PDS4 has provided an international foundation for archiving planetary science data, as well as a suite of tools and services for providing stewardship and accessibility to that data:

- **High-level Search**: Various APIs have been developed to access collections and bundles, including PDS Search API [1], PDAP[2], etc.
- **Product-level Search**: Various APIs developed specific to archive/discipline. E.g. PDS Imaging Atlas Search API [3]
- **Access**: Multiple libraries exist for accessing and manipulating PDS4 metadata and products in both Python [4] and Java [5].
- **Transform**: Tool developed to enable transformation to common formats. [6]
- **Visualize**: Basic inspection of PDS4 products included in PDS View [7]

### Desired Functional Capabilities

1. High Level Search
   a. Within an archive
   b. Across archives
2. Product-level Search
   a. Within an archive
   b. Across archives
3. Retrieve base products from an archive
4. Transform a PDS4 product
5. Integrate modern data analysis tools
6. Compute on PDS4 products
7. Interactive visualization for PDS4 data products
8. Metadata extraction using ML
9. Indexing on dynamic metadata

### Future

PDS4 and Stewardship Tools and Services have provided initial functionality and the future foundation for planetary data science discovery. Looking forward, the next generation of tools and services can harness the power of PDS4 and focus on the development of user-centric services.

- **Search**: Integrated search of PDS4-compliant federated archives
- **Access**: Return every product, including both labels and data, from any PDS4-compliant archive
- **Transform**: Provide standard library of transformations
- **Compute**: Provide standard processing services (e.g., subsetting, coordinate translation, etc)
- **Use**: Support integration with common tools and frameworks
- **Dynamic Tagging and Indexing**: Further enhance discovery and use of data through auto labeling using machine learning feature detection and classification methods based on PDS4 model

### References


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