Rollercoasters HiMCM Practice

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Problem Statement

Current rollercoaster rating/ranking systems are extremely subjective as they are based on the opinions of those rating them, and their preferences.

This means that roller coaster rating/ranking systems are not objectively helpful because they cannot appeal to the majority of people.

Obtained from https://media.cnn.com/api/v1/images/stellar/prod/190705153928-millennium-force-rollercoaster-004.jpg?q=w_1110,c_fill

Problem Statement cont.

- We were given the task of creating an objective and quantitative algorithm for ranking roller coasters based on data about the coasters themselves.
- We were then asked to create a list of the top ten roller coasters in the world using our algorithm.
- In this problem, we only considered operating roller coasters that are not family, kiddie, bobsled, or mountain-type, as those roller coaster would not have the data used

Assumptions

- The top ten roller coasters are the coasters that are the most enjoyable to the greatest number of parkgoers
- The average values in this dataset display the roller coaster that achieves this goal
- Due to time constraints the dataset was reduced to include just roller coasters in North America
- Geographical location should not be taken into account
- Duration of the ride was not taken into account due to time constraints, and issues with Excel
- Whether or not a roller coaster has inversions or not is not necessary, and the number of inversions variable completes the same function

Obtained from https://media.hswstatic.com/eyJidWNrZXQiOiJjb250ZW50Lmhzd3N0YXRpYy5jb20iLCJrZXkiOiJnaWZcL3JvbGxlci1jb2FzdGVyLXVwZGF0ZTguanBnIiwiZWRpdHMiOnsicmVzaXplIjp7IndpZHRoIjo4Mjh9fX0=

Variables

- Height (ft)
- Speed (mph)
- Length (ft)
- Number of Inversions
- Drop (ft)
- G-force
- Vertical angle

Obtained from https://cdn.britannica.com/95/166395-050-37165D6F/Roller-coaster-Six-Flags-Magic-Mountain-Valencia.jpg

Approach

- Given that we are taking a utilitarian approach, we can only use objective data from the dataset and outside sources (no rider reviews)
- The roller coaster closest to the average in the dataset will be the most enjoyable to the most people
  - Not too tall/not tall enough
  - Not too fast/not fast enough
  - Etcetera

Method/Algorithm

1. Take the average value across all 174 roller coasters for each of our variables
2. Find the standard deviation across all 174 roller coasters for each of our variables
3. Calculate the z-score for each variable in each roller coaster, leaving values blank if the variable does not exist in the dataset
4. Calculate the average z-score for each roller coaster and sort the roller coasters from lowest to highest average z-score
5. The roller with the smallest z-score is the objective best roller coaster

Solution

Obtained from https://guidetosfot.com/wp/wp-content/uploads/2015/12/doubleloops.jpg

Shock Wave	0.1583952
Patriot	0.283765
Wicked Cyclone	0.3149679
Manta	0.3399527
Hades 360	0.3545185
Joker	0.3578813
Outlaw Run	0.3799016
Apocalypse	0.3890371
Gemini	0.3996956
Full Throttle	0.4049608

Future Work

- Including duration as part of the calculation
- Recalculating average values using coasters across the world
- Filling in blank data with online data where possible
- Compare our rating systems to other systems used to look for similarities and differences
- We would create an app using our ranking system to take in user input to adjust the results (i.e. intensity, inversions y/n, max G-force, etcetera)

Questions?

Citations

- Marden, D., Callen, D., Sailors, D., Canfield, V., Engelen, R., Heiman, R., Marden, D., Munch, R. W., Pantenburg, M., Sakowski, E., Scheinin, L., Marr, M., Garvanovic, J., Valt, M., Michelson, H. L., & Bannister, R. (2024). *Random Roller coaster*. Roller Coaster DataBase. https://www.rcdb.com/
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