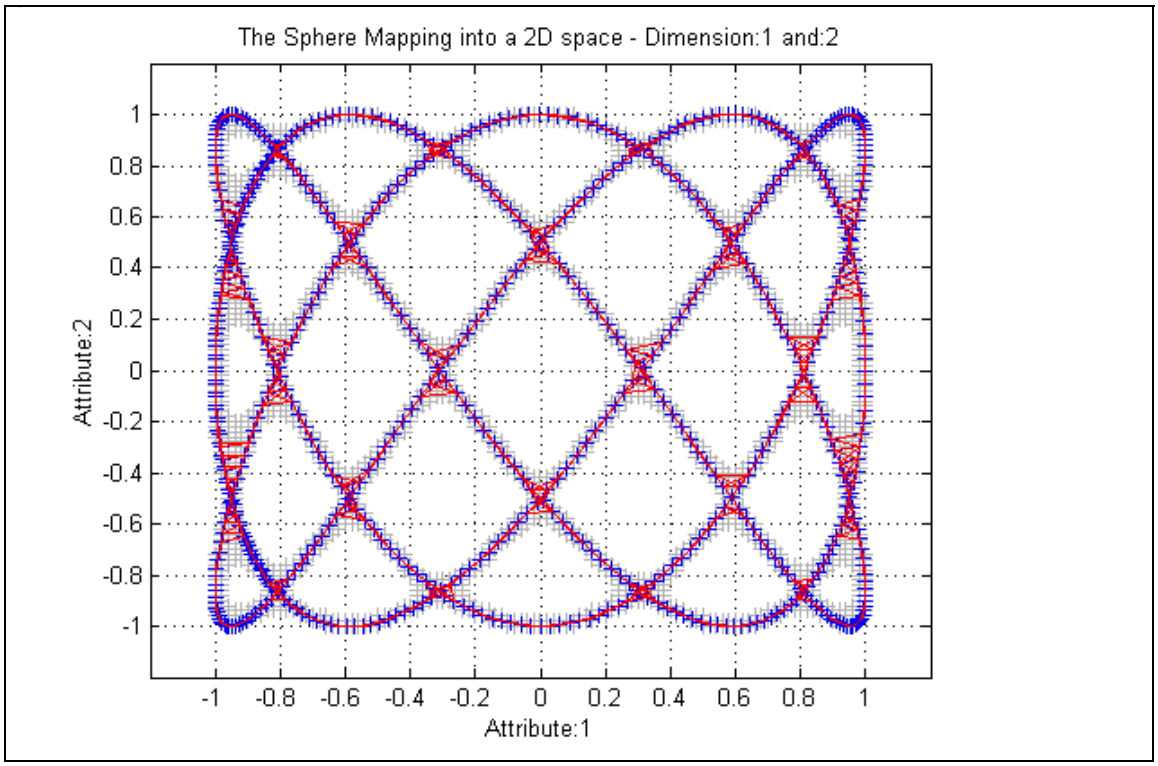


Example II: the curve of Lissajous

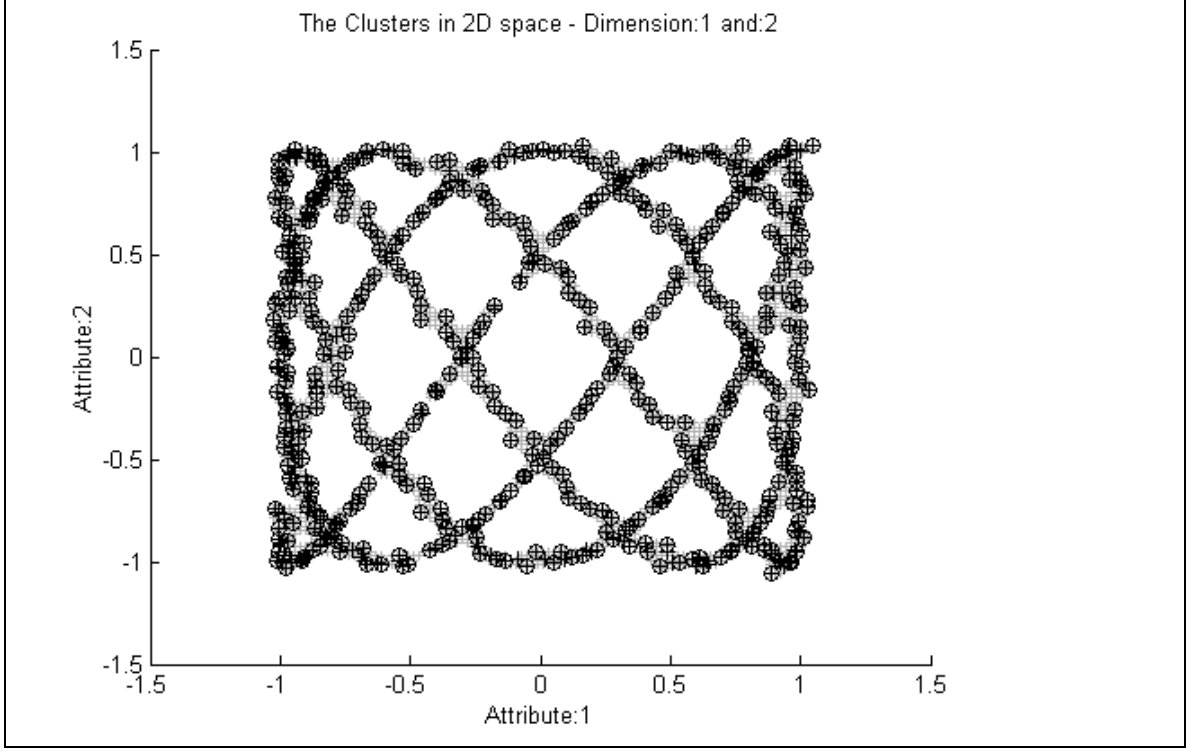
Sample size: 671 noise = 0, P=0.1, q=200, Proximity graph, 4nn
Results: #SV = 562; #BSV=0
(save in tstLssjsfp10q200, training+clustering elapsed time 26+440 sec)

