

Machine learning in Robotics

Assignment 1 Solution

Duy Nguyen
03658922

Exercise 1:

a-b)

K = 2:

P1 = 5

P2 = 3

par{1,1}	par{1,2}	par{1,3}
0.00220625732556180	-0.00269493977200834	-0.000595151484125021
0.921732195858901	-0.00135809592112292	-0.000171073749124453
0.00657348550645972	-0.0115383171659964	0.999714709020228
-0.00162656965276820	0.473042321915389	0.000839355025048968
-0.000991575978557364	0.000244539456730217	0.000126866877646435
0.00248490664424073	-0.00826729432491305	0.00178272525920993
0.00231358751656308	7.46931348182336e-05	-0.000141046904408991
-1.16646541582252e-05	4.38102067757856e-05	-4.52228930367135e-06
-0.0130056609219626	0.0164373055385548	-0.000622237972551102
0.000122681135091482	-0.000976996332548401	-1.32208929849428e-05
1.28355799646602e-05	-5.28891350696529e-06	
-0.00445663266774576	0.00429852335997518	
-4.30989334269236e-05	-4.41870625679369e-06	
1.66957256114729e-06	-2.69105974566460e-07	
0.00259767597943071	-0.00381272453688417	
-4.02394497236513e-07	2.10157140577394e-06	

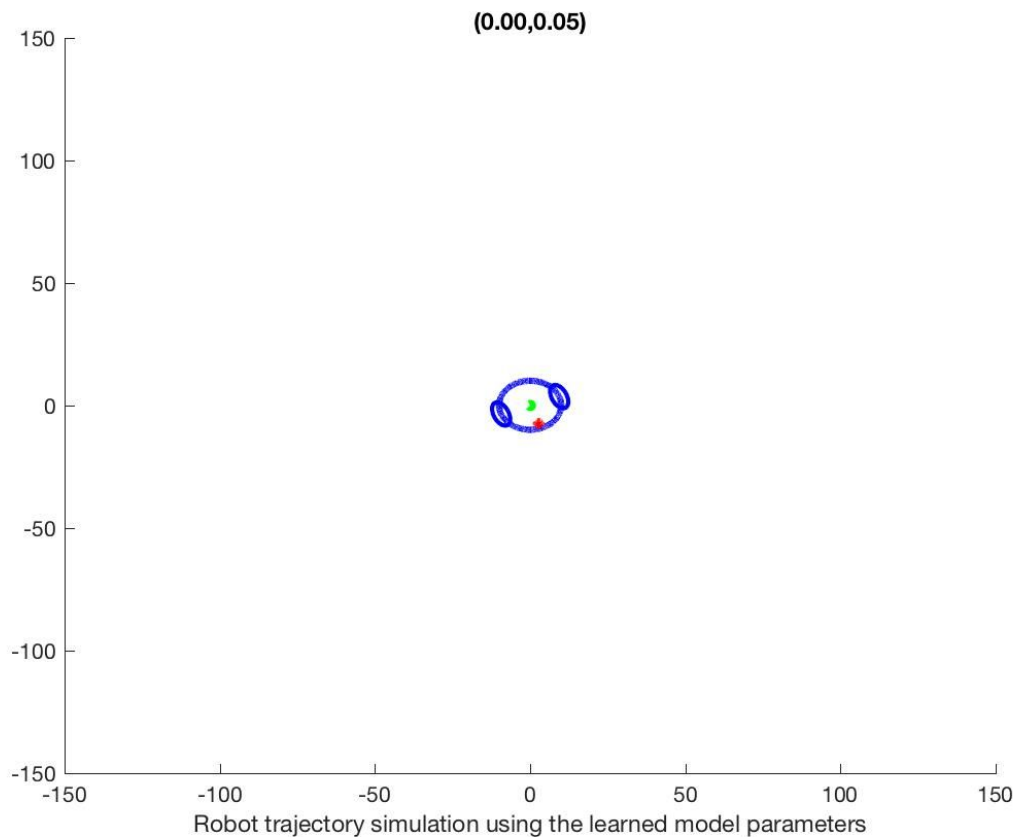
K=5:

