An Introduction to Random Forest Models

Created for the Methods Workshop
Spring 2022
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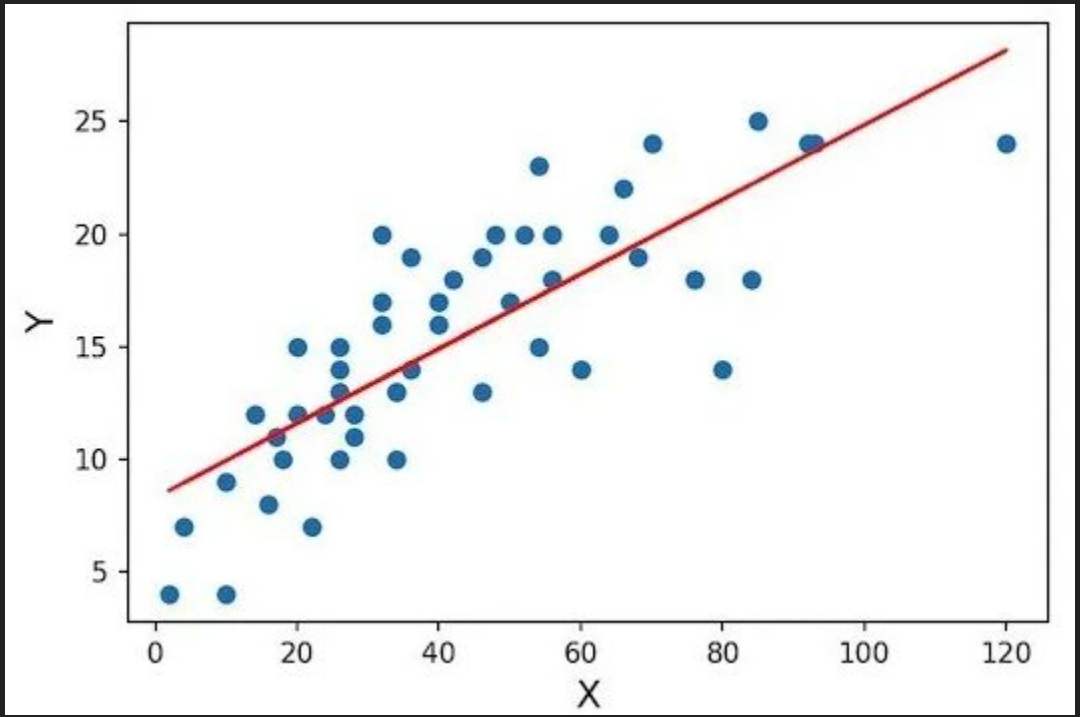
What is the intuition?



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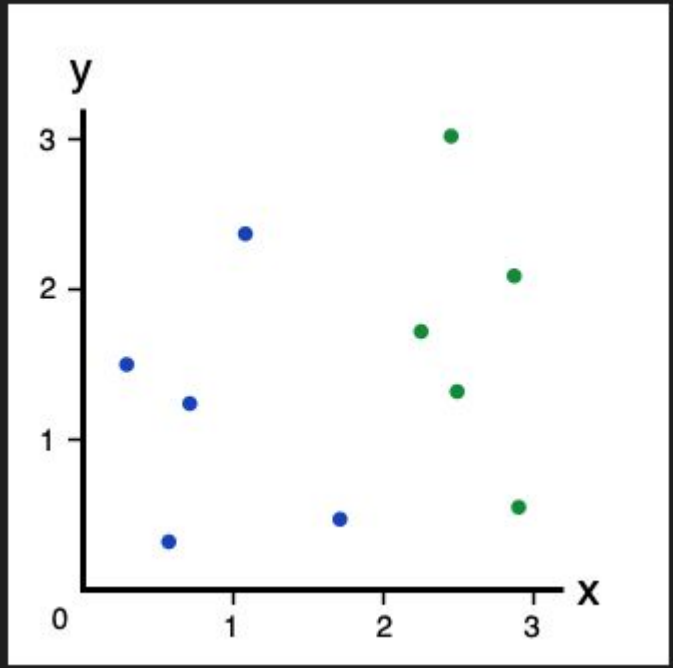

