(Progress Report)^2

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I - User Manual

Step 1: Open “Main.nb”
Step 2: Scroll down to and evaluate the “interface[]” cell--as well as the initilization cells.
Step 3: Run the examples demonstrating the uses of the helper functions
Step 4: Program is to be functional and interacitve when complete

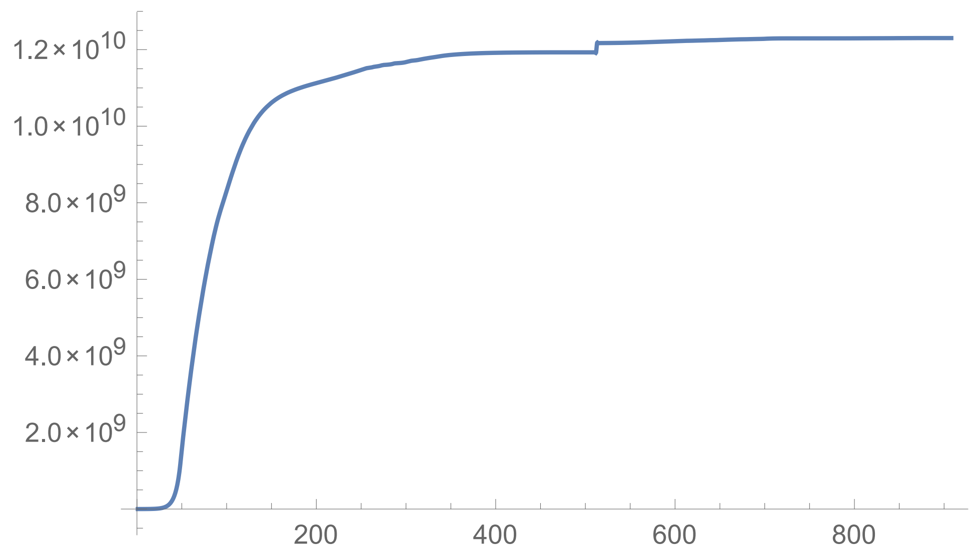
II and III

Both parts two and three can be found in the set of files accompanying this one, since they are basically adaption of previous submissions and we are simply modifying those submissons.

IV - Formulas

Interpolation Across Datasets

Our goal is to create a display that shows a star as a function of time. Our data sets possess a column with the age of the star, and sadly, the values for the age of the star are not lineraly distributed across every row of the dataset. As you can see from this graph of Row Number vs. Age (sorry its not labeled!) there are large gaps of time at the start of the dataset, and and a 2 million year jump in time towards the end:



What this means is that we have to use age as our manipulate value, and we won’t be able to get away with using the row numbers in manipulate. This does pose somewhat of a problem, as row numbers are one of the key ways two dimensional data stores are organized, and are kind of a baseline necessity for most data functions. Add that to the fact that we’re attempting to create a continuous timeline and have to interpolate a lot, and we have a fairly major challenge.

To fix this we’ve written a function that will, once we finish it up, take the parameters of age, a quantity, and a function (generally intended to be the inverse of the function of row number vs age graphed above) and use the input age to determine the approprate row value and then interpolate the specified quantity from said row value. It is however, a work in progress, and we are considering alternative methods of solving this problem that may be more efficient.

V - Files

Star Data

Our project uses text files of data from an online site that provides complex star data for different masses of star (that site can be found here: http://www.astro.wisc.edu/~townsend/static.php?ref=ez-web#Using_EZ-Web). The files are large tables of text readouts. Currently, we’re only working with and using the file for a single solar mass star, beacuse once we get that working we should be able to easily plug in the data for other mass stars. The files are stored next to our project file for ease of access.

VI - Data Organization

Datasets vs. Associations

We started the project with the intent to use datasets to store our data and have built our program to that intent. However, it’s becoming more and more apparent that it may be easier to just use associations and lists, because datasets are inconvenient for display and use and introduce unnecessary conversions. Associations have the added benefit of a key that could be as string that would allow us (humans) to better keep track of what lists hold what data. So after this report, we’re going to switch to that.

VII - Overview

Our code will create interactive diagrams of a star using real data and databases as if the item shown were a real star. It will do this by interpolating data to create a continuous animation of the star’s life. The approach that the code will take is to import the data, transform it into a useful format, create InterpolatingFunctions from this data that is dependent on time, and allow the interface to take values from the InterpolatingFunction based on the time specified by the time slider controlled by the user. Before this the user will choose what initial conditions they want from a selection of presets.

Functions:
interface - The main function that brings the dataset interpolation together with the graphics to be put onscreen. Still in progress.
fancyInterpolate - A function that returns the value of a specified quantity, based on an intput age. Still in progress, and possibly due to be phased out.
connect - a function similar to Riffle, though it returns a 2D list of points. Finished.
alter - a function that creates a series of associations from an input data table. Finished

VIII - Accomplishments

Since the last report we have added to our interface, developed multiple methods for reading database information, and started connecting that data to our interface, primarily focusing on the sphere graphic and text readouts, because they are the simplest parts of our interface and are thus apt for bug-testing the actual connections between the interface and the database. Getting the interface to work as a function of row number is fairly simple, but we need it working as a function of time, and that has proven to be more difficult.