

# STATISTICAL ANALYSIS AND DATA MINING

Original Article

## Modeling lightcurves for improved classification of astronomical objects

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### Abstract

Many synoptic surveys are observing large parts of the sky multiple times. The resulting time series of light measurements, called lightcurves, provide a wonderful window to the dynamic nature of the Universe. However, there are many significant challenges in analyzing these lightcurves. We describe a modeling - based approach using Gaussian process regression for generating critical measures for the classification of such lightcurves. This method has key advantages over other popular nonparametric regression methods in its ability to deal with censoring, a mixture of sparsely and densely sampled curves, the presence of annual gaps caused by objects not being visible throughout the year from a given position on Earth and known but variable measurement errors. We demonstrate that our approach performs better by showing it has a higher correct classification rate than past methods popular in astronomy. Finally, we provide future directions for use in sky - surveys that are getting even bigger by the day. © 2016 Wiley Periodicals, Inc. Statistical Analysis and Data Mining: The ASA Data Science Journal, 2016

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