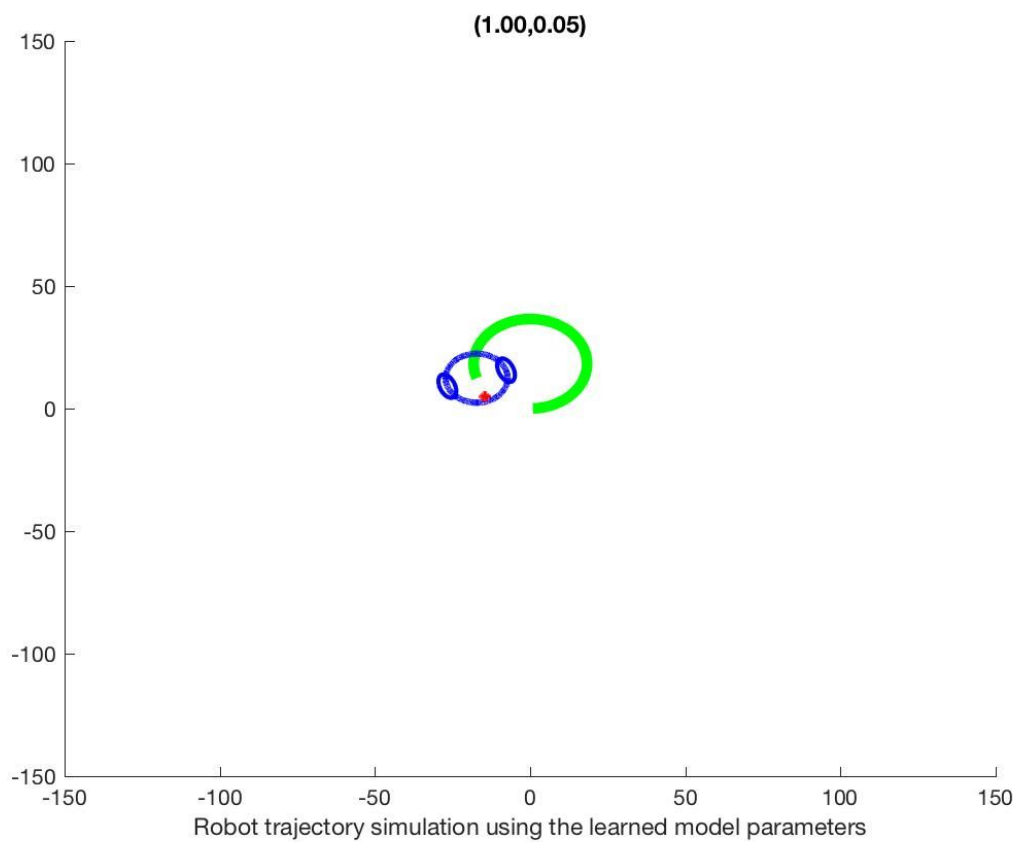
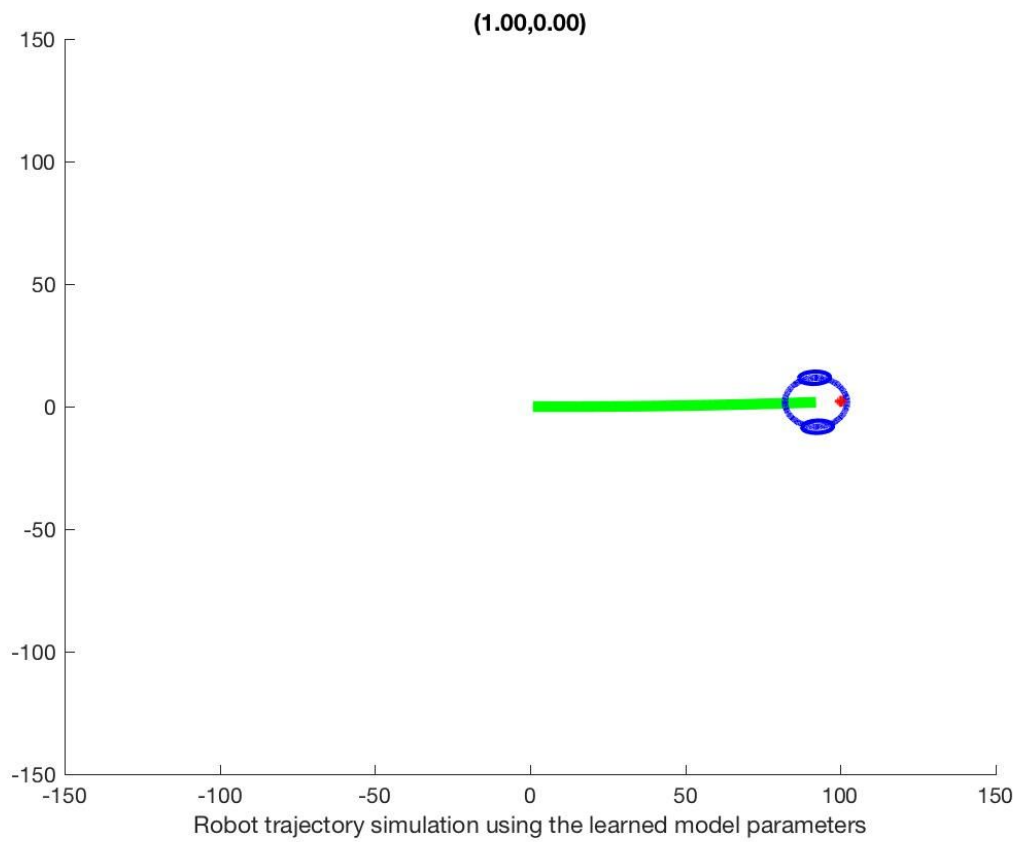
P1 = 4