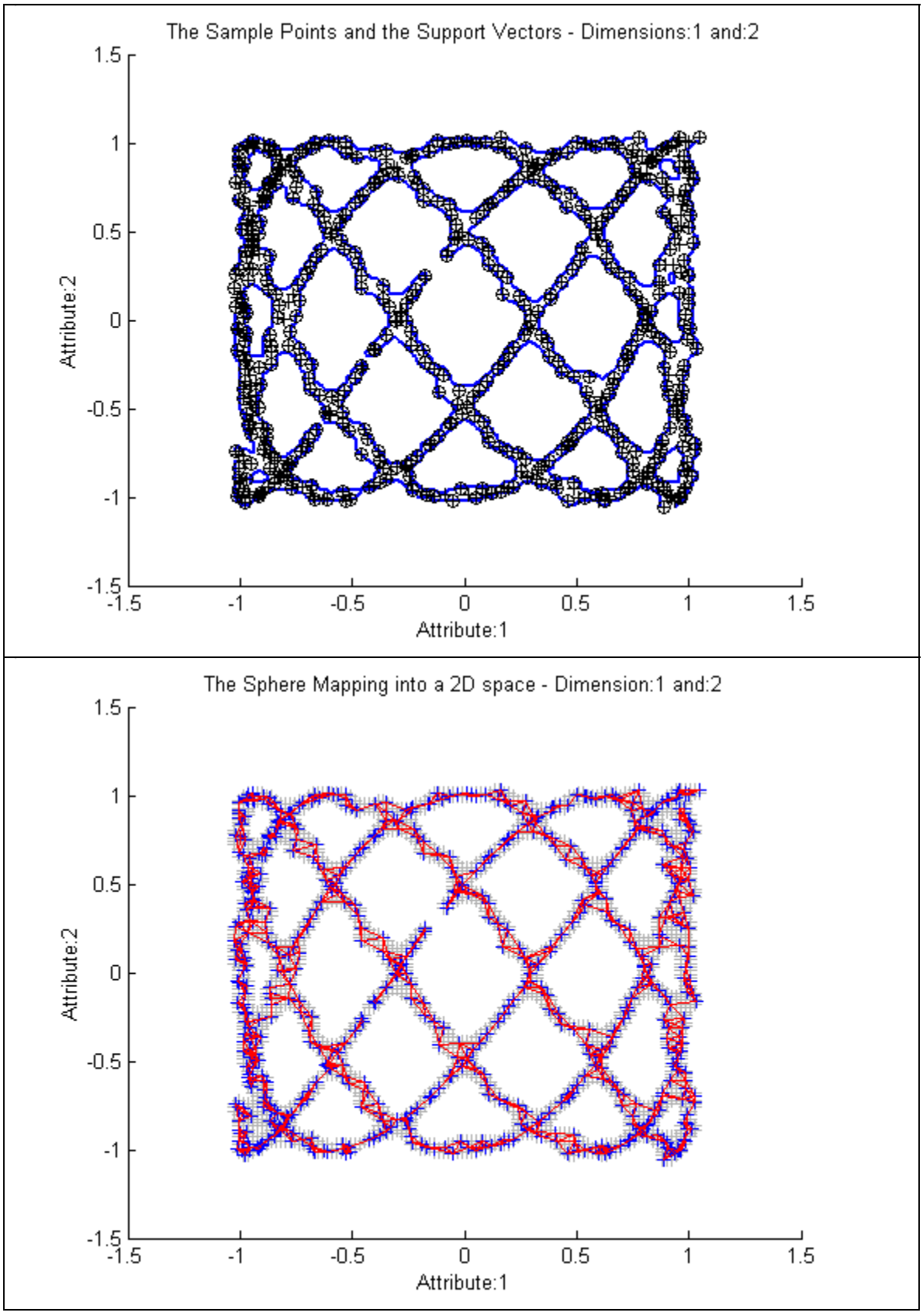


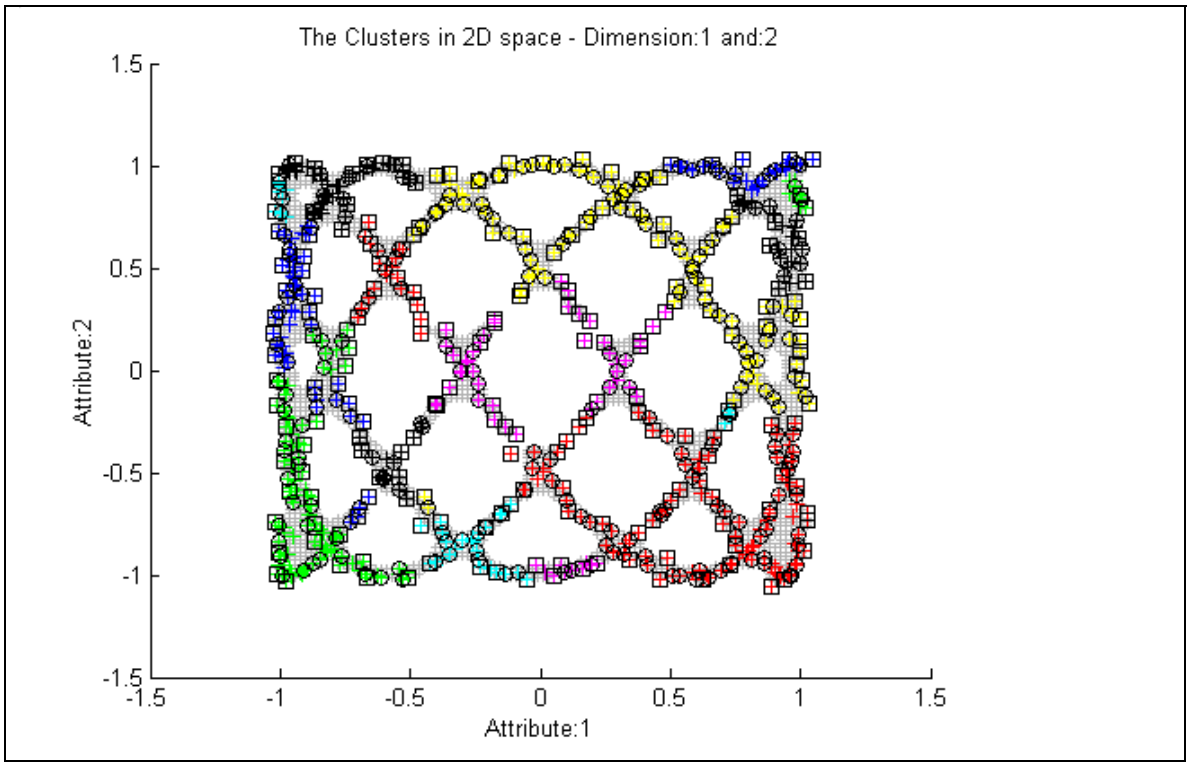




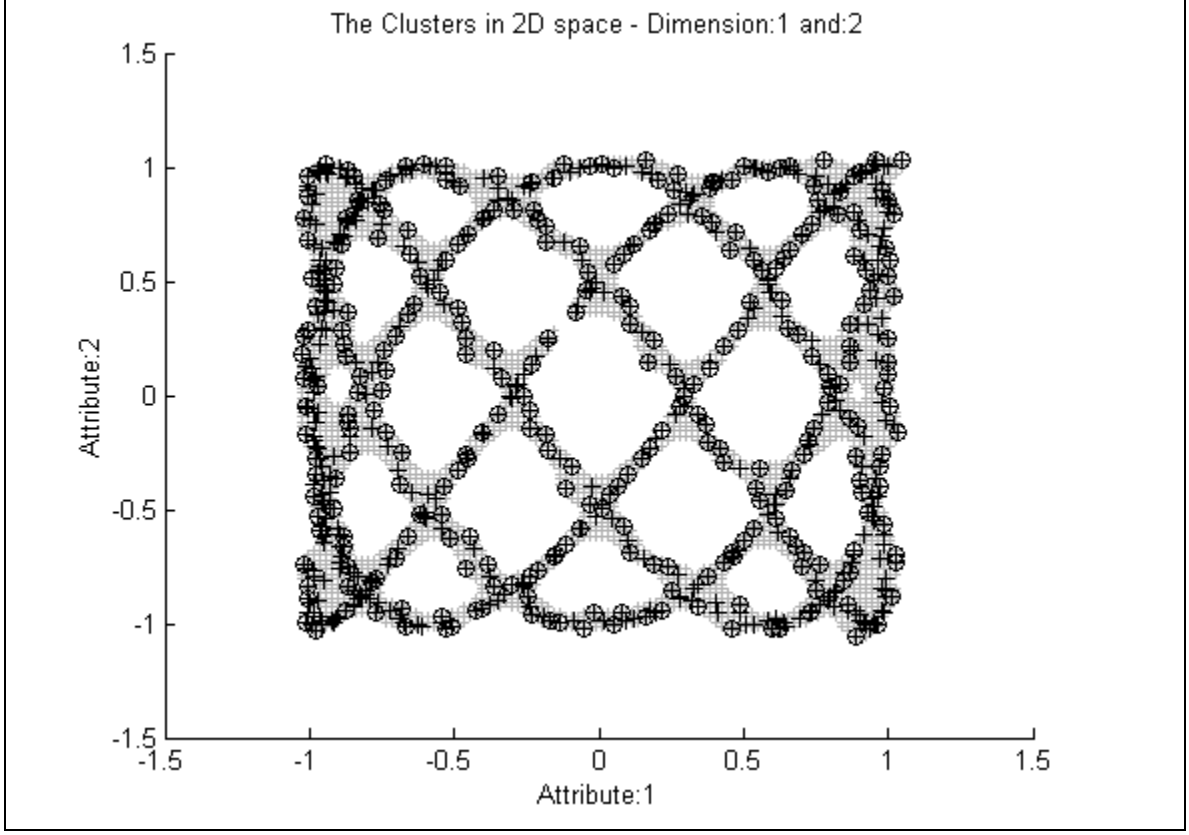
Sample size: 671 noise = 0.02*[1 1], P=0.1, q=200, Proximity graph, 4nn
Results: #SV = 448; #BSV=0
(save in tstLssjsnp10q200, training+clustering elapsed time 21+391 sec)

