Small Exoplanet Classification with Machine Learning

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The “radius valley” nicely separates small exoplanets into two groups; super-Earths and sub-Neptunes.

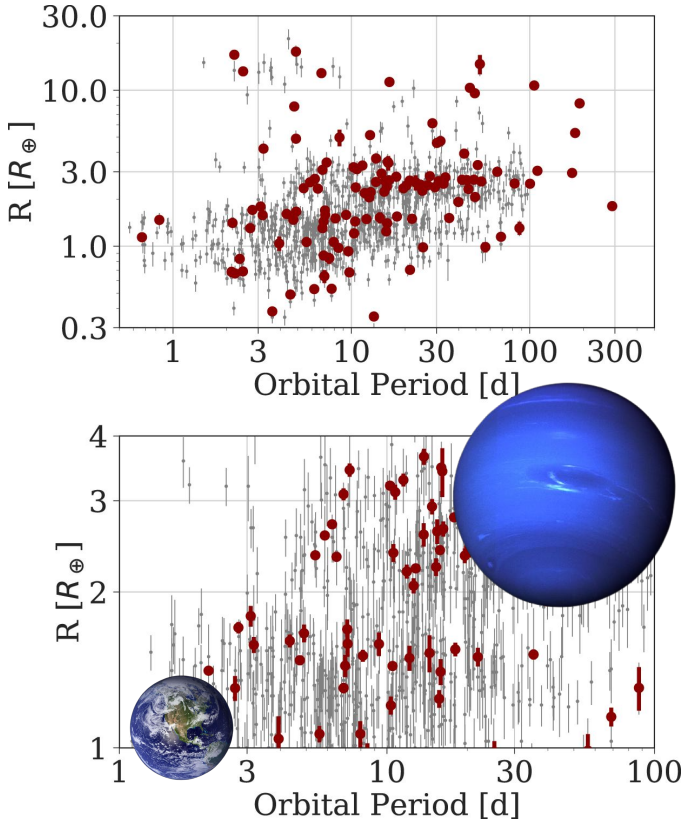
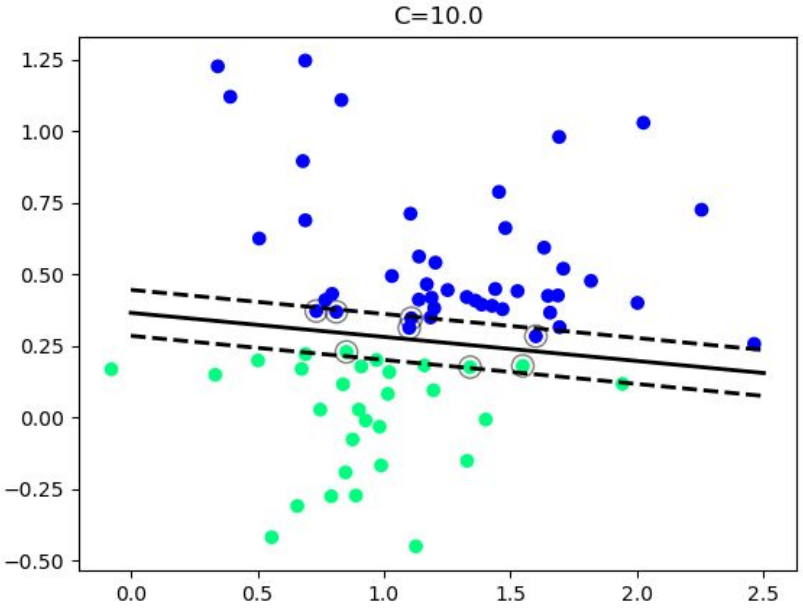


Figure: Van Eylen et. al. 2018

For homework, we used SVM to determine the slope of the radius valley.



