CS562: Applied Software Engineering

Project Proposal

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Part 1: Proposal for what to test

I am planning to test part of Astropy library called Data Tables. This enormous library is a community-driven package intended to contain much of the core functionality and some common tools needed for performing astronomy and astrophysics with Python. However, Data Tables (astropy.table) is a support tool within the library that provides functionality for storing and manipulating heterogeneous tables of data in a way that is familiar to numpy users. Here are some of the actions or functions that can be used in this tool:

- Initialize a table from a wide variety of input data structures and types.
- Modify a table by adding or removing columns, changing column names, or adding new rows of data.
- Handle tables containing missing values.
- Include table and column metadata as flexible data structures.
- Specify a description, units and output formatting for columns.
- Interactively scroll through long tables similar to using more.
- Create a new table by selecting rows or columns from a table.
- Perform Table operations like database joins, concatenation, and binning.
- Maintain a table index for fast retrieval of table items or ranges.
- Manipulate multidimensional columns.
- Handle non-native (mixin) column types within table.
- Methods for Reading and writing Table objects to files.
- Hooks for Subclassing Table and its component classes

Now, what I would like to test about this library is making sure that it does what it says. For example in modifying or removing columns, what would happen if we add and delete a column at the same time? Moreover, when adding a huge number of columns and rows what will happen? So, I will basically apply, Stress Testing, Unit Testing, Random Testing and Differential testing to better understand those four types of testing and hoping to find a bug.

The following are the functions I will ensure its correctness:

1- Modify a table by adding or removing columns, changing column names, or adding new rows of data.
2- Handle tables containing missing values.
3- Create a new table by selecting rows or columns from a table.

At least two of the following functions will be tested:

1- Perform Table operations like database joins, concatenation, and binning.
2- Initialize a table from a wide variety of input data structures and types.

3- Include table and column metadata as flexible data structures.
4- Interactively scroll through long tables similar to using more.
5- Maintain a table index for fast retrieval of table items or ranges.
6- Manipulate multidimensional columns.

Finally, if I have enough time by the end of the term, I will test another tool under Astropy called Units and Quantities (astropy.units) that handles defining, converting between, and performing arithmetic with physical quantities, such as meters, seconds, Hz, etc. It also handles logarithmic units such as magnitude and decibel. In this tool, I will test the conversion using aforementioned techniques.

The good this about this library is that it has an open source on github listed in the reference section that allows me to check the code if needed.

References:

1- http://docs.astropy.org/en/stable/index.html
2- http://docs.astropy.org/en/stable/table/index.html#module-astropy.table
3- http://docs.astropy.org/en/stable/index.html
4- http://docs.astropy.org/en/stable/units/index.html
5- http://docs.astropy.org/en/stable/index.html
6- https://github.com/astropy/astropy