**Unit 9 Assignment**

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IN300: Programming for Data Analysis

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**Python Code and Results**

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**R Code and Results**

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**Java Code and Results**

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**Compare and Contrast Languages**

Java continues to take the most amount of code to perform the same task as the other two languages. I ran into no major issues when writing and compiling it, though. At the end of the day, Java is not a great way to prototype and practice these ML algorithms.

R is still easy to use and does not need any library for this week’s assignment. The formatting of the output is not the easiest to read, however. The Pandas library makes the task easy to accomplish as well. The output from Python is extremely easy to read.

**Decision Tree, Random Forests, and Bagging**

A decision tree is a type of predictive modeling method within machine learning (Yadav, 2019). The concept is similar to a flowchart. Each node checks for a certain feature to be true or false. The code then branches to subsequent nodes until a final leaf is reached. That leaf is the classification or prediction applied to the information input into the model. The decision tree algorithm can be expanded upon to make the random forest algorithm. This algorithm combines many decision trees into a single model.

Random forests and decision trees can be added together with other machine learning algorithms in a process called bagging (Brownlee, 2020). This concept will train a model to use various algorithms and then average the predictions together. This can help overcome shortcomings of individual algorithms.

**References**

Yadav, P. (2019, September 23). *Decision Tree in Machine Learning*. Medium. https://towardsdatascience.com/decision-tree-in-machine-learning-e380942a4c96.

Brownlee, J. (2020, December 2). *Bagging and Random Forest Ensemble Algorithms for Machine Learning*. Machine Learning Mastery. https://machinelearningmastery.com/bagging-and-random-forest-ensemble-algorithms-for-machine-learning/.