Product Review

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Recipient Group: Community

Committee Members: Hugo Camacho, Martin Banda, Michel Aguena, Rodrigo Boufleur

Product: Science Server

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Abstract:

The Science Server Portal is a tool that aggregates different services to explore the data produced during the Dark Energy Survey (DES) in its DR1 and DR2 releases. The portal consists of four various tools: Sky Viewer, Target Viewer, Tile Viewer, and User Query. Through these four services, it is possible to list all available releases, release dates, number of datasets, among others. They also allow the user a quick way to view a list of objects, do tile-by-tile analysis, and make queries in a friendly manner. The design of the product is beautiful and provides ease of access and use. The presented product still contained some minor bugs that needed fixes but is fully functional. Currently, the product has process monitoring via e-mail, and updating this procedure is recommended. The presentation was attended by the director of LIneA, the team of programmers who developed the product, the data scientists at LIneA, and this evaluation committee. The meeting consisted of three moments. As an introduction, the host described the product's current status and the lessons learned during development. The host also presented the improvements introduced over time, the actions required to complete this development stage, and the future investments. After the introduction, the product's operation was presented, step by step, visiting each service's functionalities with examples. The host and the supporting team answered questions during the presentation of the services. Finally, the committee expressed its doubts, general opinions, and recommendations.

Findings:

The presentation opened by describing the work dedicated to the project so far. We can divide the introduction into three moments: lessons learned, improvements made, and actions to be taken. At first, it highlighted the fidelity of use to the available services. Also, it stressed the need to maintain the services available locally to avoid interruptions due to third party failures. Besides that, it discussed the need to document better the countless features available. The second point highlighted the corrections already introduced in the product, the production of videos, and the features' optimizations. It also underscored the reorganization of the UIX and the standardization of menus. Another critical element was the implementation and use of

containers to optimize the maintenance and the creation of verification APIs. Finally, it introduced the actions to be taken for the product's release and possible future implementations.

After this introduction, the product was presented in detail, showing all its features. Initially, the landing page and all its resources were presented. Subsequently, each service was explored separately. The tools presented were: Sky Viewer, Target Viewer, Tile Viewer, and User Query. During the product presentation, there was an interaction among presenters, programmers, data scientists, and the commission expressing general doubts and questions. In the end, each committee member and others present expressed their findings.

The product consisted of a scientific platform composed of four main tools. It was developed to explore data made available in databases, in this case, the data produced by the DES collaboration. In the following we describe the functionality of each tool.

The Sky Viewer allows the user to view and browse portions of the sky from a list of available databases. It lists the available releases as well as the release date, the number of datasets available in each release, and the total number of tiles that make up the release. The tool displays catalogs and images, allows zoom selection at different levels, and offers searching by position in the sky. It is possible to superimpose images and catalogs from other surveys, with customization of symbols. It is also possible to use grids, tile outlines, HEALPix grid with dynamic *nside*, and systematic maps in different filters and a color bar customization among the visualization options. It is furthermore feasible to produce a comparison of other releases, side by side. It also offers different options for displaying image contrast. Finally, it offers customization for combining different filters and a profile overlay tool to explore each band's pixel value. It is also possible to generate links with the cutouts generated using the tool for sharing

Target Viewer is a tool that allows the user a quick way to view a given list of objects. This list of objects can be inserted manually using coordinates or by uploading a file containing positions. With this tool, it is also possible to produce cutouts from object selections and produce custom cutouts using specific channel compositions.

Tile Viewer is a tool designed for inspecting individual tiles. It makes it possible to perform a search by entering the tile name or using coordinates. The coordinate search will return the tile correlated with the reported position. There is the possibility to download the image and catalog in different bands associated with the tile. As with the other tools, you can make custom contrast adjustments.

Finally, the User Query tool is a way for the user to make queries in a friendly manner. It allows the user to select the release he wants to search and provides examples of running the queries. It also offers the validation and preview features of the query to be executed. During execution, which can occur in the background, it displays the job running as well as other jobs that have already been completed. A prominent feature is the possibility to view queries executed within the Target Viewer tool automatically.

Comments:

Visually the product is very pleasant, has a modern appearance, and is easy to use. The functionalities are quite complete and allow the user to use the product for different use cases. The product itself is well finished and has an aesthetic consistency conforming to LIneA standards. On its home page, the product credits all funding agencies that support the project. It is also possible to find on the landing page access to information about LIneA, access to video tutorials, and access to a support/contact page. There are, however, no references on how to cite the product, either through acknowledgments or with a specific reference.

We understand that the product is excellent, meets the exploratory analysis's objectives, and meets operation and data provenance requirements. The tool required a long and complex development process, and, in addition to great operational value, it added great value to the big data science development sector.

Recommendations:

Immediate recommendations:
- Share a guide text along with the video tutorials.
- Provide information for the user to know which tables he/she has added as well as the table sizes.
- Provide better-describing tooltips for more complex actions (such as upload a file into the Target Viewer).
- Provide help links to basic manuals about SQL queries (until there is an official guide).
- Notify the maximum allowed duration for a query.
- Provide citation/acknowledgement standards.

Nice to have recommendations:
- Image cutout based on some defined RA, DEC coordinates by manually selecting a region with the mouse.
- Optional RA and DEC axes on the image.
- Side by side images from DES with other surveys.
- Choose the nside of the visualization (given a coordinate one can quickly find out where the pixel is).
- Given a dataset, find out which pixels (from HEALPix) overlap.

Conclusions:

The committee considers that the product is approved for deployment. The recommendations made are about improving the user experience and have no dependence on the operation or

quality of the product itself. The product is stable, fully functional and sufficiently tested and mature to be delivered as presented.

Signature:

Rodrigo Bonfleur