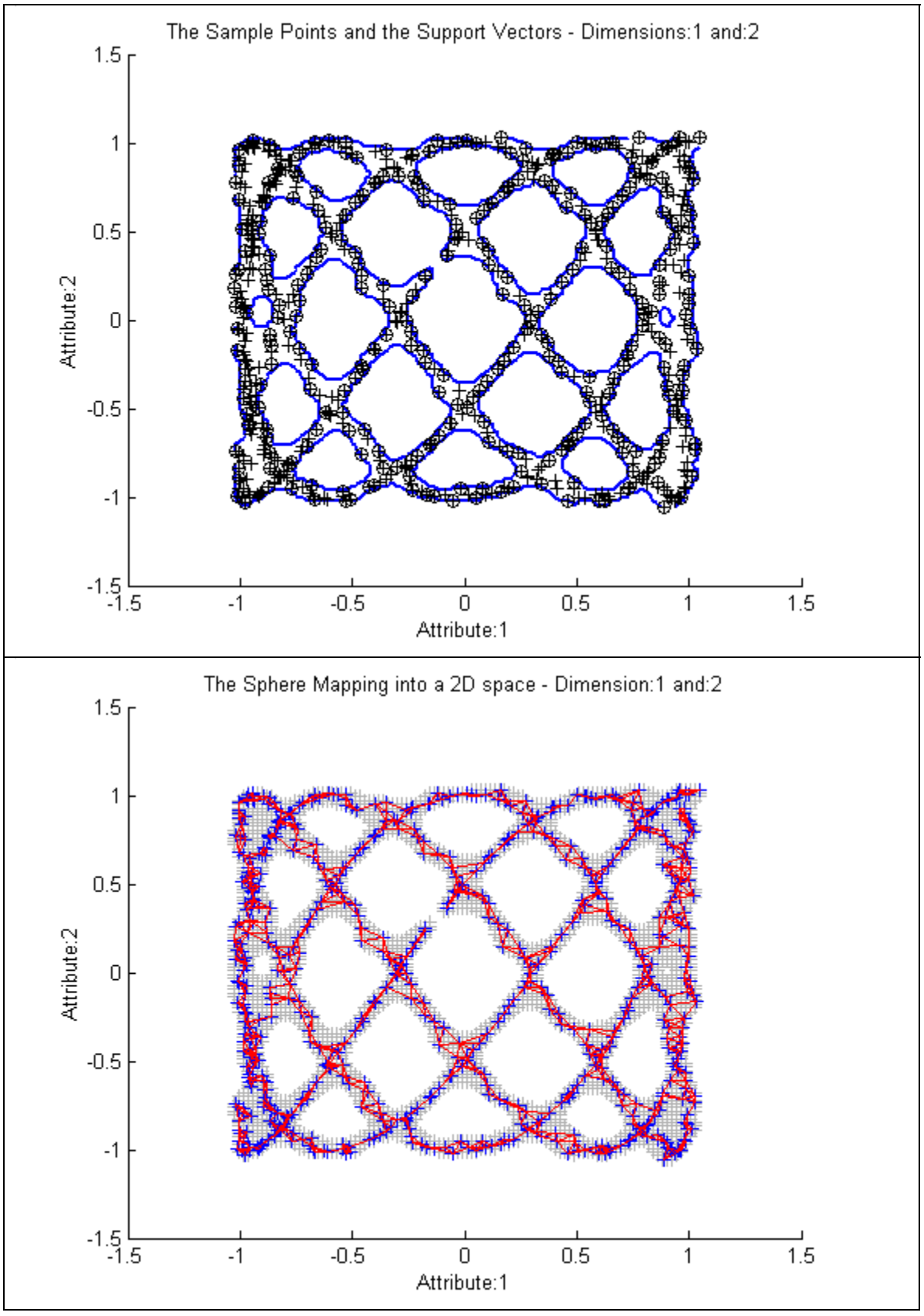



The Sample Points and the Support Vectors - Dimensions:1 and:2
Attribute:2
Attribute:1
1.5
1
0.5
0
-0.5
-1
-1.5
The Sphere Mapping into a 2D space - Dimension:1 and:2
Attribute:2
Attribute:1



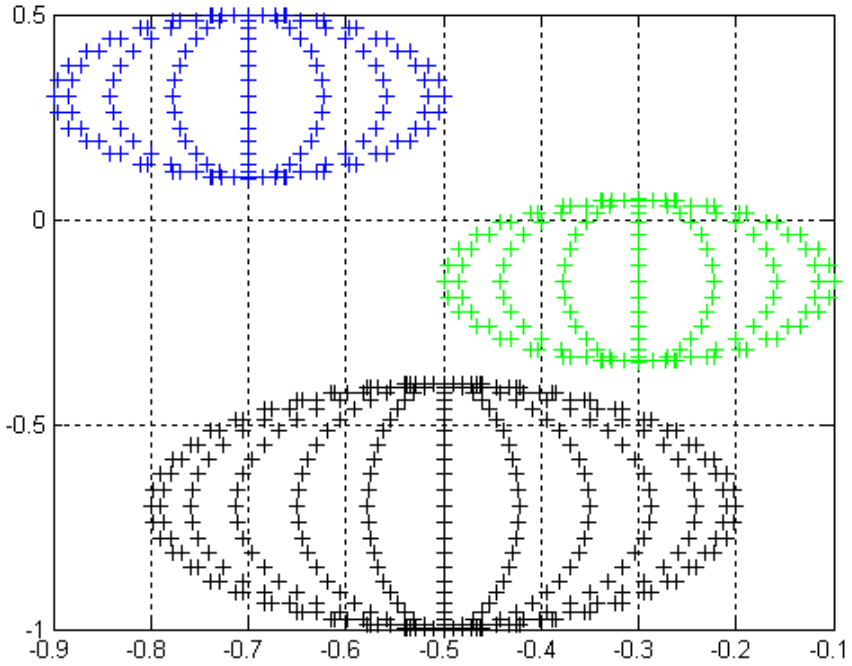
MainSVC1(Samples, 0.2, [80], 'tstLssjsnp20',{'knn',4})
#SV=294, #BSV=0; Elapsed time: training: 15 + clustering 384 secs

