Dash: TVS SC data portal for preliminary analysis of the variability data in LSST Data Releases

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Plitvice LSST Workshop, October 2022, Plitvice, Croatia

Ruđer Bošković Institute

- RBI: the largest Croatian research institute
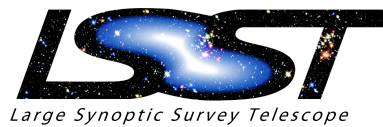- ~500 scientists across all natural sciences

Team

- Postdocs: Alex, Dani, Krešimir
- PhD Students: Marta, Ivan
- Undergrad students: Ivan, Noa
- PI: Lovro

Interests

- Variable stars and transients
- Survey & data science (AI & ML)
- Distance scales and distance determination
- Structure and history of the Milky Way

Collaborations

LSST data infrastructure

Resource	Main Functionality (API included by default)
RSP	- Full access to the LSST DR data (quick for the last DR); - External catalogues access; - Web-based GUI, including plotting tools; - Jupyter Notebooks;
VO-based data portals (NOIR Data Lab, Aladin, etc)	DR and external catalogues data access, cutout services, sky maps, Jupyter Notebooks, etc, within the boundaries set by the VO functionality and bandpasses
Broker Alerts	- Near real time access to the alert data; - Limited access to the DR data; - Periods - LC classifications - Basic visualization tools - VO-based cutout service, catalogue access
IDAC-related portals?	Task-specific web-based interfaces (DR data access, classification, parameter determination, modelling…)
SC-specific portals	- SC-specific catalogue access; - Links/integration with the relevant IDAC portals

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Dash: TVS SC data portal

Main purposes:
- preliminary investigation of variable sources present in LSST DRs;
- provide a convenient access to the science products, developed within TVS SC;
- serve as a gateway for the server-based software tools, developed within TVS SC;

Planned functionality:
- selection tools (ADQL, pre-defined filters, selection on plots, unsupervised ML clustering);
- sample plotting (scatter, density, histograms);
- light curve analysis (summary about the object, periodogram, folded LC plotting, manual adjustment of parameters such as period and zero point, plotting external data etc.).

Desired functionality (depends on the resources and collaboration, based on the suggestions from the TVS community):
- period determination (single/batch LCs, multiple algorithms, tuning);
- model fitting;
- classification of variable objects.

Current status

- In spring, we presented to the members of the TVS SC a joined Dash+OPM (Observing Program Management System, Heidelberg in-kind contribution project) questionnaire.
- Following the questionnaire, a set of interviews was organized.
- In July, the first version of the [Dash SRS document](#) was made available to the TVS community.
- Design specification document is WIP (awaiting for the TVS-customized template).
- Portal layouts development are in development.
- Backend libraries adaptation (lightkurve) is WIP.
- Aspects that need clarification (input welcome!):
    - data rights compliance: RSP's authentification mechanism?
    - hosting & computning resources: who provides this? RSP/iDACs…?
    - who provides periods? Brokers, in-kind teams?
        - A maintained library of (nearly) all period search algorithms would be very useful!
    - Which iDACs are going to provide computing resources for:
        - Period search for LCs;
        - Model fitting;
        - Classification of variable sources?