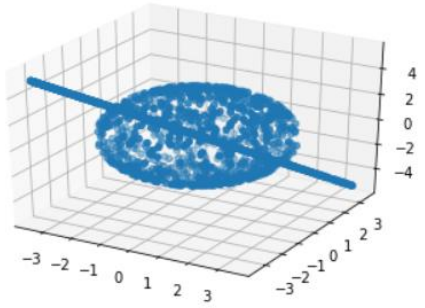
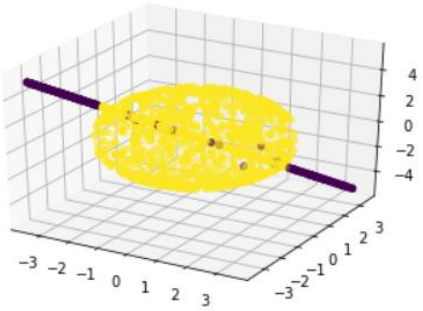
Here is the model, consists of 2000 data points. 1000 points are on a line which goes through the origin and another 1000 on the sphere whose equation is $x^2 + y^2 + z^2 = 9$. The plot is as below.



My goal is to distinguish the line and separate it. Thus, I consider OWL because it works well in subspace clustering. When I applied OWL to this model and set weights to be OSCAR weights $w_i = (n - i + 1)\Delta + \lambda$. And here $\Delta = 0.0001, \lambda = 0.01$. Then I found that for most points on the sphere, their coefficients are all 0. So I am confused how to adjust parameters to gain a more reasonable result. I would like to see that points are associated with points near them which could lead to better clustering.

In the experiment above, the result is kind of interesting. I obtained the similarity matrix through OWL and do spectral clustering. I plot the second smallest eigenvectors of the Laplacian matrix and the plot is as below.



The line outside the sphere is distinguished, but this result is due to the all-0 coefficients of points on the sphere. And when I checked the coefficients of those nonzero ones, they were connected to very extreme points like the points on both ends of the line. This made me confused as well, because I supposed in OWL, it is more cheap for points to connect with some points near them. Do I think right? How to explain this result? And how to improve it?

Thanks for your help!