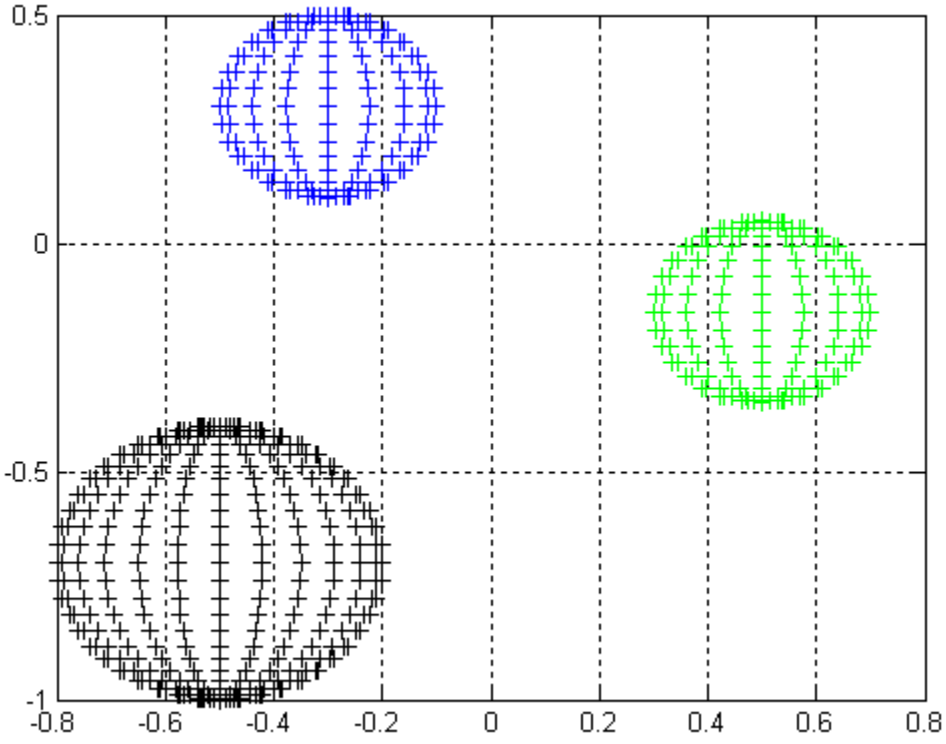


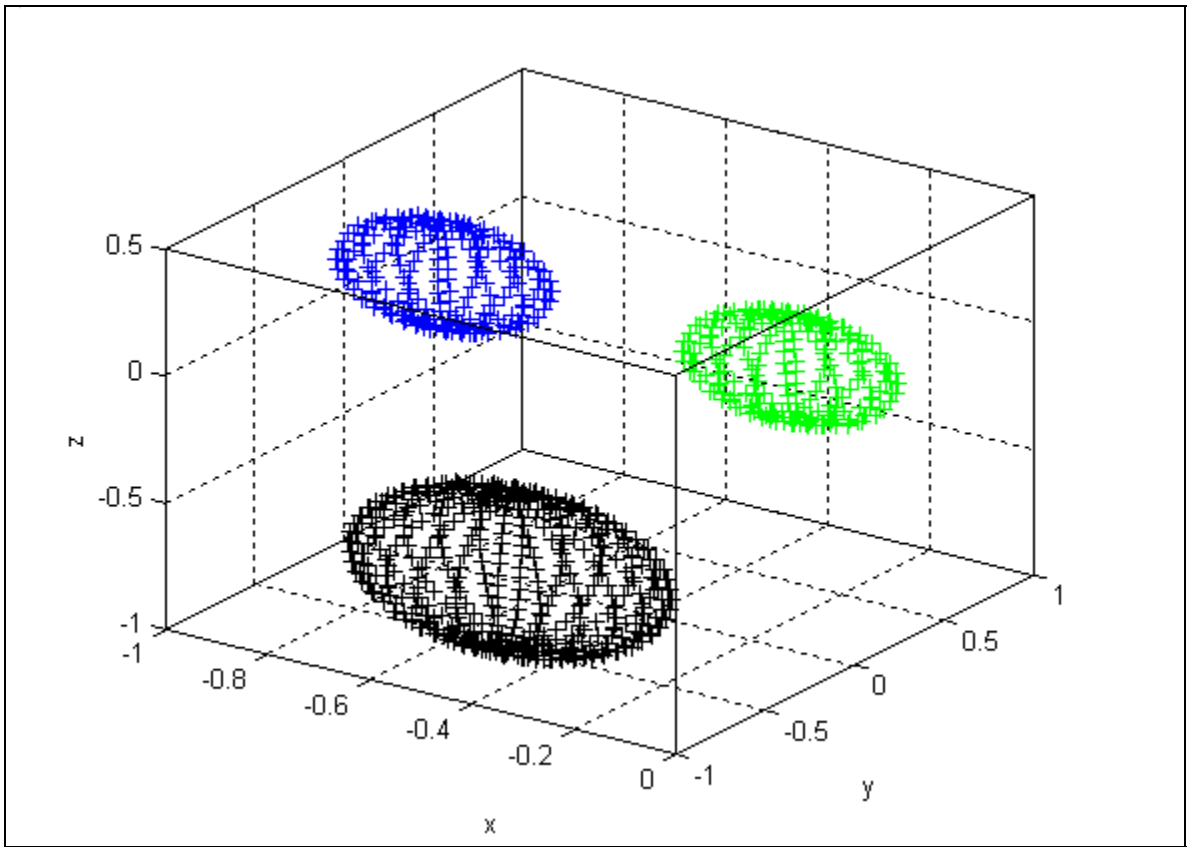

The Sample Points and the Support Vectors - Dimensions:1 and:2
Attribute:2
Attribute:1
1.5
1
0.5
0
-0.5
-1
-1.5
The Sphere Mapping into a 2D space - Dimension:1 and:2
Attribute:2
Attribute:1

