Design & Implementation of 2 Visualisation Systems for Hiking Trails Data

The Residuals

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# Video Demonstration

Video demonstration of each visualisation system can be found at the following link.

**The Zebra System:** link

**The Giraffe System:** link

# Data Set Description

The Washington Hiking data set contains data on hiking trails in Washington State. The data set comes from the Tidy Tuesday community repository [1] and can be found at <https://github.com/rfordatascience/tidytuesday/tree/master/data/2020/2020-11-24>. It was obtained by scraping the Washington Trails Association website in November 2020 [2], however the data set is offline. The data set type is a 2-dimensional table, with static availability. The data item is a hiking trail, which is specified by name. The data attributes are location, length, gain, highpoint, user rating, and trail features. Hike trail description is of text data type [3].

|  |  |  |
| --- | --- | --- |
| Attribute | Attribute Type | Ordering Direction |
| location | categorical | - |
| length | quantitative | sequential |
| gain | quantitative | diverging |
| highpoint | quantitative | diverging |
| features | categorical | - |

Table : Classification of Data Attributes

# Visualisation Objectives

The main audience of the visualisation system is a beginner hiker visiting a national park in Washington State. The beginner hiker does not have a particular hiking trail in mind, and they would like to identify which one to take. The hiker would like to browse the available hiking trails at glance or look up which hiking trails have the attributes they are interested in.

The main outcome of the data visualisation is for hiker to know the name of the trail they want to hike. The target attributes are length, gain and highpoint. For example, the hiker might like to know which trails are the shortest or provide the highest peak. The combination of these attributes is relevant, for example high gain relative to short length would be challenging.

Hikers might also be interested in additional attributes, such as user rating. Rating should be conveyed by colour or size. In this way, hikers could also explore correlation between these attributes. For example, they could discover that trails with high gain are lower rated and avoid them intuitively. Lastly, the system could summarise facts about the region or trail features.

# System Implementation

The visualisation systems are named the Zebra System and the Giraffe System. Both can be viewed in the program code, which can be found in the accompanying folders **zebra.zip** and **giraffe.zip**. For demonstration, see Video Demonstration.

# Design Comparison

[6 decisions, 100 words each]

# User Evaluation

[400 words, data in Appendix A]

# Future Work

[100 words]

# Appendix

Table : Participant Demographics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Participant | 1 | 2 | 3 | 4 | 5 |
| Age | 21 | 23 | 25 | 24 | 24 |
| Gender | Female | Female | Female | Male | Male |

Table : Evaluation of the Zebra System

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Participant | 1 | 2 | 3 | 4 | 5 |
| Select region | Yes | Yes | Yes | Yes | Yes |
| Longest trail identified | No | Yes | Yes | Yes | Yes |
| Highest highpoint trail identified | Yes | Yes | No | Yes | Yes |
| Relationship between length and trail | None | None | None | None | None |
| Able to choose trail that interests them | Yes | Yes | Yes | Yes | Yes |
| Overall rating | 5 | 4 | 4 | 3 | 3 |
| Likes | Straightforward layout | Units of measurement clearly displayed; not too many data points displayed |  | Simple to read information on length and highpoint |  |
| Dislikes |  |  | Requires concentration; When choosing a hike I care more about views; Could be confusing to people not used to this visualisation | Little other information to help choose hike | Dots are too small and hard to select |

Table : Evaluation of the Giraffe system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Participant | 1 | 2 | 3 | 4 | 5 |
| Longest trail identified | Yes | Yes | No | Yes | No |
| Lowest highpoint trail identified | Yes | Yes | No | Yes | No, there are 4 points and height is not given |
| Correctly identified ‘dogs not allowed’ feature | Yes | Yes | No | Yes | Yes |
| Relationship between length and trail | Longer trails have higher highpoint | None | Longer trails have lower highpoint | None | None |
| Able to choose trail that interests them | Yes | Yes | Yes | Yes | Yes |
| Overall rating | 5 | 2 | 3 | 4 | 3 |
| Likes | Graph is clear; shades of green visually pleasing |  |  | More information given; nothing sacrificed in simplicity |  |
| Dislikes |  | Not visually appealing; hard to make sense of it | Again, too much work [refers to Zebra evaluation] |  | Axes are too small |

Table : Users preference

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Participant | 1 | 2 | 3 | 4 | 5 |
| Depicts length and highpoint better | Giraffe | Zebra | Giraffe | Giraffe | Zebra |
| Find seeing features relevant | Yes | Yes | No | Yes | Yes |
| Overall preference | Giraffe | Zebra | Giraffe | Giraffe | Neither |
| Recommendations for improvement |  | Do not use Giraffe, it confuses users | [Giraffe] is not very user friendly; Zebra would not work on their phone |  | Make dimensions consistent; Increase size of text and icons so they can be easily seen |

# Bibliography

[1] Thomas Mock (2021). Tidy Tuesday: A weekly data project aimed at the R ecosystem. <https://github.com/rfordatascience/tidytuesday>.

[2] Elis Hughes, Patrick Ward (2020). Tidy Tuesday: Washington Hiking.   
<https://github.com/rfordatascience/tidytuesday/tree/master/data/2020/2020-11-24>

[3] *TEXT data type - IBM Documentation*. (n.d.). Retrieved July 21, 2021, from <https://www.ibm.com/docs/en/informix-servers/12.10?topic=types-text-data-type>

[4]