

Application of Machine Learning Methods in Astronomy

Objective:

The main objective of the project is to apply different machine learning methods on astronomical data for classification problems. Compare the performance of different ML methods on the same data. Apply different feature extraction methods to improve the performance of these classifiers.

Method

1. Extract features from light curve data for transient objects
2. Use dimensionality reduction algorithm to select features
3. Apply different supervised and unsupervised methods to classify the transients

Reading Topics & Materials

1. Read about light curves, transients and CRTS :
<https://arxiv.org/pdf/1407.3502.pdf>, <http://crtsc.caltech.edu/index.html>,
2. Features to be used : <http://nirgun.caltech.edu:8000/scripts/description.html>
3. Learn dimensionality reduction algorithms like PCA, truncated SVD etc
http://auajournal.uab.ro/upload/70_1288_14_-_ICTAMI_Latex_Muntean.pdf
(the first few pages will give an overview), Check some of the methods in scikit learn (http://scikit-learn.org/stable/modules/feature_selection.html).
4. Use different supervised and unsupervised ML techniques for classification
(Read basics on Clustering, KNN, Mean Shift, Hierarchical Clustering etc and SVM, K-means, Random Forest etc).