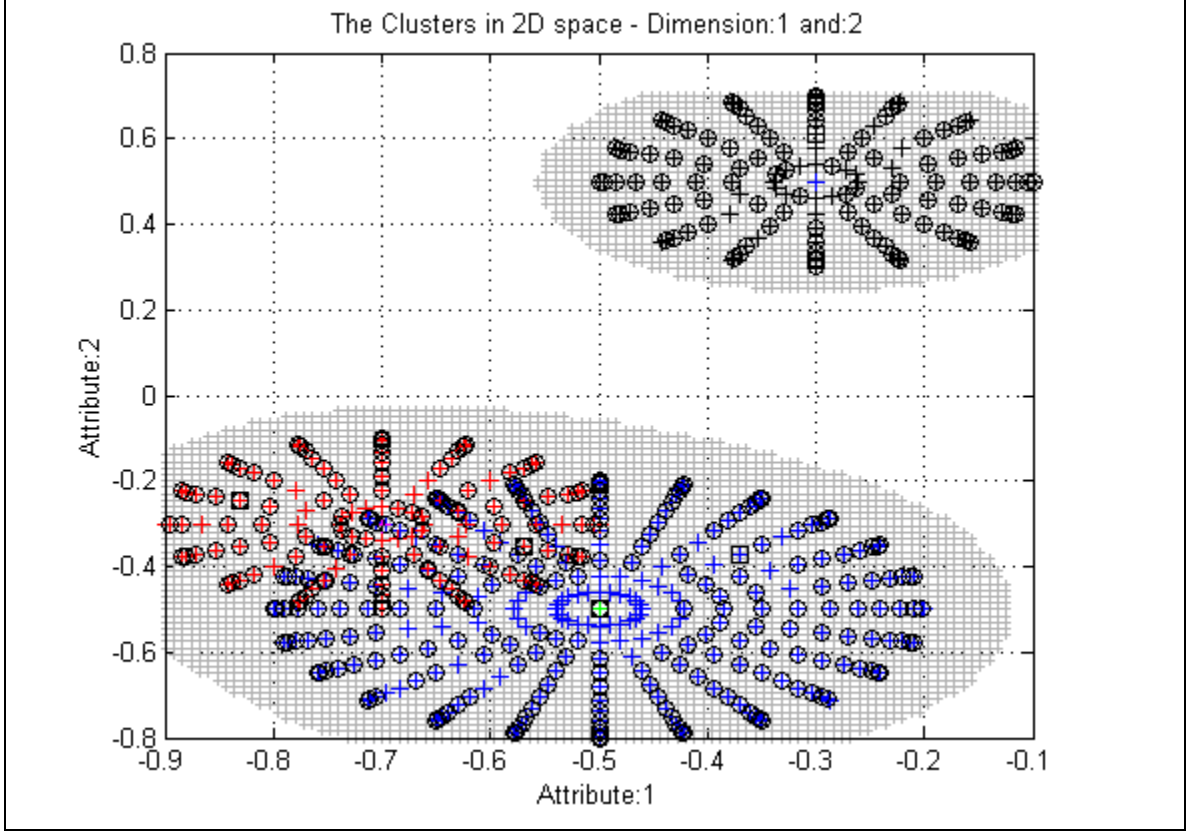
Example III: a three-sphere example

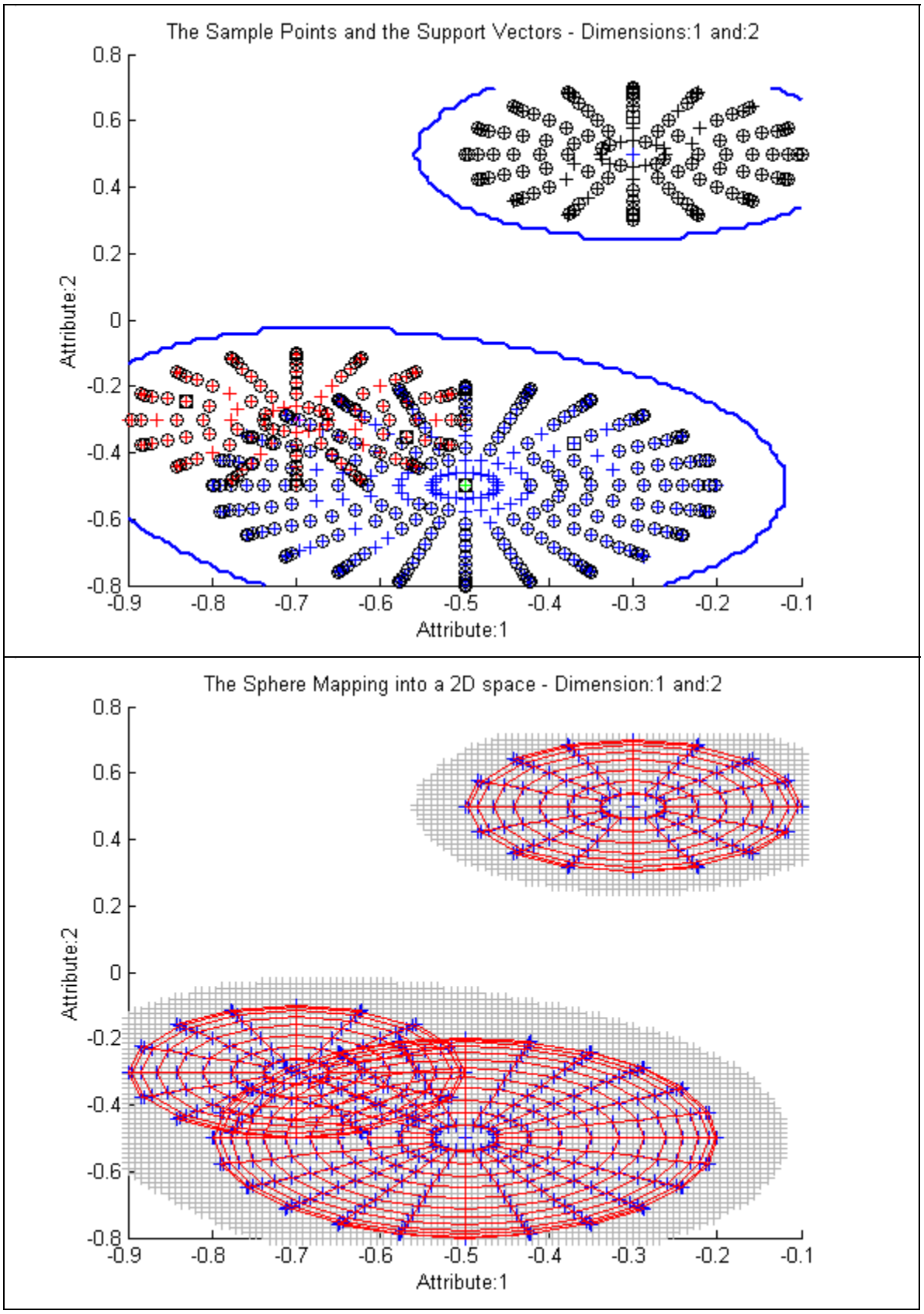
3 3d-spheres # data=1203, noise =0. Elapsed time: training 76 + clustering 1312 secs
MainSVC1(Samples, 0.2, [40], 'tst3Sphrlp20',{'knn',4})

