Probabilistic templates for periodic sources

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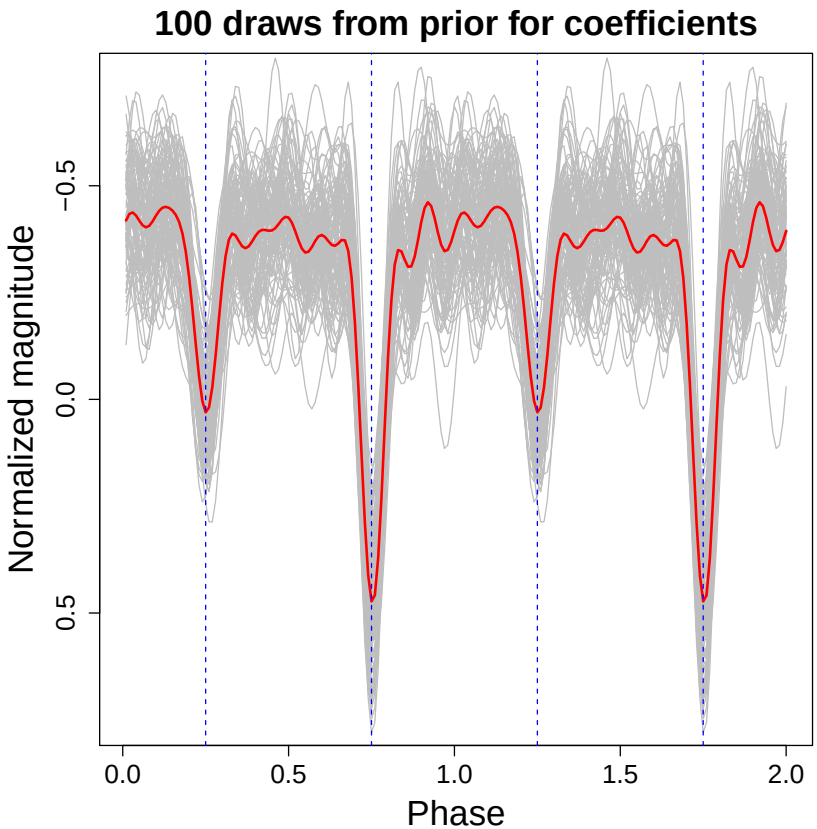
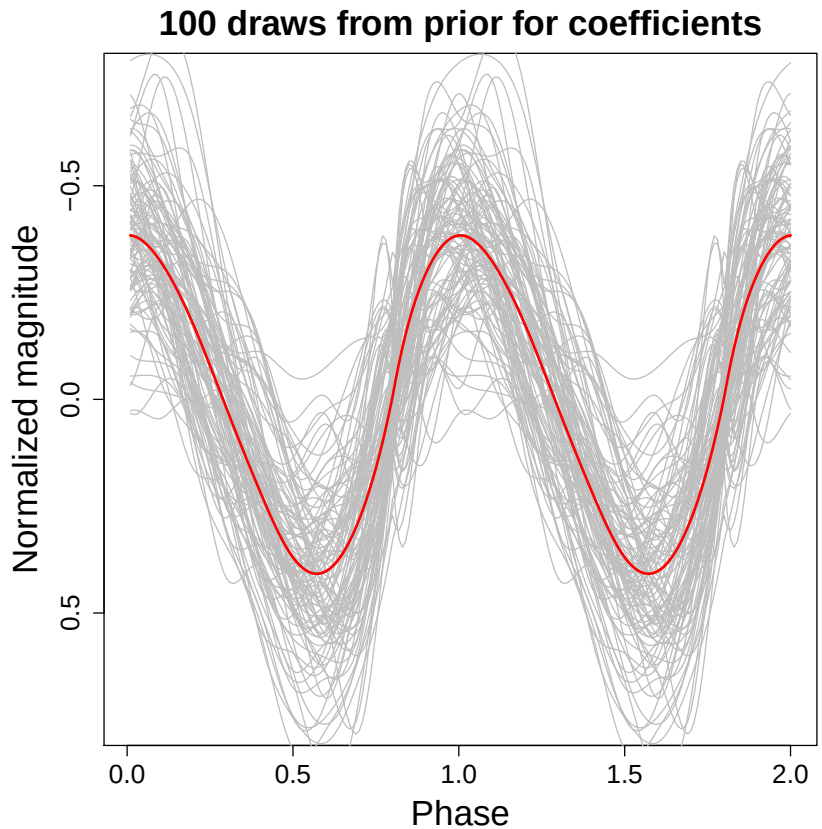
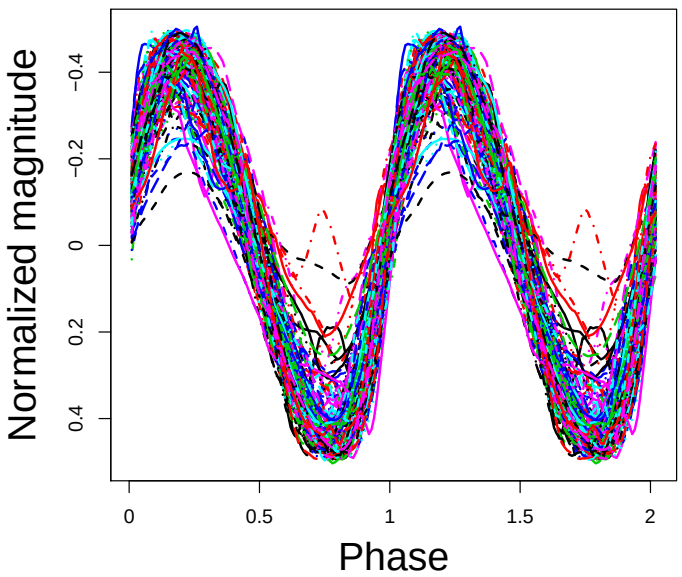
Probabilistic templates for periodic sources

