**GalFIT Final Project**

**Ammar Malik, Bailey Cross, Ben McColgan & Shah Syed**

GalFIT is a program that uses parametric functions to extract information from 2D images of galaxies, stars, and other astronomical bodies. The light distribution in a 2D digital image of an astronomical shape can be modeled using analytic functions. The inputs to the program have fixed and free parameters that can be adjusted for the best fit of the image. Parameters such as size, luminosity, and profile concentration can be compared to identify the astronomical shape, and the data can be used for other scientific analyses. Two examples given in the documentation include measuring the global morphology by using a single component, ellipsoidal model. A more complicated example is one where a galaxy is taken apart into its constituents to identify overlapping features.

The inputs to the program include a text file with fixed and free parameters and corresponding 2D images. An example of an input file from the user’s guide (Peng) is provided as an appendix. The output files include 2D images and the parameter data file that includes changes to the parameters made by the model. The output would be collected in data files to provide easy access for analysis by the astronomers.

This project is being conducted with Dr. Rose Finn in the department of physics. She and her research students have two projects that they believe would benefit from parallelizing the process of using GalFIT. First, they would like to analyze different solutions that GalFIT produces based on different input parameters. Parallelizing this process will allow her and her team to systematically change parameters and compare the results for a single galaxy for a large range of parameter values.

In the second project, GalFIT would be used to run through thousands of galaxies and provide a large dataset for analysis. Parallelizing the process would significantly increase the dataset and provide more opportunities for scientific analysis of the galaxy dataset.

What constitutes a success for this project?

1. Completing project 1 with changing parameters
2. Fitting lots of galaxies

REFERENCES

Peng, Chien, GalFIT User’s Manual, accessed 11/15/2021, https://users.obs.carnegiescience.edu/peng/work/galfit/README.pdf

APPENDIX