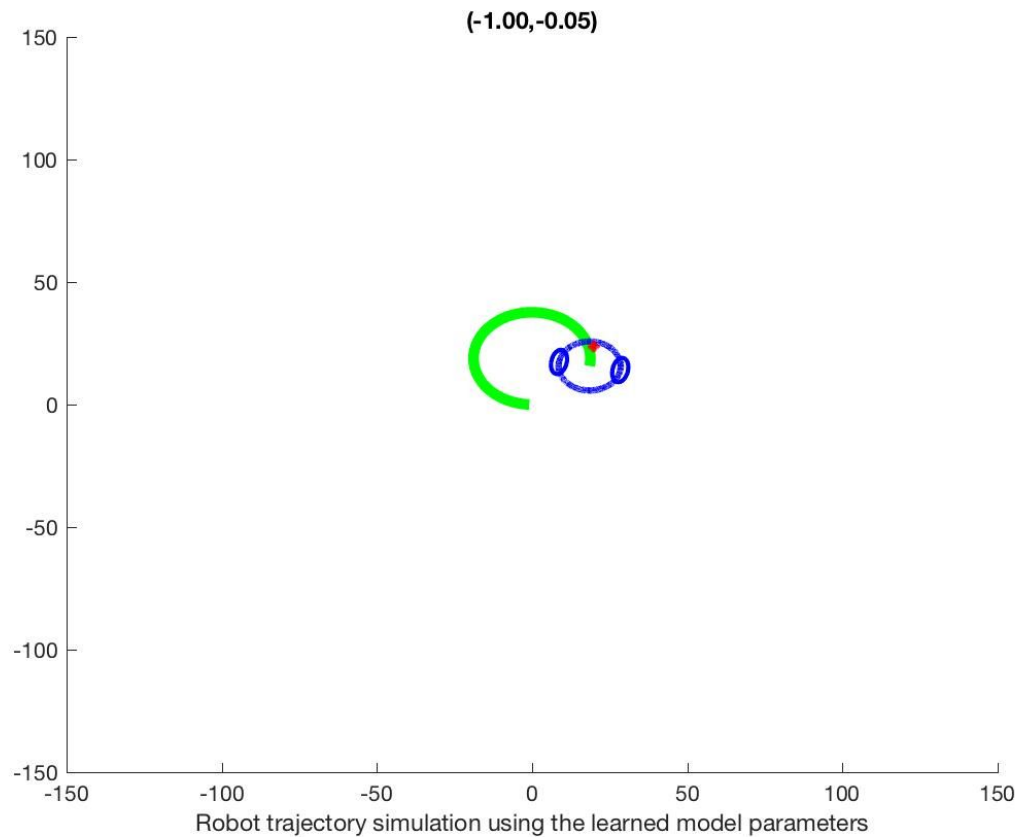
P2 = 1

par{1,1}	par{1,2}	par{1,3}
0.00250438198744821	-0.00432378702432525	0.000807837315929518
0.919758171529196	-0.00100147026158885	-0.000319015102912386
-0.00285535207851198	0.00144804828720767	0.998697948732514
-0.000743846577077313	0.467984381559632	0.000321416083203670
-0.00103415346607633	0.000568498345337262	
0.00137429795052561	-0.00252770680607283	
0.00248687885776969	-0.00102513134746687	
0.000136005129586935	1.92455105264465e-05	
-0.000269081593446587	-0.00167419363591916	
6.69261198540719e-05	-0.000672538046125725	
1.30609808751862e-05	-7.84620179300508e-06	
-0.00428157284345878	0.00347662125530496	
-4.51742614704263e-05	8.71551716809015e-06	

c) Robot trajectory plots for each (v,w) :