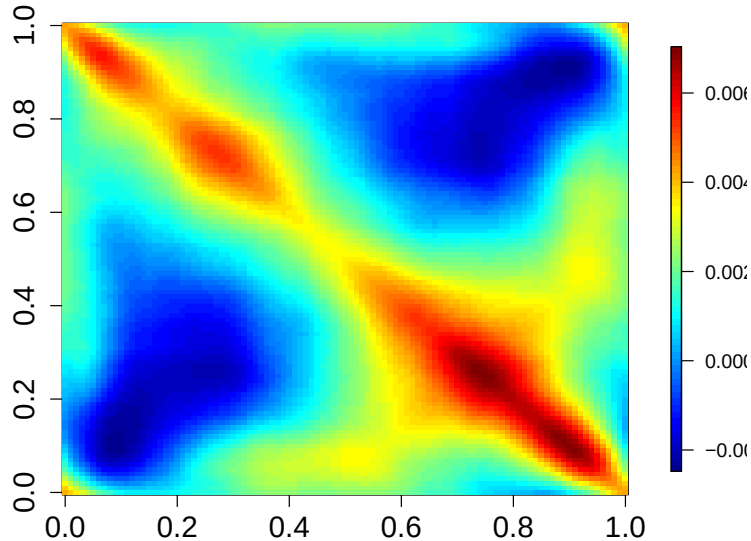
- Catalina Real-Time Transient Survey data - mainly eclipsing binaries and RR Lyrae
- Non-parameteric Bayesian hierarchical model
- Fourier and B-splines bases

