[[1]](#footnote-1)

Visual Representation of a Stellar Catalog(February 2019)

Martin Garcia, marting@smu.edu, Adam Scheerer, ascheerer@smu.edu, and Andrew L. Wilkins, awilkins@mail.smu.edu

*Abstract*—Data from the HYG Database containing all stars in Hipparcos, Yale Bright Star, and Gliese catalogs was implemented into an SQL database for ease of information retrieval. A user interface was then created to visually represent the results of a search query under various search criteria.

*Index Terms*—Stellar Catalog, star catalog, HYG, Hipparcos, Yale Bright Star, Gliese, star data, SQL, space exploration, space technology

# INTRODUCTION

T

HE purpose of this project is to create an intuitive, graphical representation of the astronomical data found within the HYG dataset. This dataset contains extensive information for more than 120,000 stars including their name, magnitude, distance, and color index. Using this information, we can create a user interface that allows the user to query for a specific star or group of stars meeting certain search criteria, and then generate a graphic to more easily visualize the data. Having a graphical representation of stellar data provides much more insight to the inner workings of the cosmos than a sequence of numbers ordered in an extensive database and makes the information contained in this vast database more tangible to the average person.

# RESEARCH METHODOLOGY

The following steps will outline how we intend to approach this problem.

*A.* Download the HYG Dataset and gain familiarity with the attributes contained within.

*B.* Create an ER diagram for the HYG Dataset that contains all of the entities and relationships we will need. We will create a database called “NovaDB.”

*C*. Read in the HYG Dataset and segregate each entry into its appropriate relation in NovaDB.

*D.* Design what the user interface will look like on paper. This may undergo some revisions as we identify other features or elements of the data that we want to represent.

*E.* Design the front end of the user interface with the features identified above in python using relevant libraries.

*F.* Design the back end of the user interface that will query the NovaDB and return the query results for display in the front end.

*G.* Try various search criteria to identify rules that need to be implemented into SQL for domain constraints or debugging efforts needed to make the program run properly.

# PREVIOUS WORKS

Stellar catalogs have been around for thousands of years. Professional astronomers use stellar catalogs and star charts for mapping the galaxy, detecting exoplanets, and various other works in modern day astrophysics. The following are related works in this field:

1) 100,000 Stars[1]

2) Google Sky[2]

3) NASA’s Eyes[3]

4) Online Planetarium[4]

5) Application of Visualization in Space Science[5]

# SCHEDULE

Week 4: Submit project proposal (this).

Week 4-8:

* Complete part A of Research Methodology
* Complete part B of Research Methodology
* Complete part C of Research Methodology
* Complete part D of Research Methodology
* Create Lightning Talk presentation

Week 8: Present Lightning Talk during Live Session.

Week 8-12:

* Complete part E of Research Methodology
* Begin draft of paper

Week 12: Complete draft due.

Week 12-15:

* Complete part F of Research Methodology
* Complete part G of Research Methodology
* Begin final draft of paper
* Begin final presentation

Week 14-15: Final presentation.

Week 16: Submit final paper.

# RESOURCES NEEDED

In order to complete this project, we will need extensive knowledge on how to navigate and utilize the MySQL Workbench, python and its respective packages including but not limited to numpy, pandas, sqlite3, tkinter, and matplotlib.

# QUESTIONS

No questions at this time.

# REFERENCES

[1] Chrome Experiment, “100,000 Stars,” <http://stars.chromeexperiments.com/>

[2] Google, “Google Sky,” <https://www.google.com/sky/>

[3] Jason Craig, “NASA’s Eyes,” <https://eyes.nasa.gov/>

[4] Space Telescope Science Institute, “Online Planetarium,” <https://theskylive.com/planetarium#ra|16.558480412328986|dec|39.14086784897939|fov|80>

[5] He Huan & Meng Xin, “IEEE Xplore Digital Library,” https://ieeexplore.ieee.org/document/4732338/authors#authors

1. [↑](#footnote-ref-1)