STAT 607 - Assignment 3

Name: Zhen Qin, Uniqname: qinzhen

1.1

According to reference guide, we can use scipy.linalg to solve Eigenvalue Problems by these functions.

`eig` **(a[, b, left, right, overwrite_a, ...])**	**Solve an ordinary or generalized eigenvalue problem of a square matrix.**
`eigvals` (a[, b, overwrite_a, check_finite, ...])	Compute eigenvalues from an ordinary or generalized eigenvalue problem.
`eigh` (a[, b, lower, eigvals_only, ...])	Solve an ordinary or generalized eigenvalue problem for a complex Hermitian or real symmetric matrix.
`eigvalsh` (a[, b, lower, overwrite_a, ...])	Solve an ordinary or generalized eigenvalue problem for a complex Hermitian or real symmetric matrix.

If I need eigenvalues and eigenvectors, I will use `eig` and `eigh`. If I need only eigenvalues, I will use `eigvals` and `eigvalsh`. I choose `eigvalsh` in order to save time since I do not need eigenvectors. If I solve for a complex Hermitian or real symmetric matrix, I will use `eigh` and `eigvalsh`, otherwise I will use `eig` and `eigvals`. Here I choose `eigvalsh` because it is more applicable to the problem.

1.2

Yes, I still got the same plots.

2.1

Yes, it find one such separator.

2.2

The final classifier misclassify 8 points. If we keep running the algorithm by cycling through the data, it will not eventually classify everything correctly because data is non linearly-separable data.

3.1

Yes, the number of rows in `df` is the same as `nresults`.

3.2

5 fuel types are available in Ann Arbor: ELEC, E85, BD, CNG and LPG. ELEC is most common among Ann Arbor.