Homework 1

Plotly Practices

Total Points: 16
Number of Tasks: 3
Release Date: Wed, Jan 19, 2022 7:00 PM EST
Deadline: Part I: Sun, Jan 23, 2022 11:55 PM EST
Part II: Tue, Jan 25, 2022 11:55 PM EST

Contact help: Rajath Jayashankar (rajath.jay@rutgers.edu), Haoyang Zhang (hz333@scarletmail.rutgers.edu)

Homework Description

This homework is about "*Plotly Practices*". You have two tasks to complete before the due date. This is an individual assignment. Before you start, we highly suggest you reading the document Plotly Python Open Source Graphing Library.

Grading

Part I: Task 1: 8 points
Part II: Task 2: 4 points
Task 3: 4 points

Tasks:

1. **Plotly Scatter Plot Practices**: Modify `scatter.py` to visualize `asoiaf_nodes_prop.csv`. You have 8 sub-tasks:
   a) Use column `pagerank` and `betweenness` as x and y coordinate for each point respectively, and rename the y-axis title as "betweenness centrality".
   b) Use logarithmic scale on x- and y-Axis.
   c) Encode column `peel` by points' color, and use color scale `Turbo`.
   d) Encode column `degree` by points' size, and scale sizes using `sizeref` to make points more visible.
   e) In tooltip, show `name`, `degree`, `peel`, `diversity`, `pagerank` and `betweenness` for each vertex.
   f) Enable scroll zoom.
   g) Set left-click dragmode as panning.
   h) Add a range slider and selector for x-axis.

   Please submit your script named "`HW1_<YourNetID>_scatter.py`", and a screenshot of the resulting scatter plot named "`HW1_<YourNetID>_scatter.png`".
2. **Plotly Tree Map Practices**: In this task you will first build a simple decision tree based on properties in `asoiaf_nodes_prop.csv`, and then visualize the decision tree with Plotly.
   a) Given all vertices in `asoiaf_nodes_prop.csv`, compute the `mean` and `standard deviation (std)` of their `degree`.
   b) Prepare buckets of …, `[mean - 3 * std, mean - 2 * std)`, `[mean - 2 * std, mean - std)`, `[mean - std, mean)`, `[mean, mean + std)`, `[mean + std, mean + 2 * std)`, … Partition all vertices into those buckets. This gives you the first level of the decision tree.
   c) In each bucket, compute the **local** `mean` and `standard` deviation of their `peel`, and partition locally to get the second level of the decision tree.
   d) Similar to step c), use `pagerank`, `diversity`, and `betweenness` as the criteria for Level 3, 4, and 5 respectively.
   e) Visualize your decision tree with Plotly `treemap`.

   Please submit your script named "`HW1_<YourNetID>_treemap.py`", and a screenshot of the resulting tree map plot named "`HW1_<YourNetID>_treemap.png`".

3. **Plotly Barycentric Representation Practices**: In this task you will visualize `asoiaf_nodes_prop.csv` with Barycentric Representations.
   a) Normalize each property P for each vertex v by $\frac{v[P]-\min(P)}{\max(P)-\min(P)}$, where v[P] is the P value for vertex v, and min(P), max (P) are the range of P for all vertices.
   b) Use `scatter_ternary` to plot vertices. Use `degree`, `peel`, and `diversity` as the three axis coordinates. Represent `pagerank` as point size, and `betweenness` as point color.

   Please submit your script named "`HW1_<YourNetID>_Barycentric.py`", and a screenshot of the resulting barycentric plot named "`HW1_<YourNetID>_Barycentric.png`".

GOOD LUCK!!!