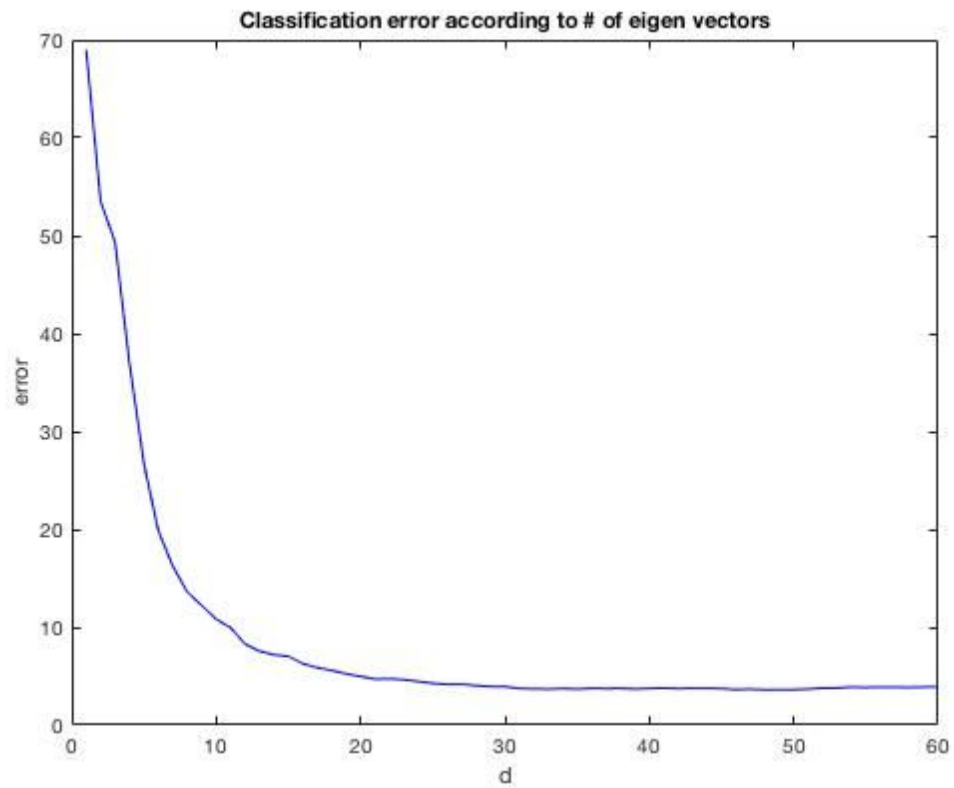
Exercise 2:

