Activity 16 - Support Vector Machine

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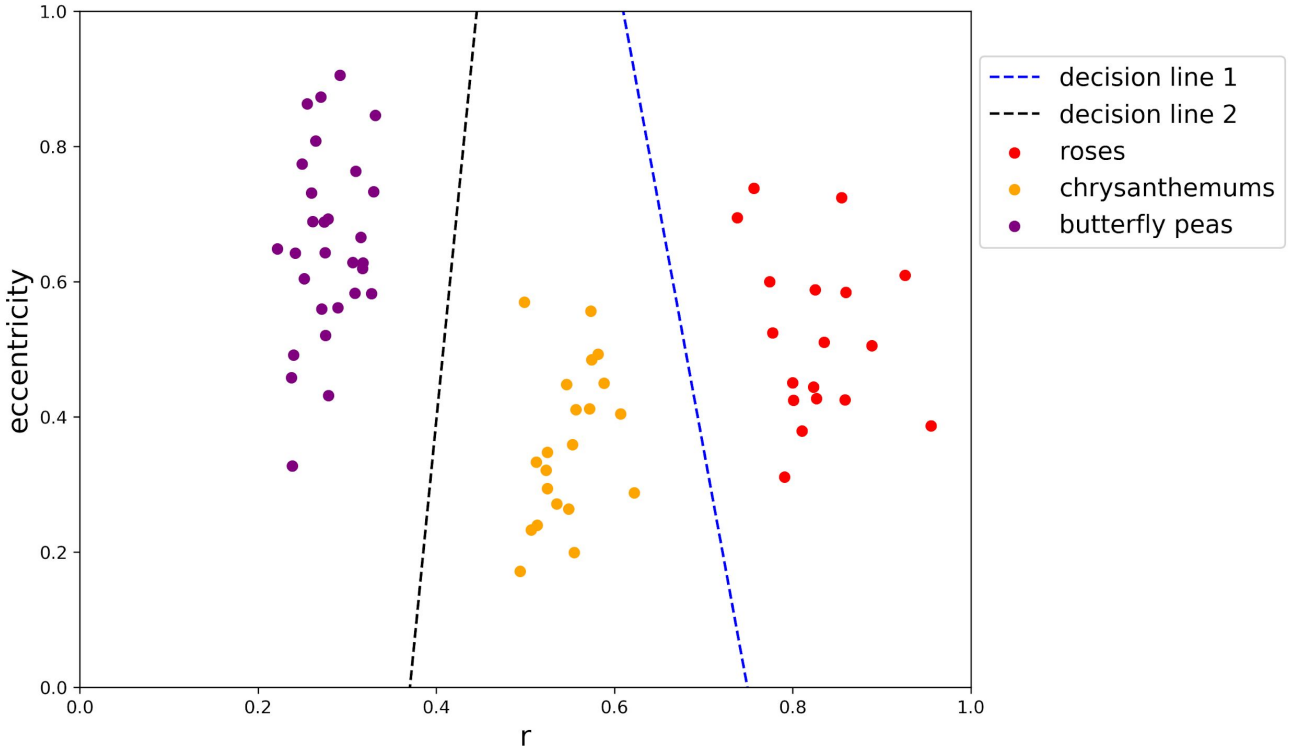
SVM: Separable Case

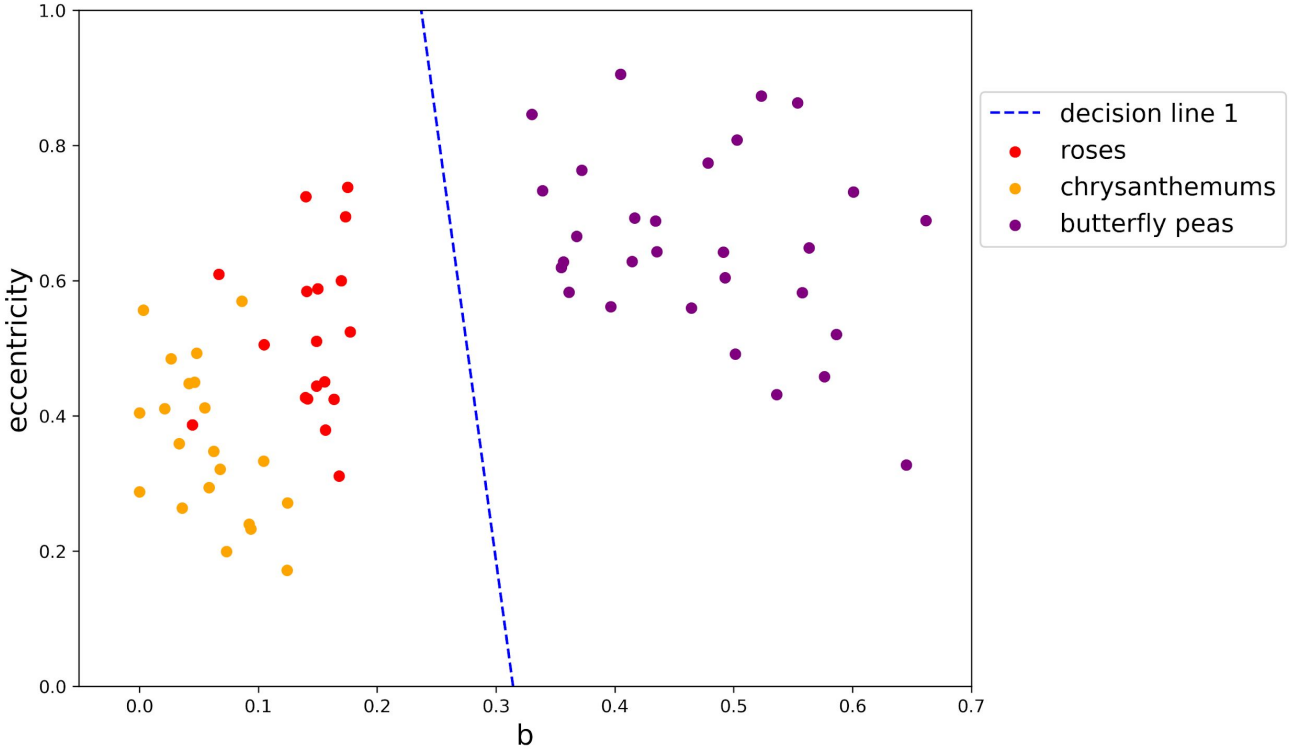
I was able to obtain the **H** and **A** matrices, and **f** and **a** vectors by following [1]. However, I had to modify the **B** matrix and **b** vector in [1], since the equations shown in [1] didn't work for *cvxopt*. I changed it such that **B = z** and **b = 0.** Then, I just followed the example shown in the documentation of *cvxopt.solvers.qp* [2].

