LIGHT CURVES Light Curve Analysis - AoV ANOVA

BRIEF



Overview

With most variable stars, a period of variability cannot be measured in a single, night, observation.

Vast majority of light curves are derived from a conglomeration of individual measurements that are "Folded" together to create a "Phase Plot".

When the data is successfully folded into a phase plot, each measurement of a particular magnitude is then added to others at increasing period intervals. For example:

Data point = Initial Point + ((initial point) x (1 x Period)) + ((initial point) x (2 x Period)) + ((initial period) x (n x Period))...



AoV ANOVA Analysis

Develops a periodogram (Plot of period vs. power) by looking for a period within a provided date range that provides the best statistical fit for a phased plot.

- Creates a series of phase plots.
- One plot for every period requested in the analysis period
- This uses the ANOVA algorithm
- "Peaks" emerge with the highest being the most probable to have a period solution
- The analysis rejects a *null hypothesis* which states that only noise is to blame for the signal.





AoV – ANOVA (One-Way Analysis of Variance)

Develops a periodogram (Plot of period vs. power) by looking for a period within a provided date range that provides the best statistical fit for a phased plot.

When a successful period is found, each data point is folded with a period multiplier to create a tight plot



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4



AoV – ANOVA (One-Way Analysis of Variance)

With variable star data, there is variance that is a combination of many things, not just the intrinsic scatter in the measurements: systematic errors, such as different observers using different charts, or maybe having different optical or color sensitivities, and even variations about the mean due to the star's varying brightness.

Sometimes this difference is important, particularly when we want to talk about the *signal to noise ratio* of the data (the amount of signal compared to the amount of intrinsic scatter), so including the real variations isn't appropriate. However, at other times, this measurement of variance is key, particularly if you're using a statistical method like the ANOVA test to find periods that minimize the total variance in the data.



Summary

This presents one method of finding a repeatable period in a variety of data points that are, by themselves, scattered.

ANOVA is a key analysis method used in Peranso and a variety of other software.



Questions?