Layer Analyzing

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Objective

Provide tools for statistical analysis of elements from the Moon to provide more insight about the Moon and the elements that are there.

Background

JPL has created Moon Trek to educate users about the Moon. There are multiple layers available which contain information such as elevation, element concentration, and roughness. Despite its current available information and capabilities, Moon Trek does not allow for statistical analysis of layers and there is lack of visual representation of data. To address this issue, JPL is partnering with California State University - Los Angeles, College of Engineering, Computer Science, and Technology to create an analytical tool consisting of functions that will analyze a single or multiple layers.

Features

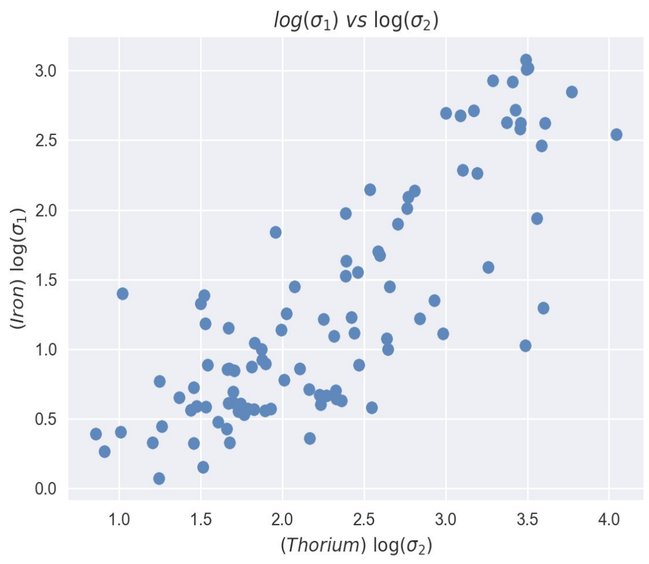
Calculations that may be carried out on the layer(s):

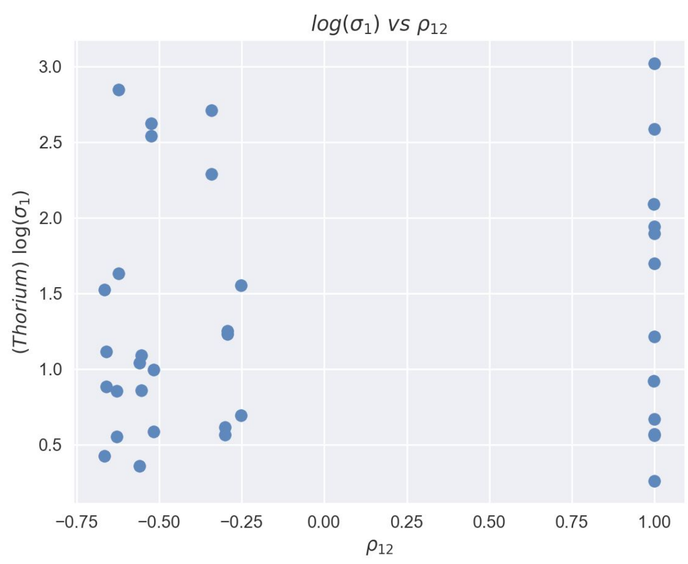
- Minimum
- Maximum
- Average
- Median
- Standard Deviation

Analysis that may be carried out on the layer(s):

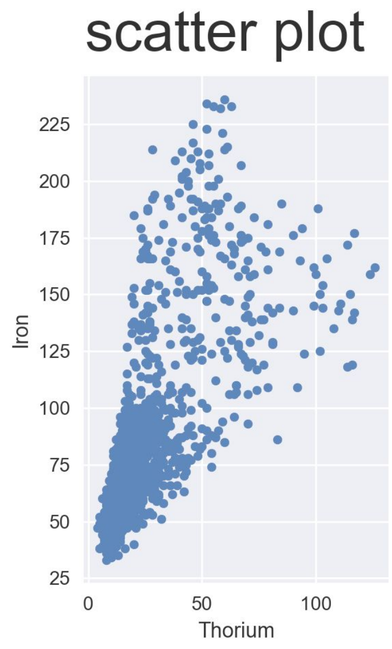
- Correlation
- Covariance
- Clustering

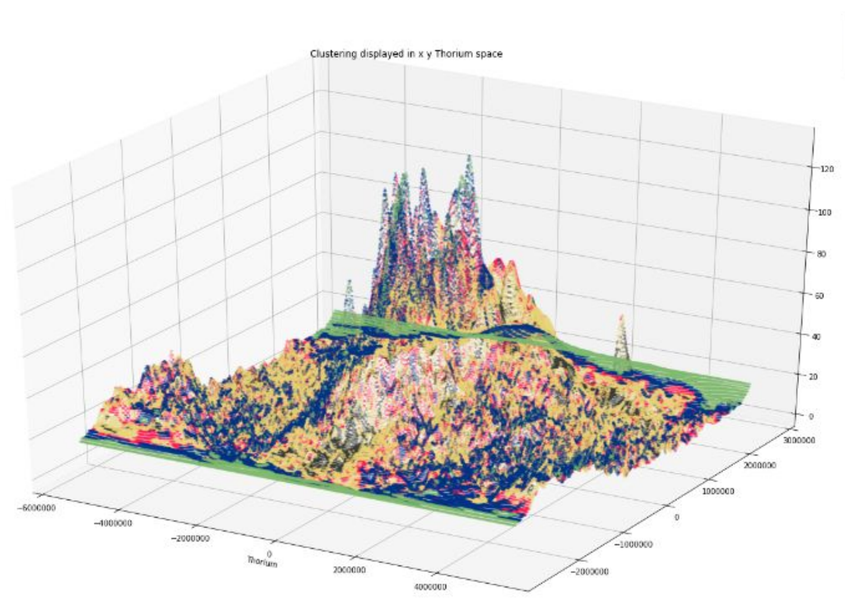
Results





scatter plot





Pipeline

Input

- Tif files
  - Tif files shall have only one band
- xyz files
  - xyz files should have Latitude, Longitude, and Temperature

Preprocessing

- Conversion of tif file to pandas dataframe
- Convert decimal degree columns to latitude and longitude
- Aggregation and normalization
- Fill NaN values with Linear Interpolation

Analysis

- Display Covariance Matrix
- Display Correlation Matrix
- Clustering of different elements

Results

- Visualizing via Scatter Plots
- Visualizing the Covariance Matrix
- Visualizing the Correlation Matrix
- Visualizing via 3d Plotting

Technologies

jupyter · python · NumPy · scikit learn · pandas