Data Processing - Readings 4

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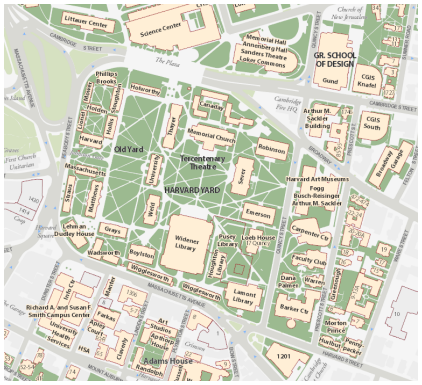
Questions

1. For this question, I will compare a search for Harvard Yard on two interactive maps: the Harvard University Campus Map[1] and Google Maps[2]. Figure 1a shows a screenshot of Harvard Yard on the Harvard University Campus Map, and Figure 1b shows a screenshot of Harvard Yard on Google Maps. Both screenshots are such that they roughly capture the same area.



(a) A screenshot of Harvard Yard on the Harvard University Campus Map.

(b) A screenshot of Harvard Yard on Google Maps.

Figure 1: Screenshots of Harvard Yard on the Harvard University Campus Map (left) and Google Maps (right). Both screenshots are such that they roughly capture the same area.

   (a) In order for a map to provide a good visual search for buildings, it must be easy to tune your attention to the pattern that represents buildings. Both maps use color to aid in this attentional tuning:

[1] Source: `map.harvard.edu`
[2] Source: `maps.google.nl`

both maps use a light, medium-/high-saturated color for buildings. Both maps also use light colors for the ground surface and because of this, the color that represents a building is not always clearly distinguishable from the colors that represent the ground surface. However, in the Harvard University Campus Map, the buildings are surrounded by a red contrasting border that separates them from the ground surface. Furthermore, all the buildings in the Harvard University Campus Map are labelled (either by name or number). Google Maps uses shading to separate the buildings from the ground surface. The red borders in the Harvard University Campus Map result in a better contrast and thus the Harvard University Campus map provides a better visual search for buildings than Google Maps.

(b) The cognitive process of finding a route from a random point A to point B involves a complex set of visual pattern queries, including visually tracing a number of lines between point A and point B. The Harvard University Campus Map uses a low-saturated color for roads (i.e., dark grey), and Google maps uses three, high-saturated colors for roads (i.e., white, orange, and yellow [only the white color for roads is visible in Figure 1b]). The colors that are used in Google maps (for roads) are distinct and easily identified, and allow for good visual tracing, whereas the color used in the Harvard University Campus Map is not always clearly distinguishable from the other colors used in the map. Therefore, Google Maps more effectively visualizes routes from a random point A to point B than the Harvard University Campus Map.

(c) It is somewhat difficult to say which map is an overall better visualization. The Harvard University Campus Map is specifically designed for Harvard University students and employees, and only provides a detailed visualization of the Harvard campus, whereas Google Maps is designed for everyone around the world, and provides a detailed visualization of the world. However, based on the two screenshots in Figure 1, Google Maps is an overall better visualization than the Harvard University Campus Map. First, Google Maps more effectively visualizes routes from a random point A to point B than the Harvard University Campus Map (which is one of the main tasks of a map, see the previous question). Furthermore, Google Maps provides more features that aid in route planning than the Harvard University Campus Map (e.g., Street View, travel directions).

2. (a) Figure 2 shows a rainbow color map visualization of the volume of Obama and Romney tweets from the 2012 presidential elections[3]. The visualization shows in which countries people tweeted about Obama and Romney during the 2012 presidential elections, and how

[3]Source: http://www.poynter.org/uncategorized/224413/why-rainbow-colors-arent-always-the-best-options-for-data-visualizations/

much tweets were being posted (indicated using a rainbow color map). The visualization is possibly intended for people interested in politics.

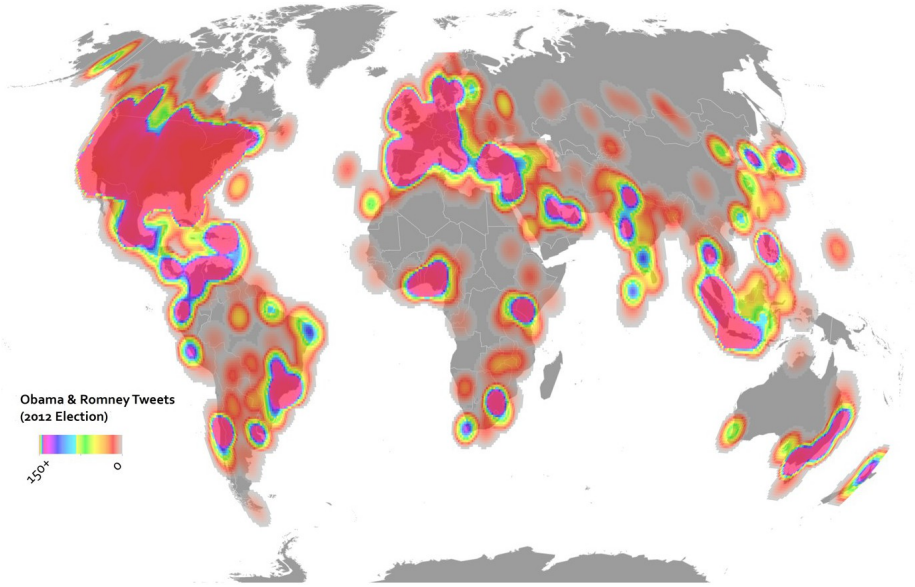


Figure 2: A rainbow color map visualization of the volume of Obama and Romney tweets from the 2012 presidential elections.

The visualization fails to successfully convey information for two reasons (discussed in Borland and Taylor II (2007)). First, a rainbow color map is not perceptually ordered, and thus confusion results because greater-than and less-than relationships are not immediately evident. Furthermore, the sharp transitions between hues suggest sharp transitions in the data, but this is not always the case. In the visualization in Figure 2 for example, the sharp transition from green to yellow does not suggest a sharp transition in the number of tweets, but rather a gradual transition.

(b) An alternative color scheme to replace the rainbow color map is a color scheme that uses a single hue with varying saturation. The article in which the rainbow color map visualization appears[4], shows the same map with the rainbow colors changed to purple with varying saturation.

[4]Source: `http://www.poynter.org/uncategorized/224413/why-rainbow-colors-arent-always-the-best-options-for-data-visualizations/`

References

Borland, D. and Taylor II, R. M. (2007). Rainbow color map (still) considered harmful. *IEEE Computer Graphics and Applications*, 27(2):14–17.