Optimal $d = 48$

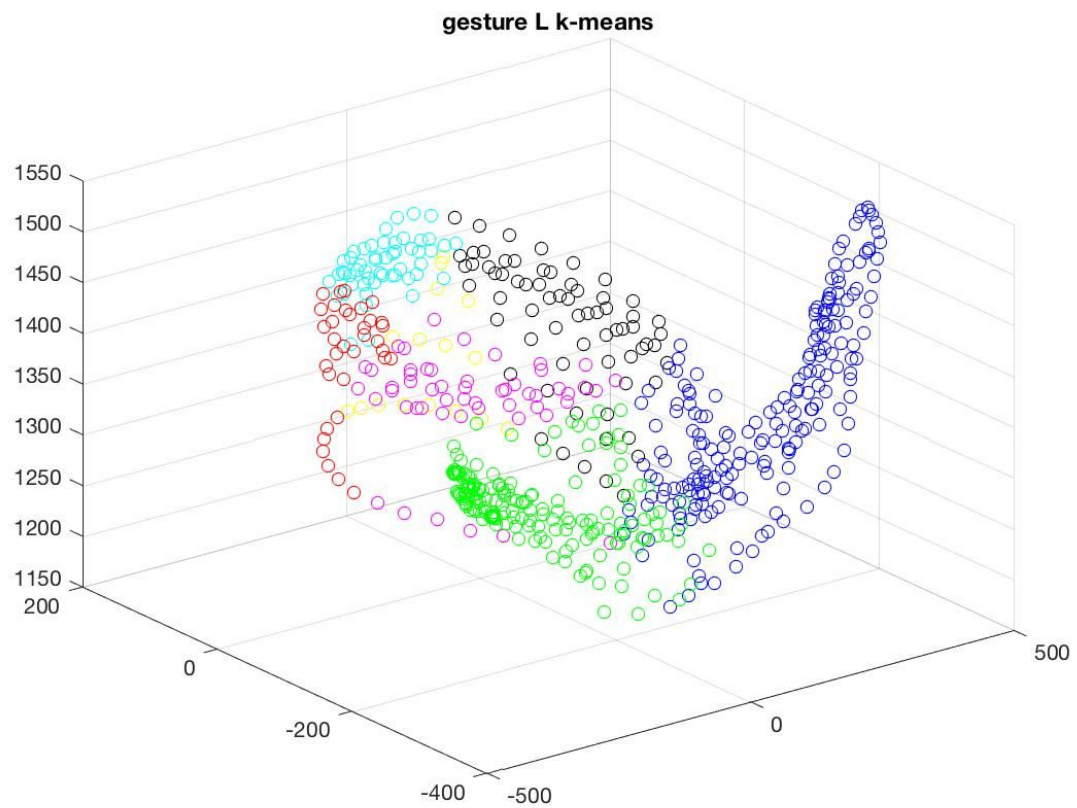
Classification error = 3.62 %

Confusion matrix :

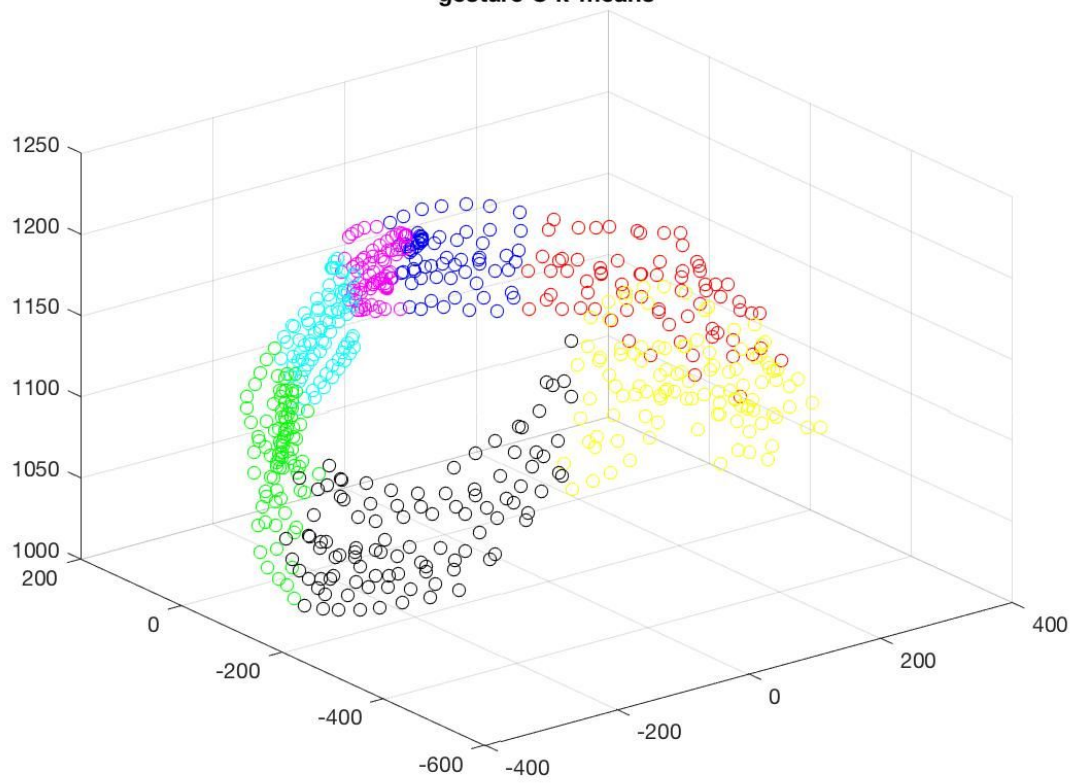
digit	0	1	2	3	4	5	6	7	8	9
0	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1	0.00	0.97	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00
2	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.02	0.00
3	0.00	0.00	0.01	0.96	0.00	0.00	0.00	0.00	0.02	0.00
4	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.01
5	0.00	0.00	0.00	0.02	0.00	0.96	0.00	0.00	0.01	0.00
6	0.01	0.00	0.00	0.00	0.00	0.01	0.96	0.00	0.01	0.00
7	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.93	0.01	0.02
8	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.97	0.01
9	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.94