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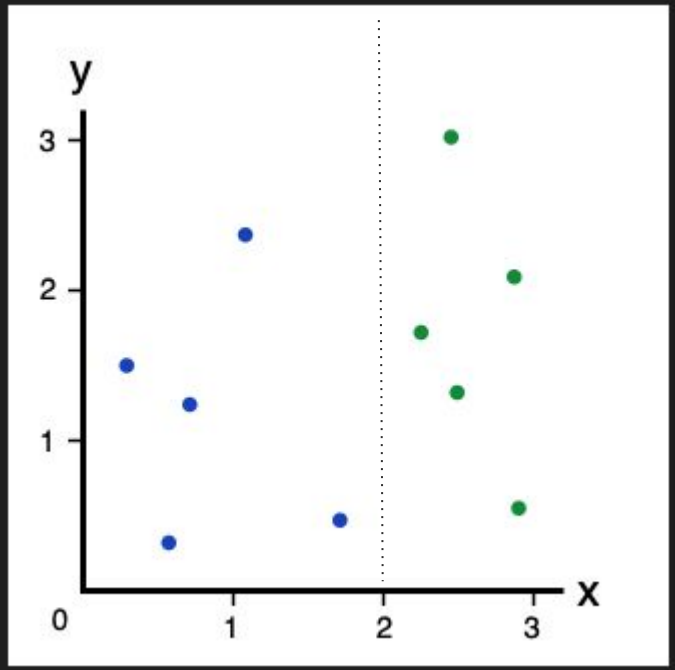
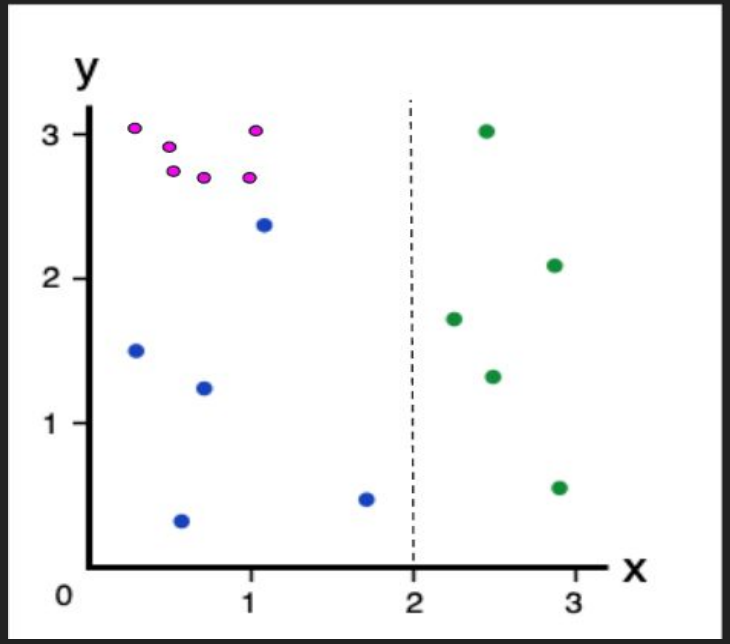
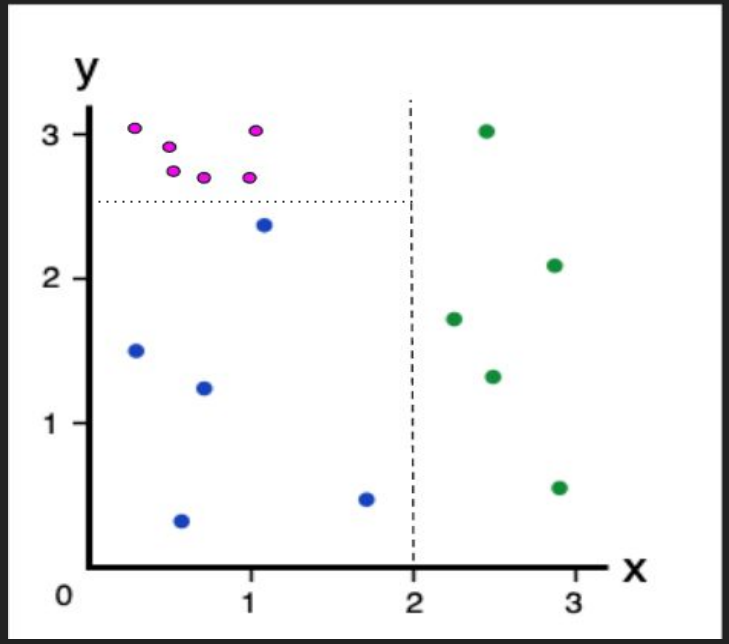
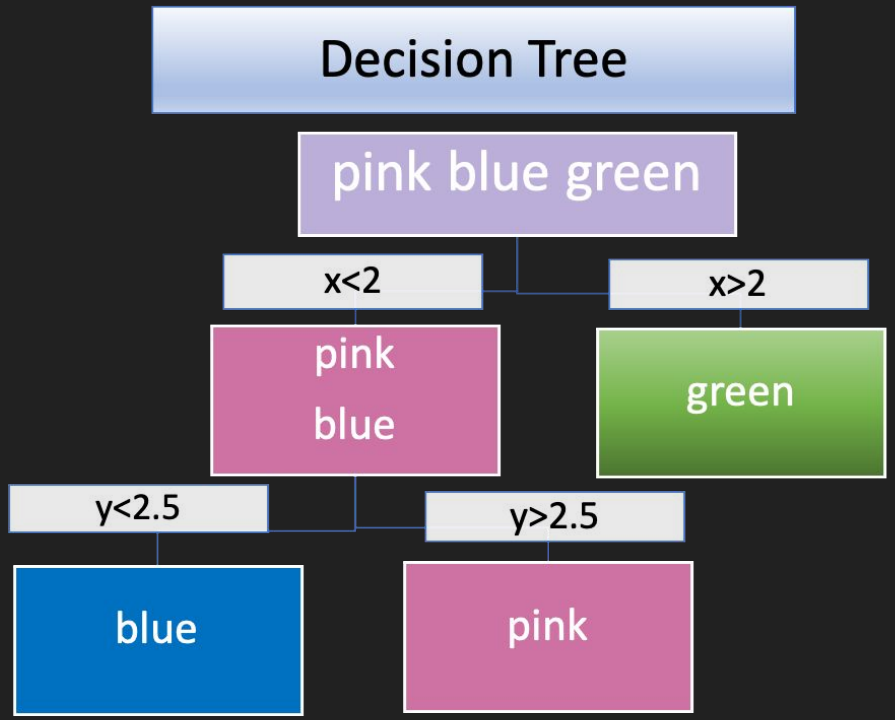


