

Confirmed Exoplanets Data Visualization

Data

The data visualized comes from collected data for confirmed exoplanets, namely their masses, radii, orbital periods, orbital radii, and their host stars. The data is filtered to eliminate planets that are missing values for any properties being visualized. Due to the distribution of the data, values are scaled by taking the natural logarithm. The data was pulled from the following link:

<https://www.kaggle.com/eduardowoj/exoplanets-database/version/1>

Visualization I: Radial Plot

The primary visualization is a radial plot. The center of the plot is a symbolic star, around which each planet is drawn at a distance proportional to its orbital radius and an angle proportional to its orbital period. If the data is filtered further for mass and planetary radius, the planet is drawn with a proportional radius and filled with a color relative to its mass. Hovering the mouse over any planet will highlight it and output its visualized properties in the bottom left corner.

Visualization II: Parallel Coordinates Plot

The secondary visualization is a standard parallel coordinates plot with axes for mass, planetary radius, orbital period, and orbital radius. The ranges of the axes are extended to the nearest half increment beyond the log-scaled range (e.g., if the axis's minimum value were -9.46 and its maximum value were 10.23, the range of the axis would be -9.5—10.5). Hovering the mouse over any data point will highlight all points and connecting lines for the corresponding planet and output the visualized properties in the bottom left corner.

Extension I: Filtering with Buttons

The radial plot includes a button that allows the user to switch between two 'modes'. The default visualizes only orbital radius and orbital period, and the other additionally visualizes mass and planetary radius. Clicking the "Show/Hide Mass and Radius" button effectively filters the data in order to include only planets with valid values for the visualized properties.

In addition, both the radial and parallel coordinates plots include a "Reset" button that allows the user to reset the values of the sliders (discussed below) back to their maximum ranges.

Extension II: Filtering with Mouse Selection

In the default 'mode' of the radial plot, if the mouse is clicked while hovering over a planet, the data will be filtered to include only planets with the same host star, the name of which will be displayed in the bottom left corner. This functionality is not supported in the 'mode' filtered for mass and radius because very few of the planets remaining in the data at that level of filtering share a host star.

Extension III: Filtering with Horizontal Sliders

The radial plots include self-written horizontal sliders that allow the user to filter the data visualized by reducing the maximum value of the property controlled by the slider. This will alter visual properties of each planet remaining in range: for orbital radius and orbital period, the planet's location on the plot; for mass, the planet's color; and for planetary radius, its size.

Extension IV: Filtering with Vertical Ranged Sliders

The axes of the parallel coordinates plot are self-written vertical ranged sliders that allow the user to filter the data visualized by reducing the range of the property controlled by the slider. The minimum value of the range can be increased by moving the lower 'marker' and the maximum value can be decreased by moving the higher 'marker'. The markers will never overlap. Only planets whose properties are within their respective ranges will be displayed.