

**Instructions:** In these assignments the goal will be to compare the from scratch processes we looked at in class, to the functionality of built-in functions that perform similar tasks. You should compare the functionality of our custom-built examples and the ability to further customize them, to the functionality of package functions. Describe any limitations of the from-scratch versions and the built-in functions. Run an example dataset through both and compare the results.

**Submission:** Create a Word document that discusses the comparison. Include graphs and explanations here, which package functions you are comparing, etc. With your submission, include your R code file.

**Tasks:**

1. Compare our implementations of ensemble (tree) methods to built in functions for random forest and adaboost (for example: <https://www.rdocumentation.org/packages/JOUSBoost/versions/2.1.0/topics/adaboost>). What kind of functionality is available in the packages? What kind of functionality would require a custom implementation? Compare them on a sample dataset and compare the results.
2. Compare our agglomerative clustering algorithm to the function `hclust()` for hierarchical clustering. Compare the customization options for both and compare the outcomes on a sample dataset.
3. Compare our implementation of K-Means to one of built-in `kmeans()` functions. Compare the functionality and customization options (such as distance metric, initialization options, etc.). Test on a sample dataset to compare results. Time the implementation of the algorithm to see which is faster.