SVM: eccentricity vs r plot of flowers



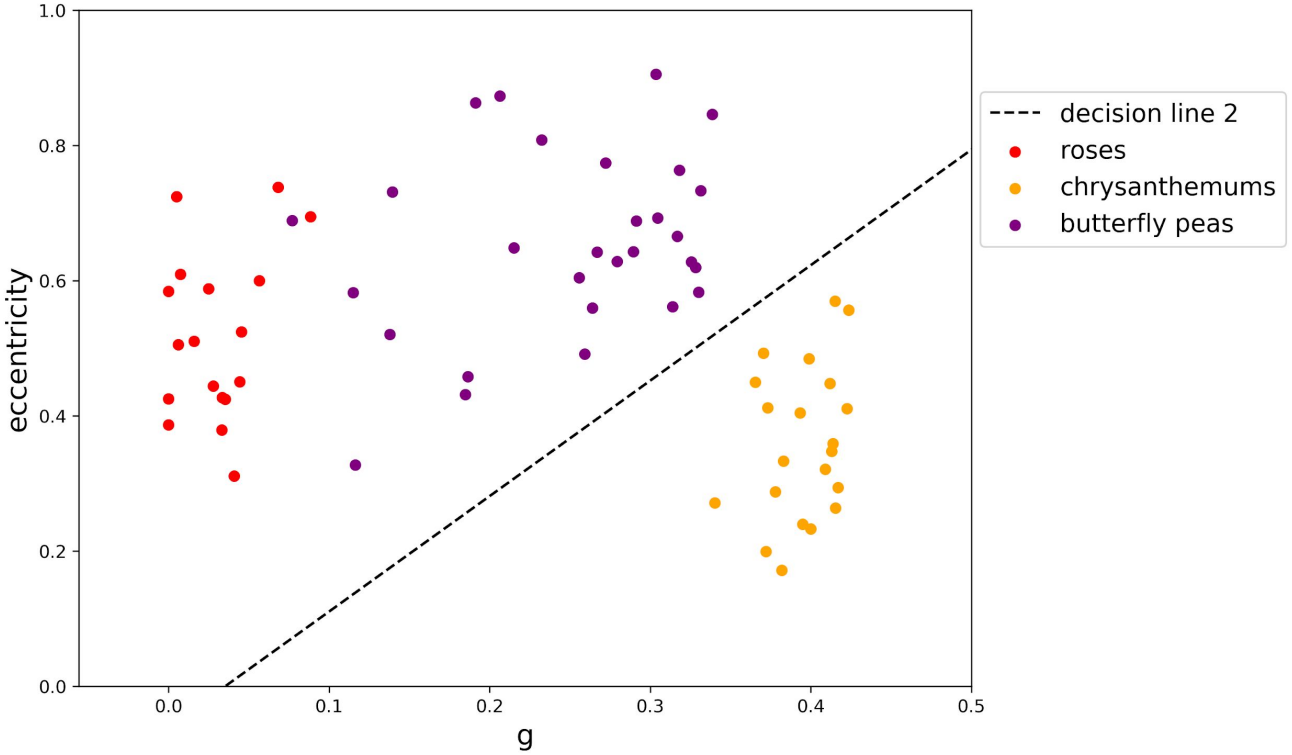
These decision lines are unique. This means that even if I rerun the program, it would still output the same decision lines. Unlike the perceptron algorithm, wherein the resulting decision lines depend on the initial random weights I set. SVM obtains the optimal decision line.

SVM: eccentricity vs b plot of flowers



The separation between the roses and chrysanthemums can still be linear, but with some outliers. I tried to apply the non-separable case shown in [1]. Unfortunately, I couldn't make it work, so I just worked with the roses and butterfly peas.

SVM: eccentricity vs g plot of flowers



References

1. Veksler, O. , CS 434a/541a:Pattern Recognition Lecture 11 slides.
2. Andersen, M., Dahl, J., and Vandenberghe, L. (2019) CVXOPT Documentation: Release 1.2.3, Retrieved from https://buildmedia.readthedocs.org/media/pdf/cvxopt/latest/cvxopt.pdf.