What happens if there are more than two colors now?

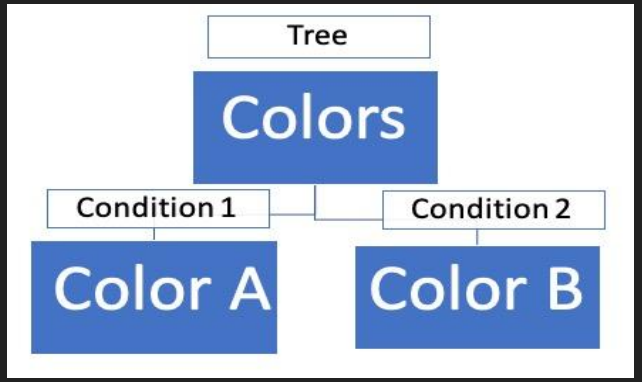


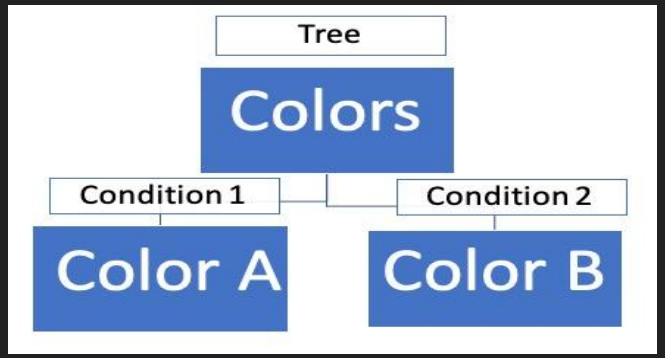


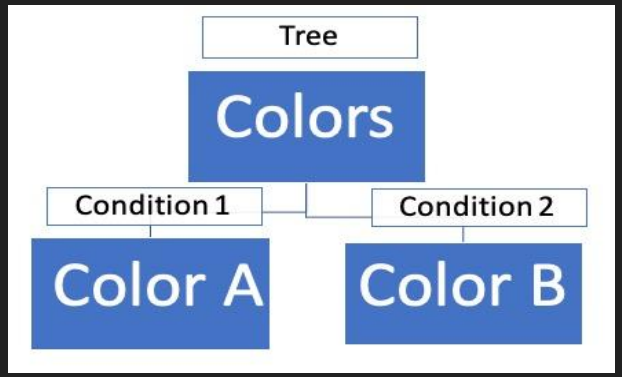
Let’s see that in a decision tree



What about a random forest?