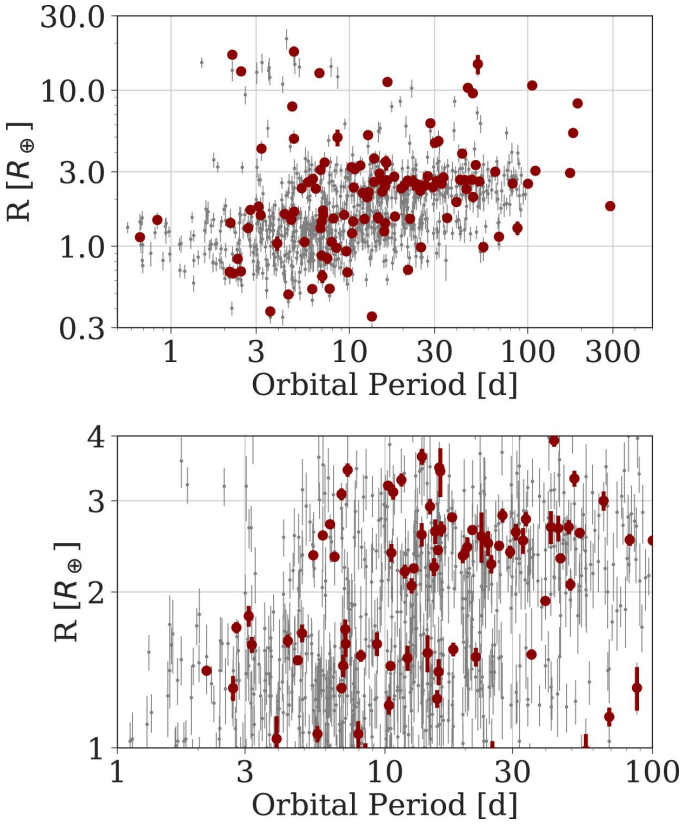


Figure: Van Eylen et. al. 2018

Which machine learning algorithm can most accurately classify small exoplanets in period-radius space?

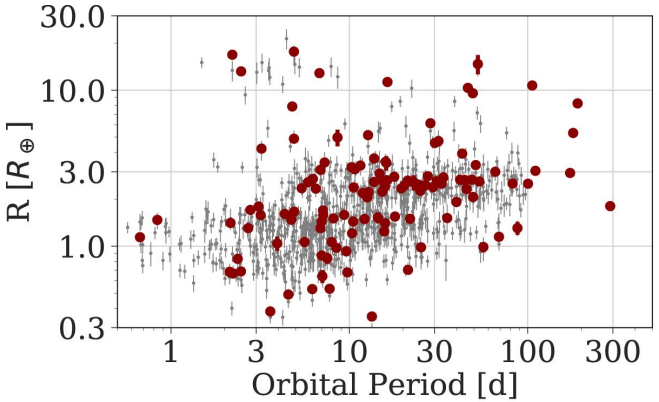
I will use the observations from Fulton et.al. 2017 as the training dataset.

Supervised learning (I can assign labels to the data based on the slope of the radius valley):

- kNN
- Decision Tree

Unsupervised learning (dataset is naturally unlabeled):

- K-means clustering
- DBSCAN



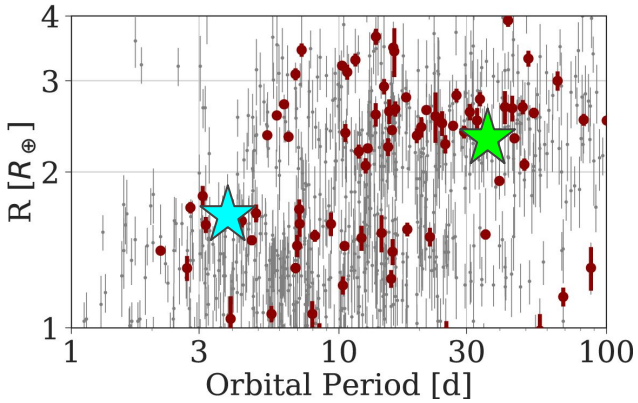


Figure: Van Eylen et. al. 2018