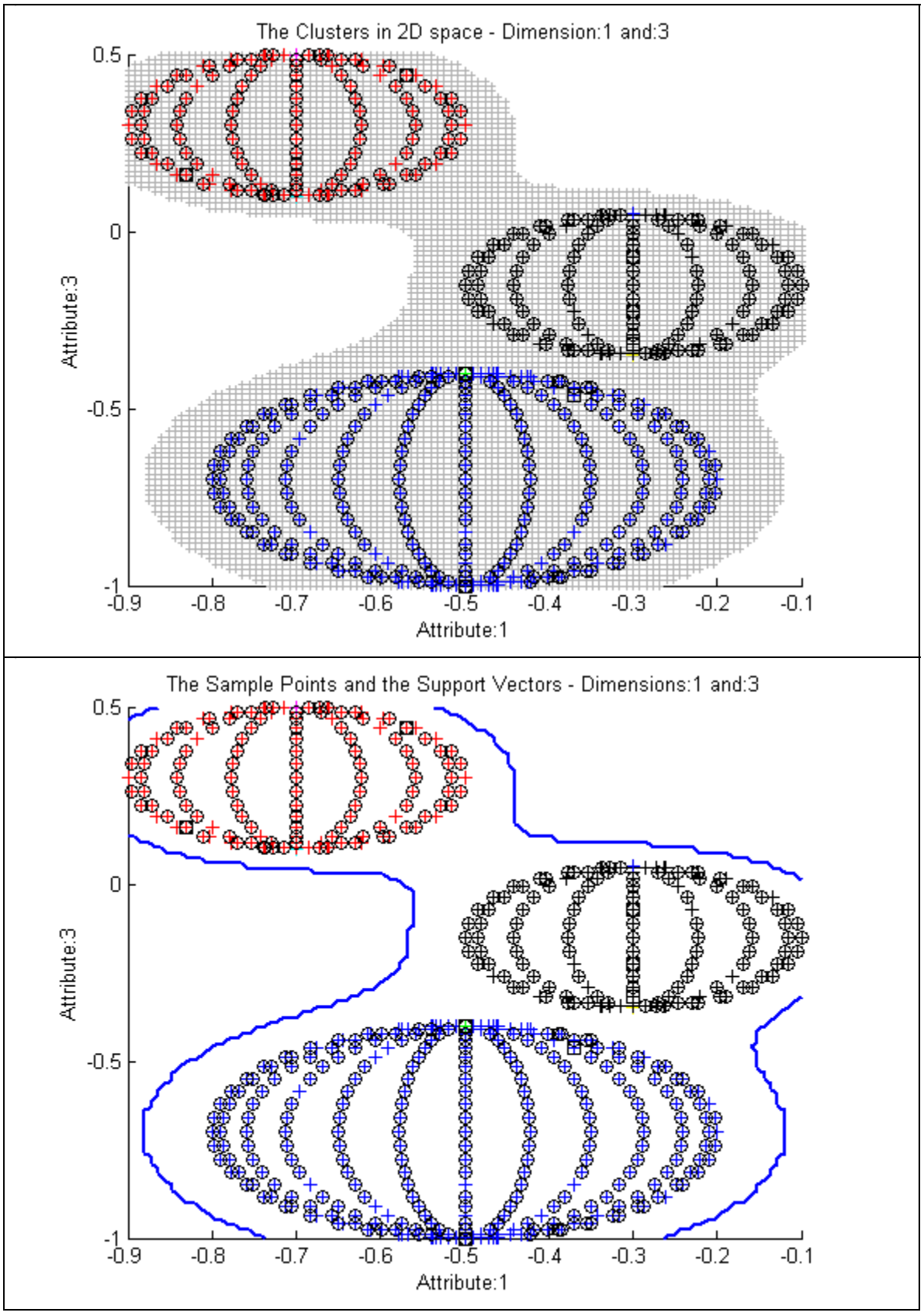


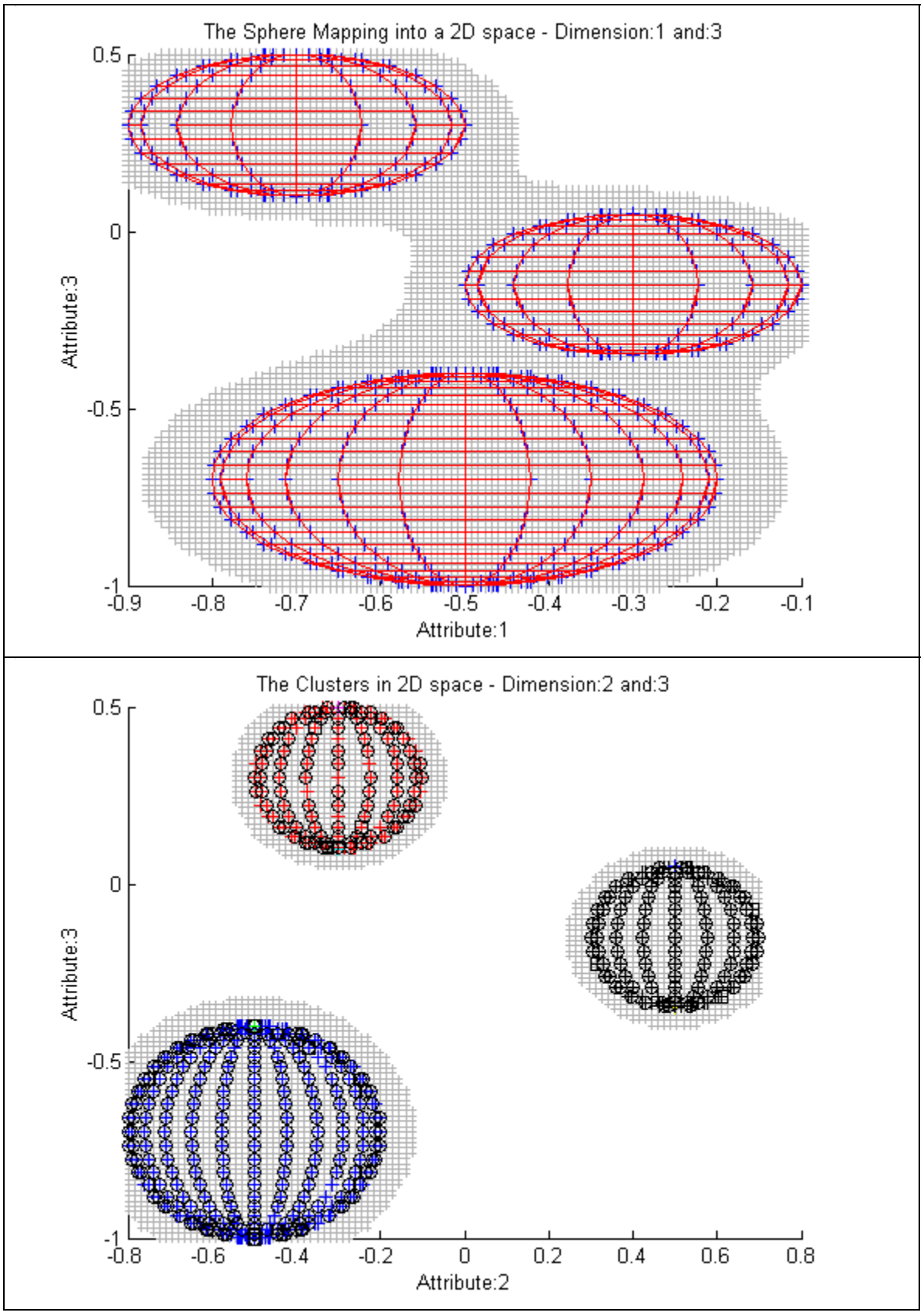


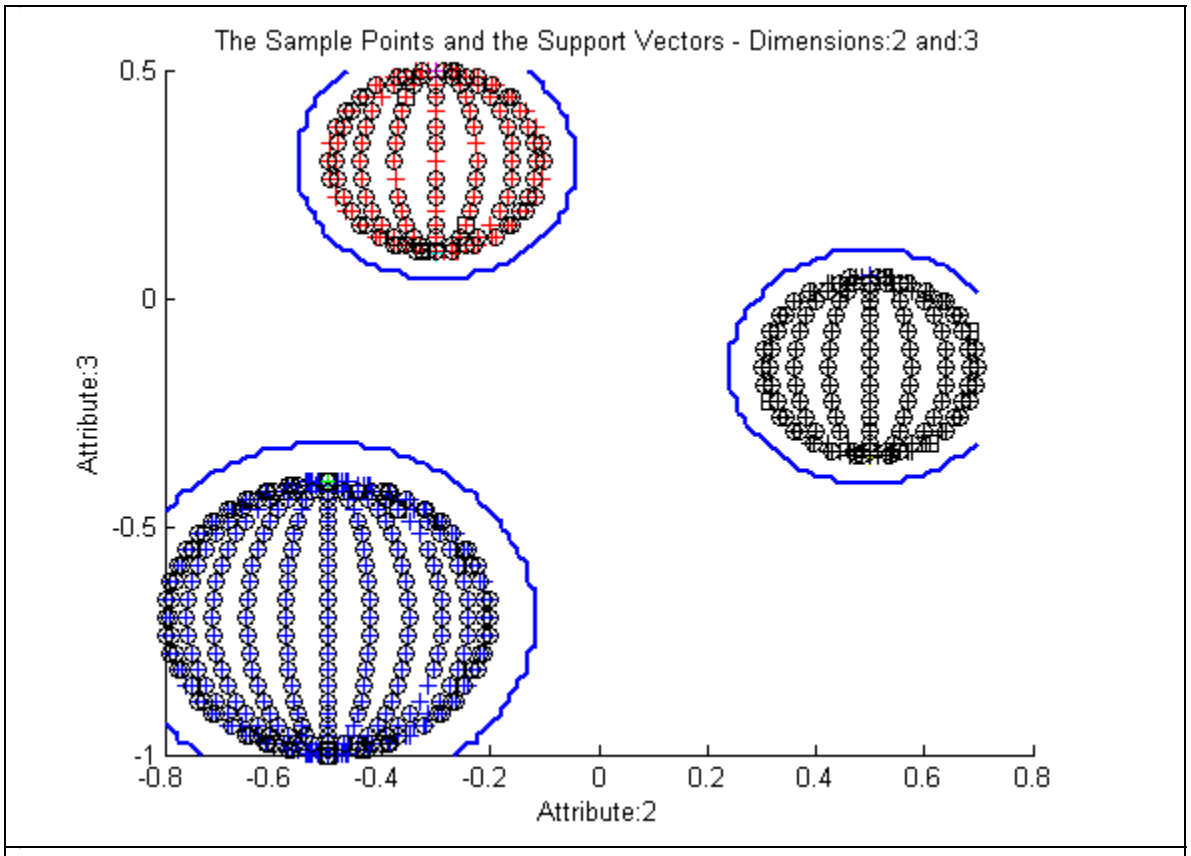

0.5
0
-0.5
-1
z
-1
-0.8
-0.6
-0.4
-0.2
0
x
-1
-0.5
0
0.5
1
y

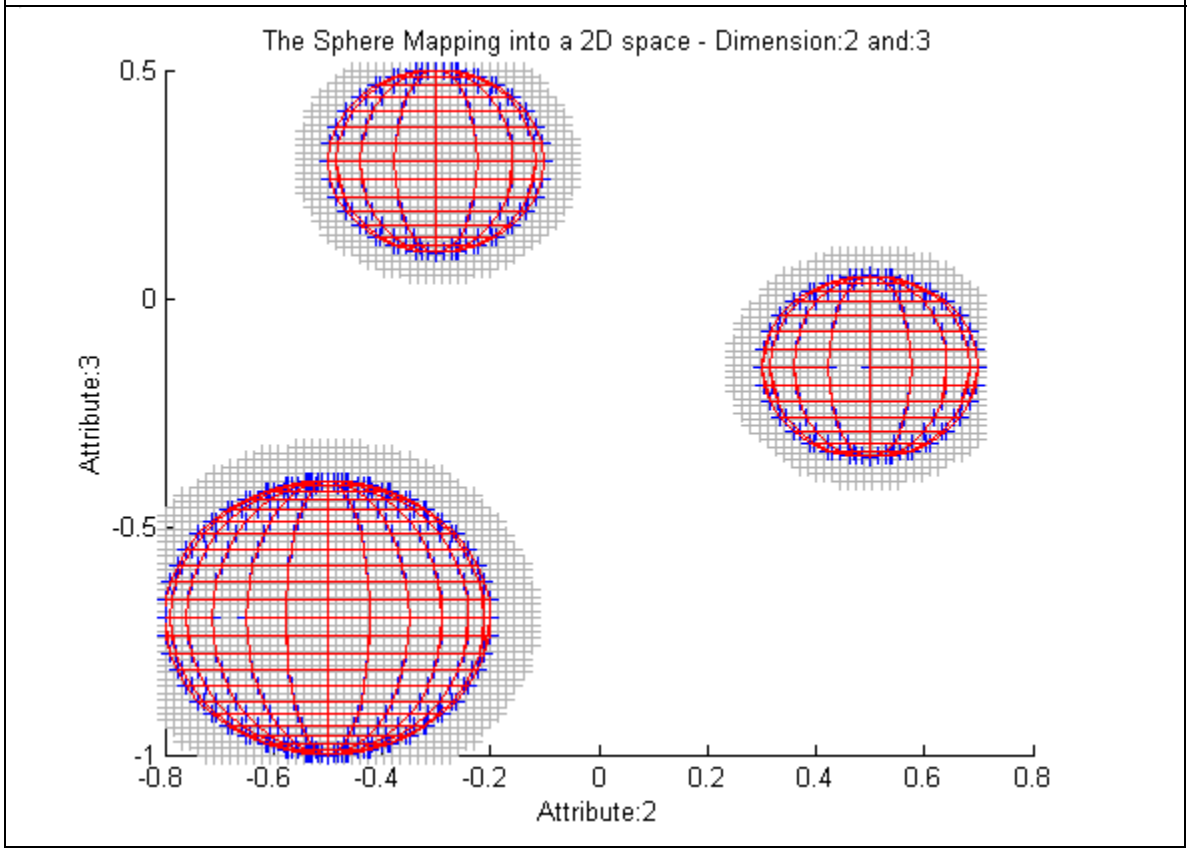

The Clusters in 2D space - Dimension:1 and:2
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
Attribute:2
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
Attribute:1


The Sample Points and the Support Vectors - Dimensions:1 and:2
Attribute:2
Attribute:1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
The Sphere Mapping into a 2D space - Dimension:1 and:2
Attribute:2
Attribute:1


The Clusters in 2D space - Dimension:1 and:3
Attribute:3
Attribute:1
0.5
0
-0.5
-1
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
The Sample Points and the Support Vectors - Dimensions:1 and:3
Attribute:3
Attribute:1
0.5
0
-0.5
-1
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1


The Sphere Mapping into a 2D space - Dimension:1 and:3
Attribute:3
Attribute:1
0.5
0
-0.5
-1
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
The Clusters in 2D space - Dimension:2 and:3
Attribute:3
Attribute:2
0.5
0
-0.5
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8


The Sample Points and the Support Vectors - Dimensions:2 and:3
Attribute:3
Attribute:2
0.5
0
-0.5
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8


The Sphere Mapping into a 2D space - Dimension:2 and:3
Attribute:3
Attribute:2
0.5
0
-0.5
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8