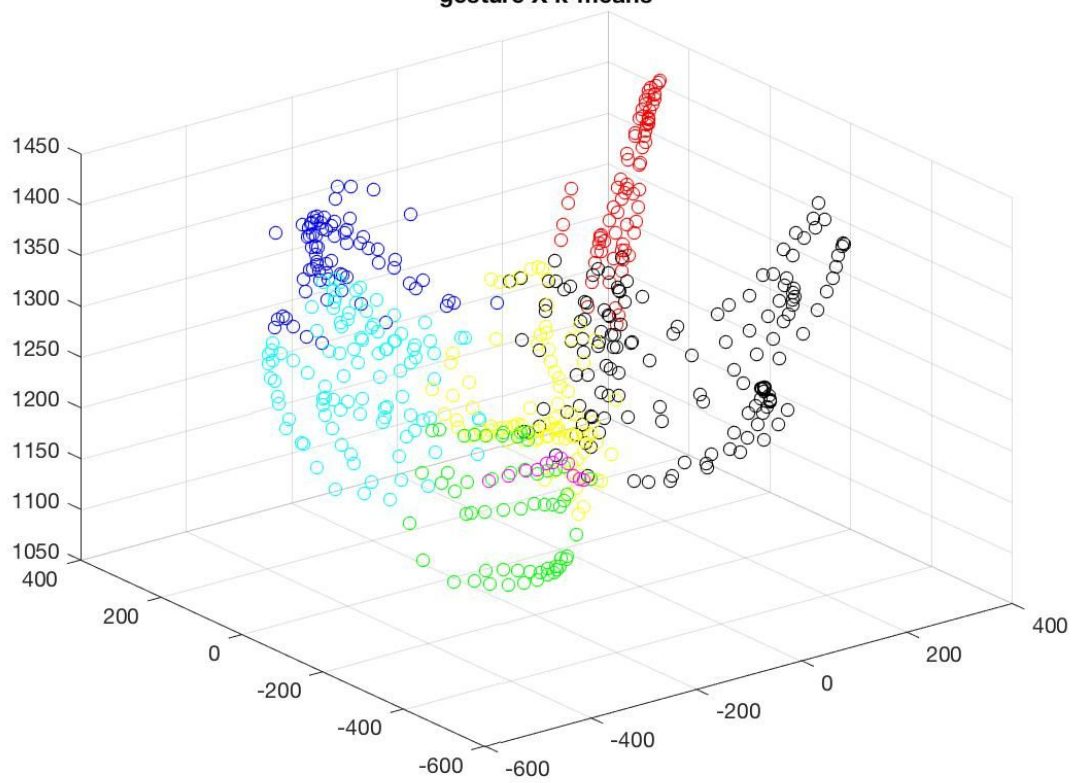
Exercise 3:



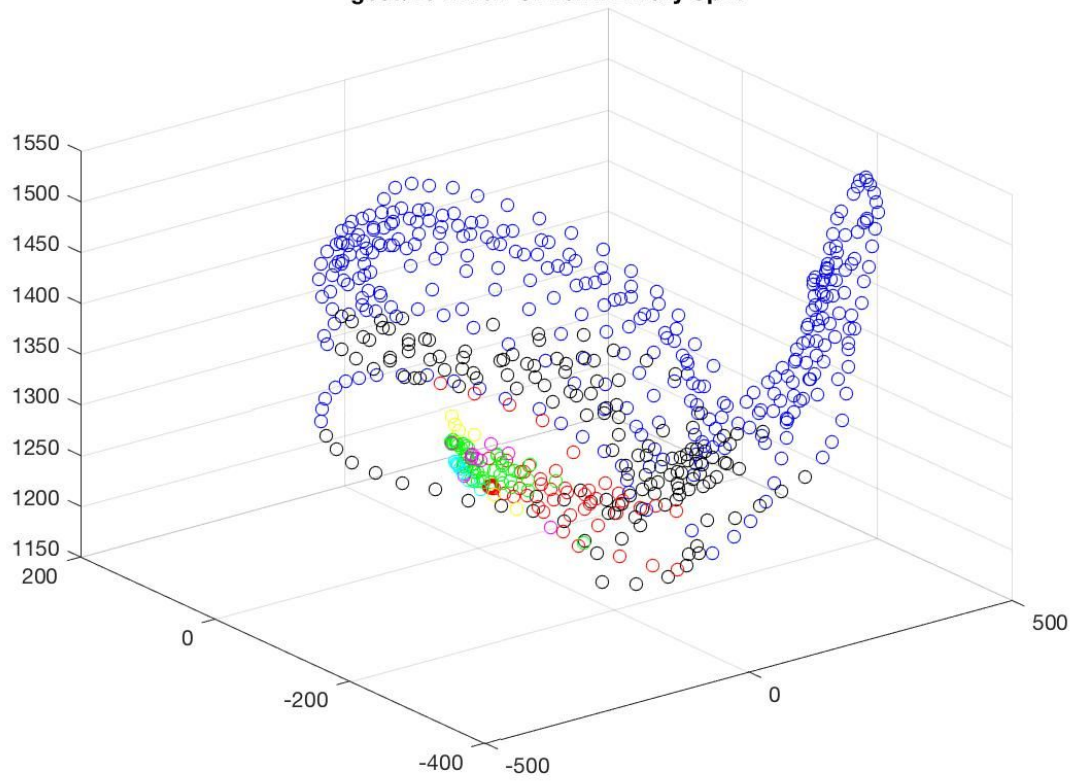
gesture O k-means



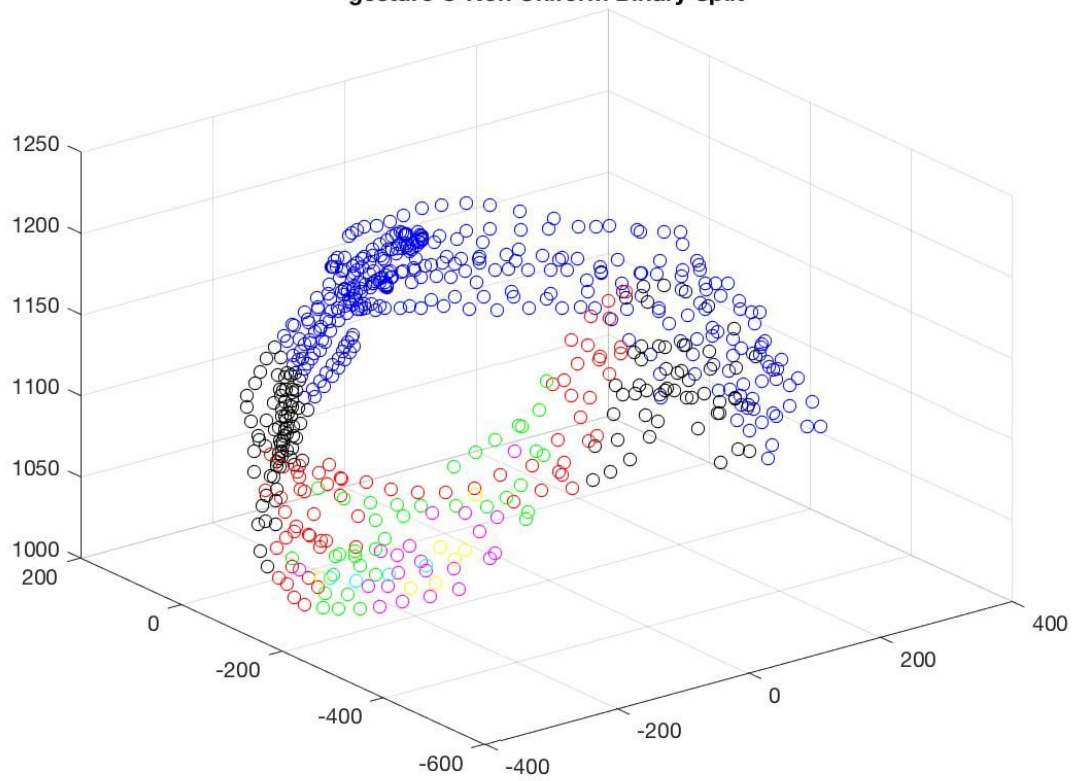
gesture X k-means



gesture L Non Uniform Binary Split



gesture O Non Uniform Binary Split



gesture X Non Uniform Binary Split

