Team Big Data

U-tification

DAR Report
Maps API

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Git Repository: https://github.com/JosephArmas/cecs-491A-Team-Big-Data

Version	Date	Author	Changes
3	12/11/2022	Frank Curry	Adjusted Technologies. Added weights to Metrics.
2	12/10/2022	Frank Curry	Added versions numbers for all technologies. Added new metrics. Updated Discussion. Updated References.
1	11/28/2022	Frank Curry	Initial Draft

Technologies:

1. Google Maps Platform | Version 3.50
2. MapLibre | Version 2.4.0
3. Mapbox | Version 2.11.0
4. Esri ArcGIS | Version 4.25

Metrics:

1. Total amount of markers
2. Map load time
3. Pricing
4. Data Rate Limit
5. Custom markers
6. Pop Ups
7. Street names and parks
8. Panning
9. Bound limit
10. Marker interactivity
11. Zoom limit

Introduction

The problem is that we need a map to display one of our key features. The litter map needs a map in order to function. The time required to design a map API will take too long to complete within our project plan. The technologies chosen were selected because of their reputation and wide spread use.

Technologies/ Metrics	Google Maps API	MapLibre	Mapbox	Esri ArcGIS
Total amount of markers (1.2x)	Unlimited [4]	Unlimited [4]	Unlimited [4]	30000 [1]
Map load time (1.1x)	300 - 500 ms [4]	1 second [3]	1 second [3]	3 Seconds [1]
Pricing (USD) (1.0x)	0.007 [3]	0.0 [4]	2.50 [2]	500 per year [1]

Data Rate Limit (1.1x)	30000 [2]	100000 [4]	100000 [4]	? [1]
Custom Markers (1.0x)	True [1]	True [1]	True [1]	True [1]
Pop Ups (1.0x)	True [1]	True [1]	True [1]	True [1]
Street names and parks (1.0x)	True [1]	True [1]	True [1]	True [1]
Panning (1.1x)	True [1]	True [1]	True [1]	True [1]
Bound limit (1.1x)	Implementation Defined [1]	Implementation Defined [1]	Implementation Defined [1]	Implementation Defined [1]
Marker Interactivity (1.2x)	Text, button, image [4]	Text, button [2]	Text, button [2]	Text, button, image [4]
Zoom Limit (1.1x)	0 - 22+ (591657550.500000) - (1128.497220) [2]	0 - 22 (?) - (?) [1]	0 - 24 (73551.136 meters/pixel) - (0.018 meters/pixel) [4]	0 - 23 (591657527) - (35.2655368) [3]
Total	26.6	25.2	26.5	17.7

Each of the pricing is per 1000 users that have loaded a map and is for the first 100000 users in a month.
Valuation was determined 1-4 with 4 being the best option and 1 being the worst option for each metric. The weights were determined by how important they are to make our application work. The score each metric gets is inside of the brackets "[]".

Discussion
Google's pricing, although labeled as 0.007 is actually free for the first 28,000 users using the map. This is due to Google having the first 200 dollars of credits be free for each month.

For Mapbox there is noticeable lag at 500 markers without a map. There is subtle lag between 300 - 450 markers. Load time for the markers was low but that may be because I was not loading a map.
AWS' maps from appearances look to provide similar experiences to the others. However, AWS allows for multiple ways to render the map. The service itself does not necessarily render them, it rather, outsources them to different libraries. This has benefits however it uses react. Amazon web services allows the use of the Mapbox coding for the interactive map.
Esri ArcGIS has a sample of how the map would look. Using the map, which is likely in an ideal condition. While the map load time took 3 seconds to render the marker load time took 1 additional second after the map had loaded. Since the Esri ArcGIS is not as flexible of an API as the others, and it is more limited in terms of providing memory it is likely less fit for our application. ArcGIS also does not provide a data rate limit from their website or even secondary sources.
The Zoom Limit is a bit difficult to completely define. Each API has their own way of defining the zoom level. For all the metrics that are true, there was no easy way to differentiate each of the features. Some of them can't be adequately quantifiable, like popups, panning, or custom markers, they either have them or they do not. For the bounds they are similar, they either have them or not, but they can be defined by the developer to anywhere on the map.
The unlimited number of markers fits within what we are looking for in the number of pins. Although the lag was noticeable, none of the other features like planning and zoom were working fine.

Conclusion

MapBox pricing is what brings down the effectiveness of the API as the cost is greater than any of the other APIs. MapLibre is a derivative of Mapbox, but it is free and open-source. It still relies on Mapbox API to get all of its functionality, so Mapbox would be the better choice, it is also more updated. Esri ArcGIS does not match the same levels as other technologies and may not provide what we need in a publicly available interactive map. Google Maps API looks like the preferable choice to use in our application. While the data rate limit is lower than its contemporaries it still provides an adequate amount of data that can be used for our needs.
The Google Maps API crucially provides the images for the popups which narrowly puts it ahead of Mapbox.

References

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