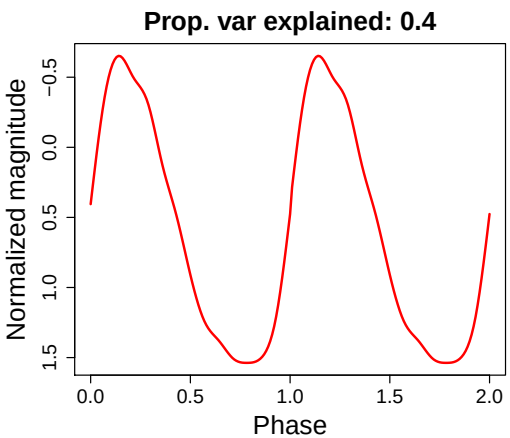


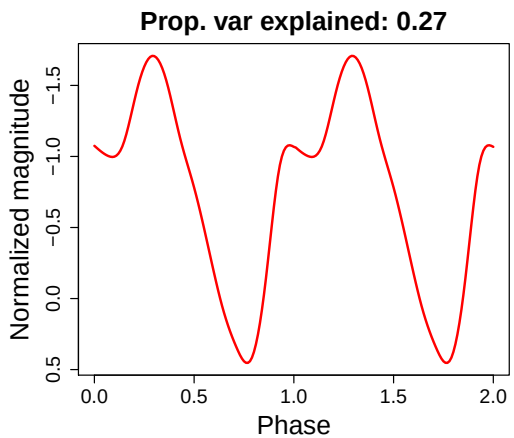


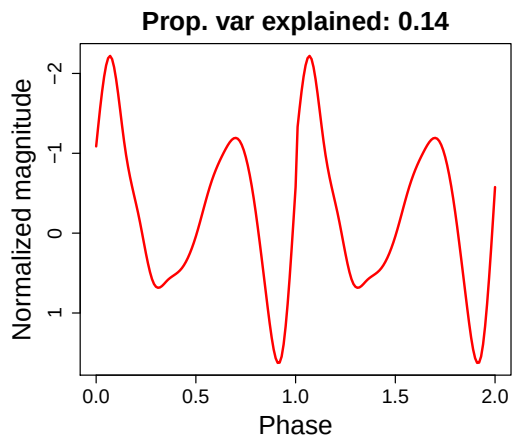
Probabilistic templates using FDA eigen-functions