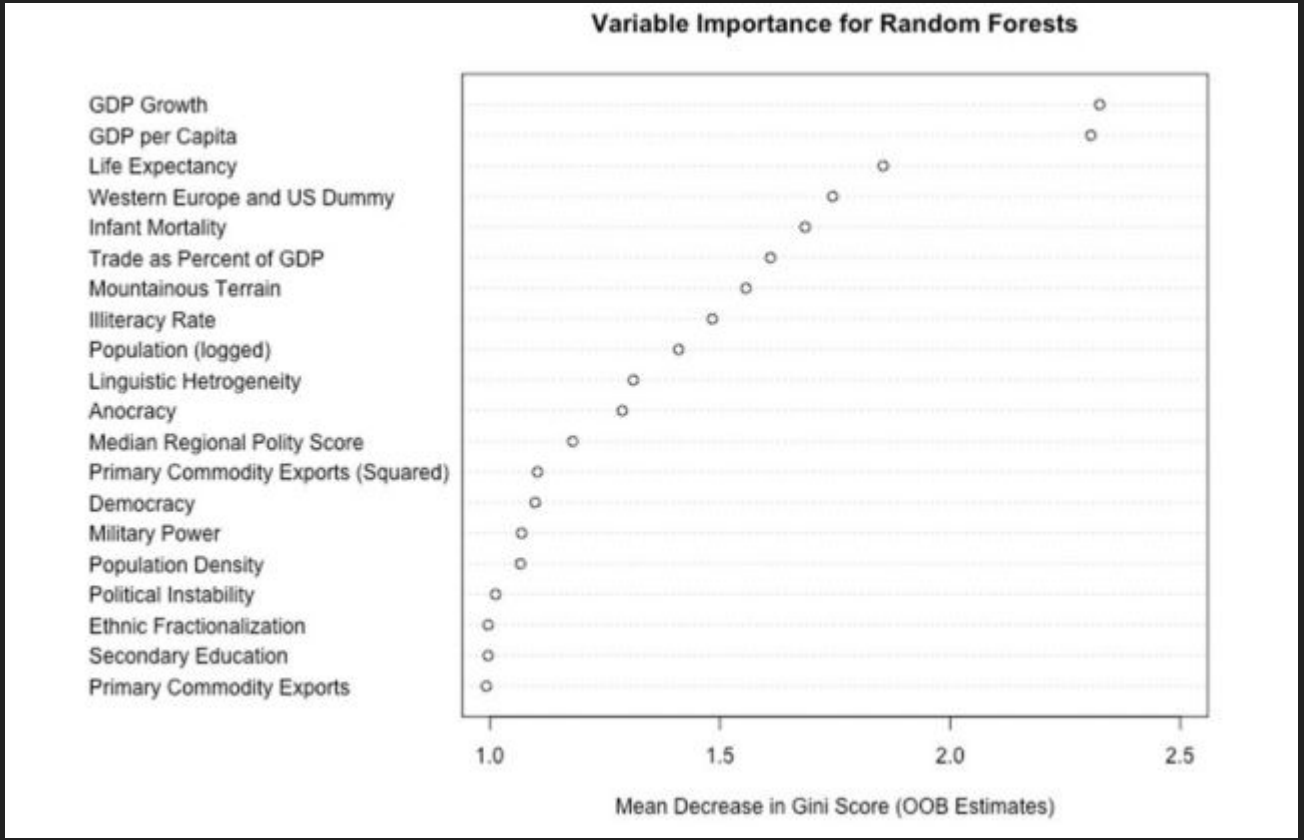




So What? How can I use it in Political Science?

Example: Muchlinski et. al 2017 (Political Analysis)

- *Comparing Random Forest with Logistic Regression for Predicting Class-Imbalanced Civil War Onset Data*
  - Does our theory make correct predictions?
  - Causality v. Predictive Power
  - DV: civil war onset; IV: 88 predictors (Civil War Data)
  - Compare RF against Collier and Hoeffler, Fearon and Laitin, and Hegre and Sambanis
  - How can we tell which predictor is the best?
    - Gini Score (0-1)
    - Variables with greater mean decrease



Variable Importance Plot from Muchlinsky et. al

Steps to conduct Random Forest analysis

- Randomly pick k data points from a training dataset
- Build tree with those data points
- Choose the number of trees (N tree) you want to build and repeat the steps above
- For a new data point,
  - Make each of your Ntree predict Y
  - Assign new data point the average across all of the Y values

Let’s look at a simple example in R

Interested in learning more?

An Introduction to Statistical Learning: With Applications in R

Machine Learning @ JPSM

Machine Learning @GWU

Coursera and other online learning