# Machine Learning applied to temporal astrophysics

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#### **Problem**

- Large temporal surveys = lots of data
- Lots of periodic variables, how do we find them?
- A noisy but correctly folded Light Curve looks similar to an incorrectly folded LC
- Too many types of variable stars to reliably use any fitting metric
- Statistical methods unreliable given the variety of variable stars.

### What we need

- A robust method that can reliably determine a correctly phase-folded periodic variable.
- A method that is independent of LC shape, and quality
- AKA, A reliable False Alarm Probability

Can a neural network solve this?



Phase

**RNN/CNN** 

FAP

## The VVV Survey

- First IR survey of this photometric and temporal depth
- We can't rely on other surveys for too much assistance as we expect many previously unknown sources
- Multiple methods are used to extract
- periods from periodic stars
- 700 million stars, of which ~107 are variable

#### Same star with 5 different methods extracting different periods, how do we know which one is correct?