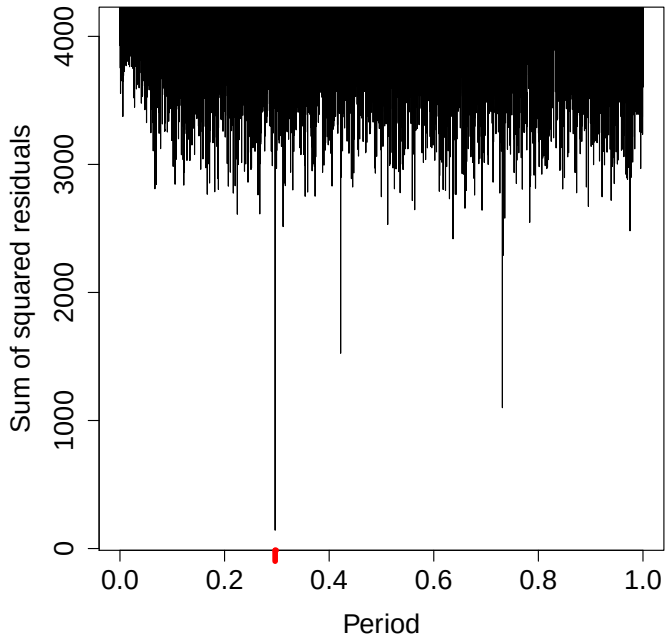


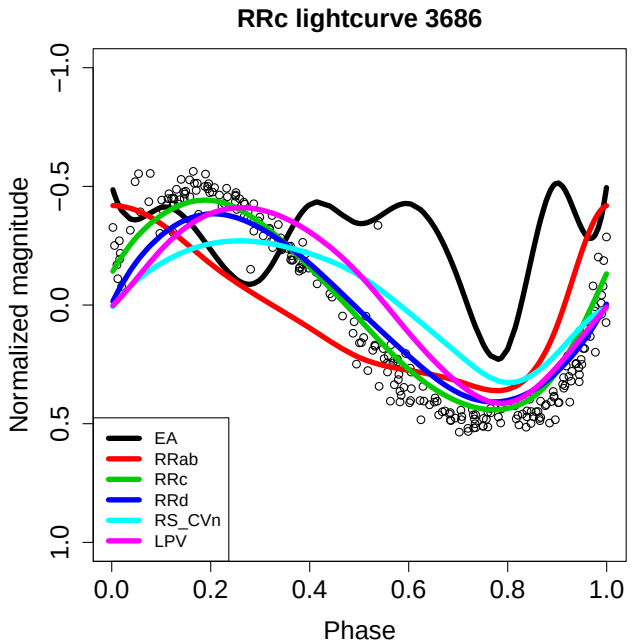


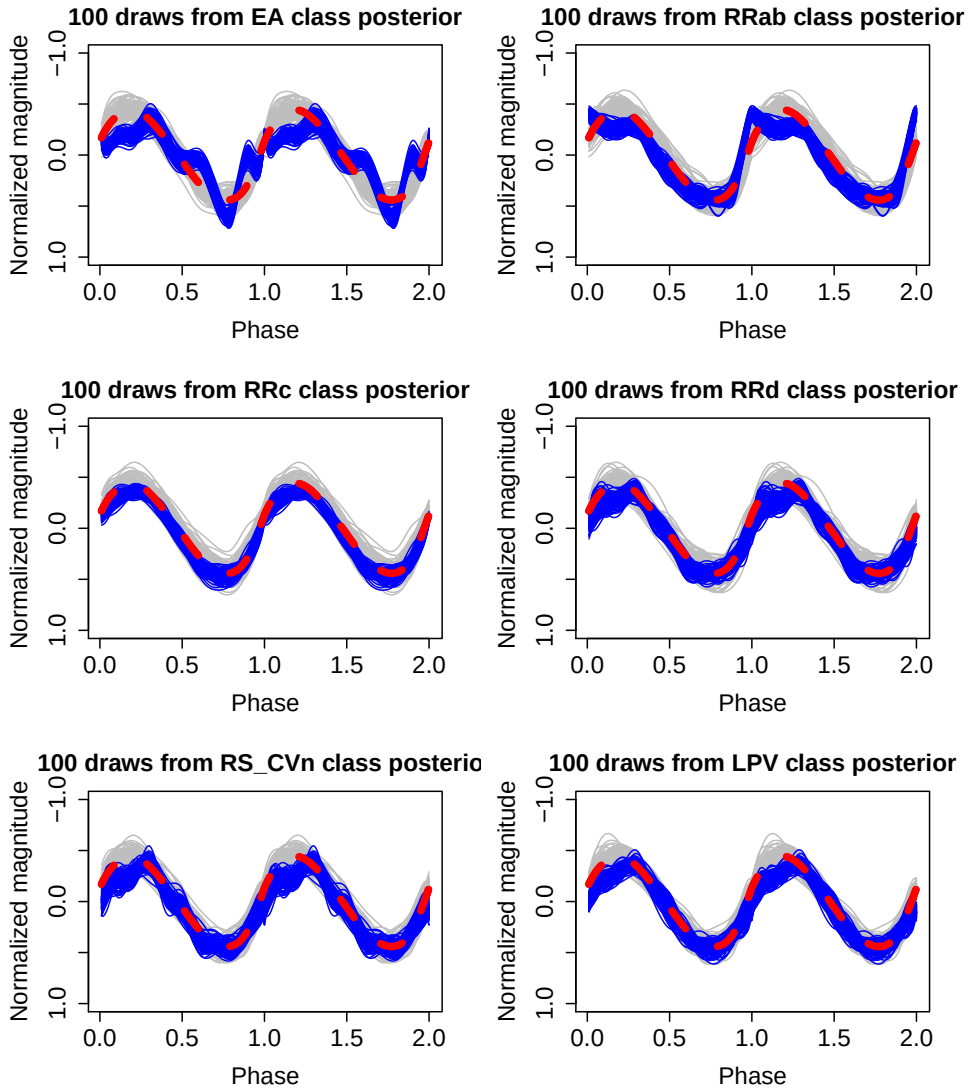




Period finding and classification (ideally joint)



