Random Forest applied to JPLUS photometric survey

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JPLUS Survey

Javalambre Photometric Local Universe Survey (JPLUS)

- Observatorio Astrofísico de Javalambre.
- JAST/T80 Telescope.
- 12 filters in the optical wavelength spectrum.
 - Wide, Intermediate and Narrow Band Filters.
- DR1 available since July 2018.
 - Images collected from November 2015 to January 2018



Observatorio Astrofísico de Javalambre (OAJ)

Filter System of JPLUS



Fig. 3. Efficiency curves measured for the set of 12 J-PLUS filters, including the effect of the entire system (sky, mirrors, lenses, and CCD).

Fields Observed by JPLUS (DR1)



Total Coverage Area: 1022deg².

Random Forest in a Nutshell

One Algorithm to Classify and Estimate Numerical Values



How the Model Works



Classification



The Quasar Challenge

Quasars can affect the identification and study of faint stars.

We need to figure out a way to clean the sample as best as possible.













Importance of the features using all the possible colors from JPLUS

QSOs tend to be bluer than most main-sequence stars.

So a bigger difference is expected between colors based on bluer filters for QSOs than for stars.

The algorithm seems to choose "wisely" based on the previous hypothesis.



Color - Color Diagram



Color - Color Diagram

Although this Color Diagram cannot separate between Stars and "other" objects, it does manage to perform a good separation between Stars and QSOs.



Comparison between Lamost & SDSS Models for Teff



Comparison between Lamost & SDSS Models for [Fe/H]







In Summary

- Random Forest has the potential to separate Stars from QSOs with a reasonable accuracy.
- It also offers a good alternative to provide decent estimations of Stellar Parameters (Teff, [Fe/H], Logg) in a reasonable short time.
- More tests are required in order to improve the accuracy of the predictions.
 Better tuning of Models.
- There is a preliminary list of candidates (Extremely Metal Poor Stars) that is being analyzed in order to plan follow up observations and validate the predictions.

Thank You!