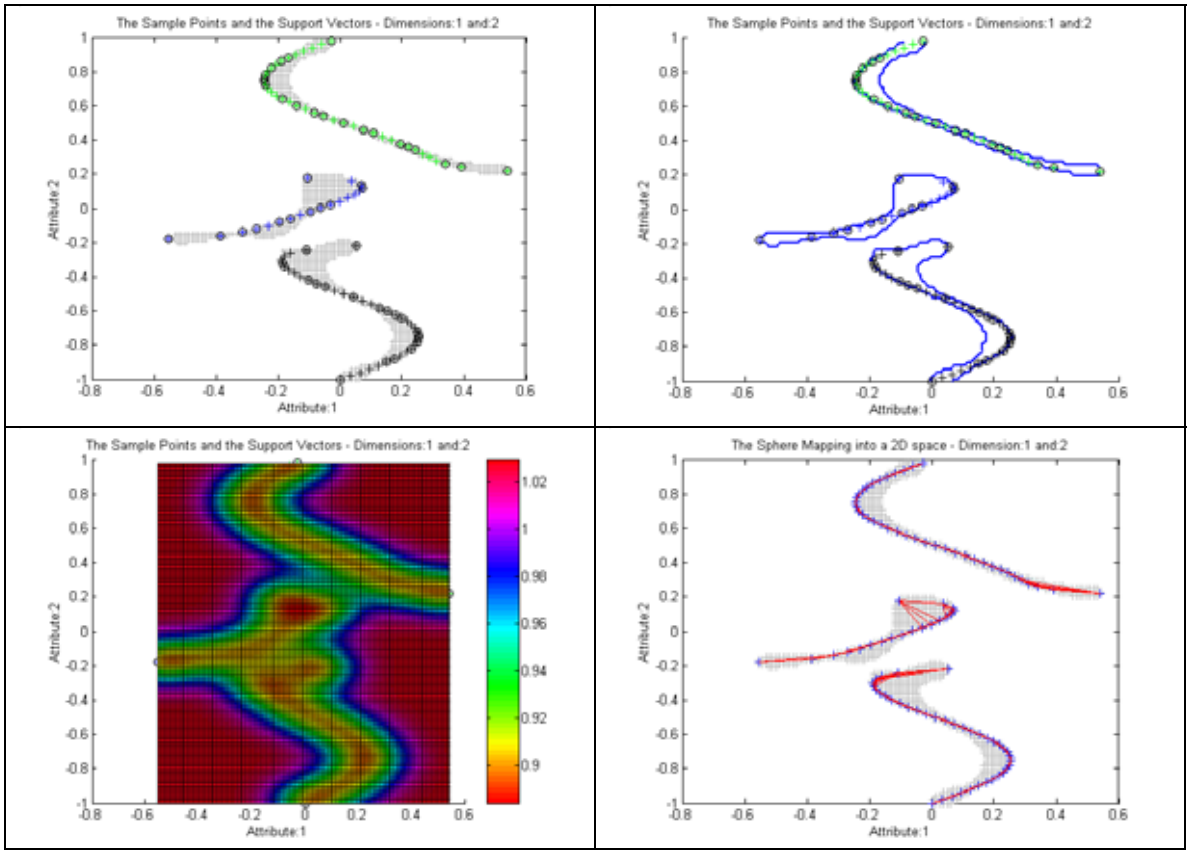
Example III. The following graphs show how the support vector clustering can be used in inverse discontinuous problems.

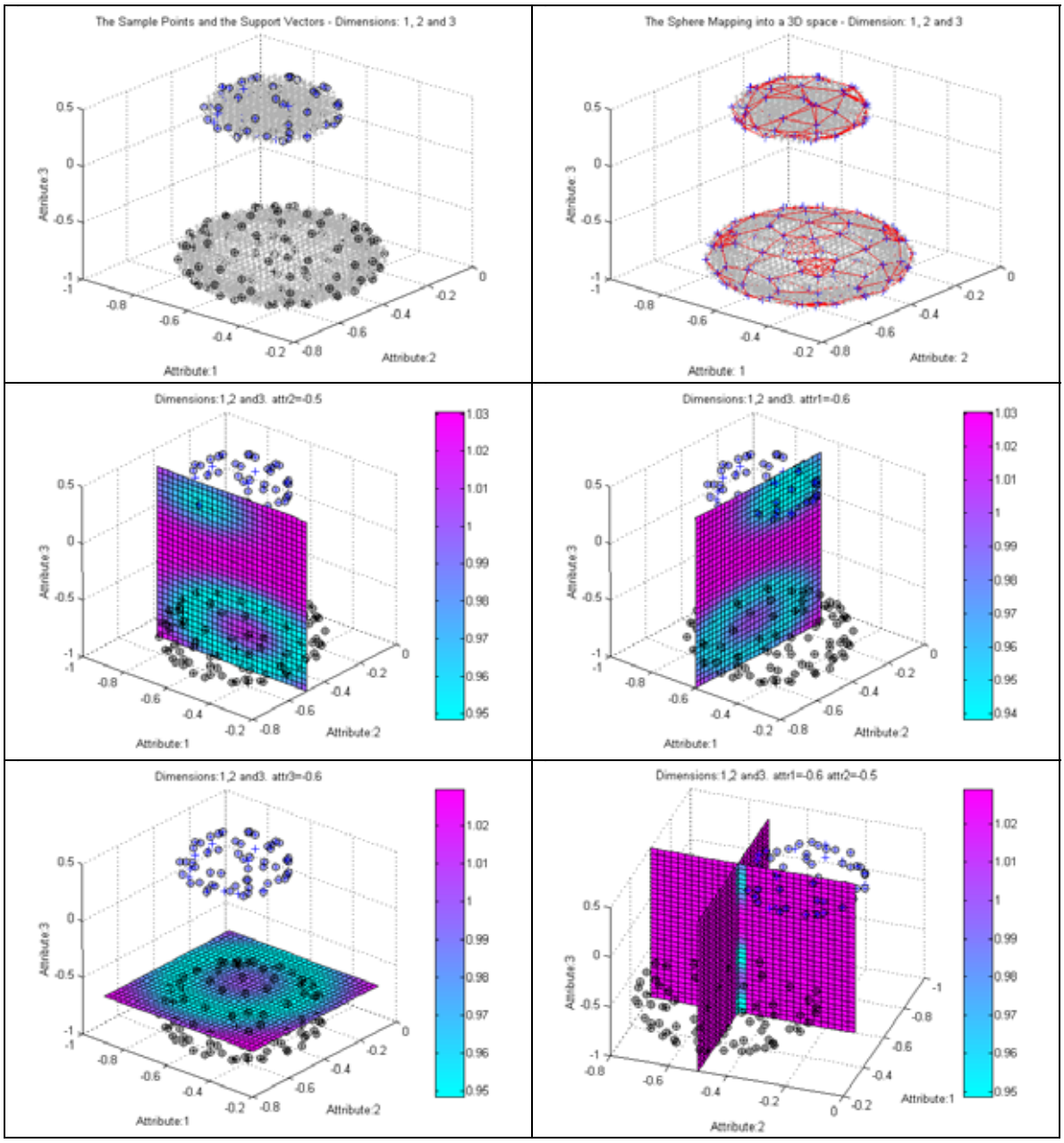
Data points are denoted by '+'s, the SVs are circled.

The clusters of the data points are indicated in different colors. The grey '+' represents the data points inside the sphere in the feature space.

The colormap shows the distance of the point to the center of the spheres. The points whose distances <= the radius of the sphere R can be considered as the solutions given an input value. Interpolations can also be done from these points.

The linkings (in red) between the data points, which are connected within the sphere, are found by checking the 4NN proximity graph.




The Sample Points and the Support Vectors - Dimensions: 1, 2 and 3
Attribute:3
Attribute:1
Attribute:2
The Sphere Mapping into a 3D space - Dimension: 1, 2 and 3
Attribute: 3
Attribute: 1
Attribute: 2
Dimensions:1,2 and3. attr2=-0.5
Attribute:3
Attribute:1
Attribute:2
Dimensions:1,2 and3. attr1=-0.6
Attribute:3
Attribute:1
Attribute:2
Dimensions:1,2 and3. attr3=-0.6
Attribute:3
Attribute:1
Attribute:2
Dimensions:1,2 and3. attr1=-0.6 attr2=-0.5
Attribute:3
Attribute:2
Attribute:1