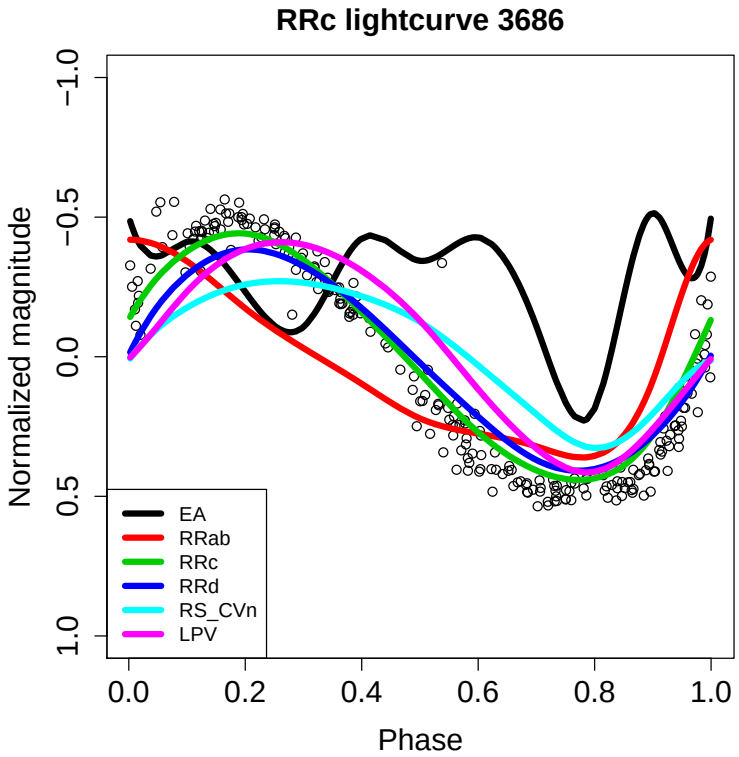


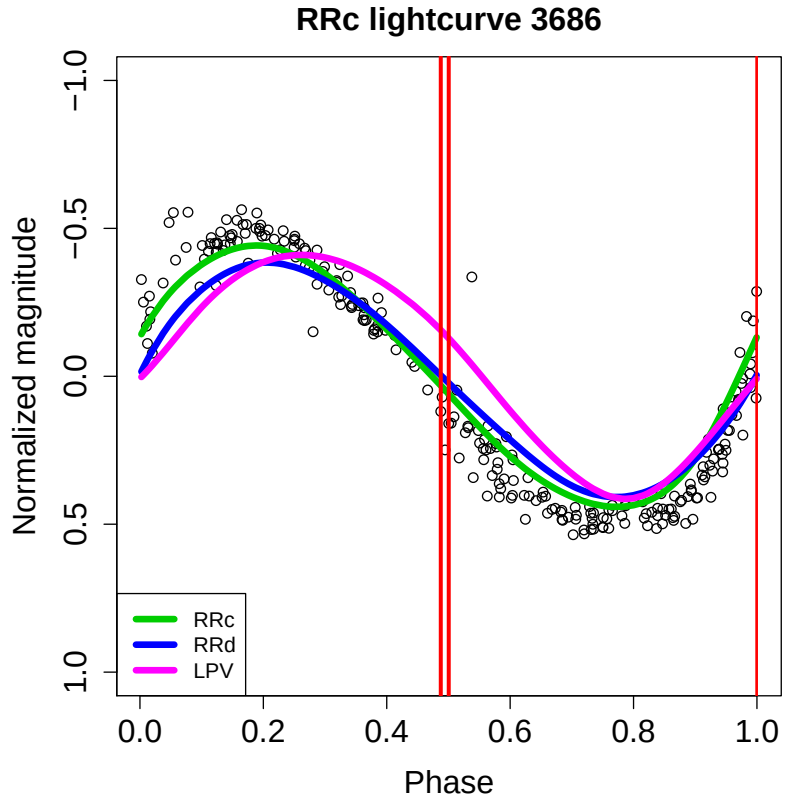


	EA	RRab	RRc	RRd	RS_CVn	LPV
Class prob	0.00	0.00	0.83	0.17	0.00	0.00

Note: not using period priors

Scheduling follow-up observations





Full version will find posterior distribution for

$$\hat{t}_{c_1,c_2} = \underset{t\in[T_1,T_2]}{\text{argmax}} \left| \sum_{j=0}^{(J-1)} \alpha_{lj}^{(C=c_1)} \psi_j^{(C=c_1)}(t) - \sum_{j=0}^{(J-1)} \alpha_{lj}^{(C=c_2)} \psi_j^{(C=c_2)}(t) \right|$$

Questions / Comments

- Use of templates for feature extraction / identification / imputation? Perhaps in multi-band setting.
- Use of bases mitigates dependence among "features". Methods for when features are dependent e.g. projections?
- Feature quality / benefits of reducing to a small number of features?
- Computational issues? In template setting, FDA approach may reduce the number of basis functions.
- What if the lightcurve is not from any of the classes?
- Model misspecification / training set contamination.