FIT3179 Data Visualisation

Week 9 Homework: Create a Map with Vega-Lite

Introduction

This is an assessed homework and is worth 1% of your final mark. The goal of this homework is to create a map with Vega-Lite that is useful for your Data Visualisation 2 assignment. You will get feedback about your map on Moodle and in the Week 10 studio, and you can later include an improved version of your map in your submission for the Data Visualisation 2 assignment.

Task

The task is to create a map that is relevant for your Visualisation 2 domain. Search a dataset that you want to visualise. The dataset does not need to include longitude/latitude information; you can link your data with existing geoshape information that you download from *naturalearthdata.org* or another data source.

Select a map idiom that is well suited for your dataset and makes sense in the context of your Visualisation 2 project. In the unusual case that creating a map does not make sense for your domain and your tutor has given you an exemption from including a map in the Visualisation 2 assignment, you are still required to create a map for this homework. You may choose any topic in this case.

Submission

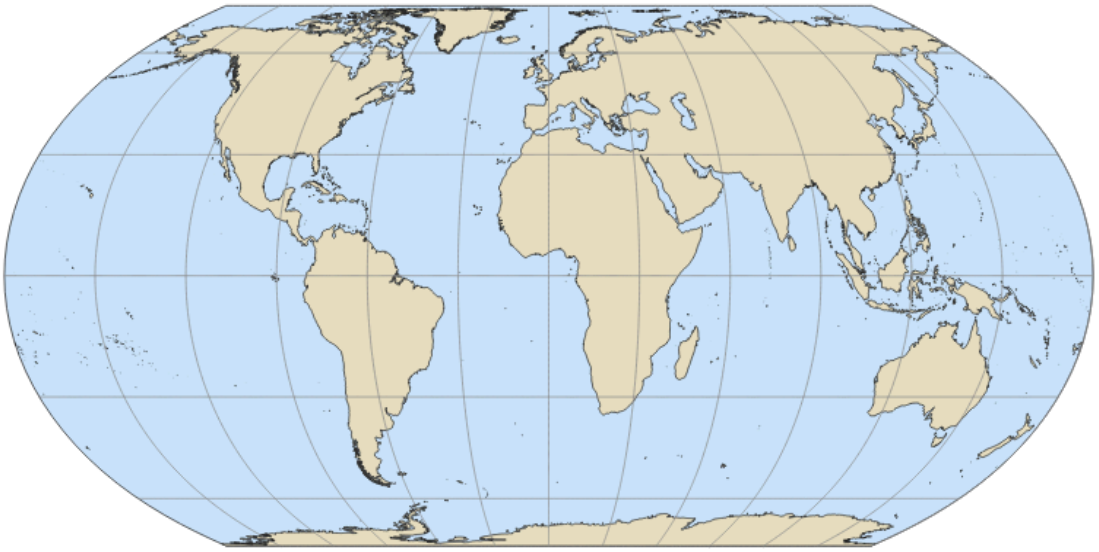
A report is to be submitted in PDF format through the submission link on the Week 9 Moodle page. The page limit of the report content is two pages. Write a report with the following content:

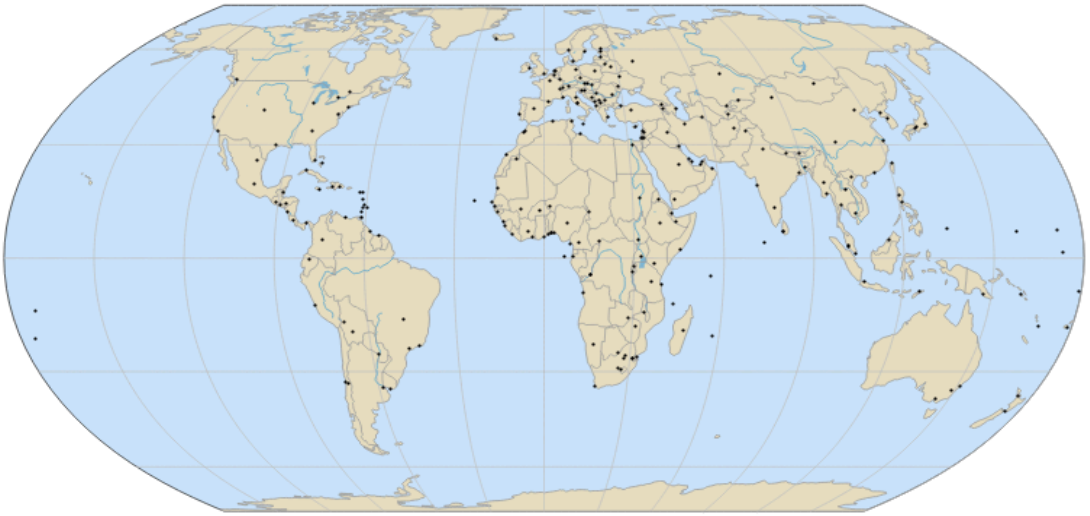
- Your name, Monash student ID, lab, tutor name
- A URL of your publicly accessible web page on GitHub that embeds the map that you created. Note that a link to the JSON definition of the map is not accepted; a URL of a HTML web page is required instead. Refer to the Week 4 (section 4) and Week 7 (section 1.3) studio materials for publishing a Vega-Lite visualisation with a GitHub page.
- A screen capture of your map.

- One short bullet point for each of the following items:
    - The domain of your visualisation
    - The visualised dataset (attribute types, source and author, etc.)
    - Data transformation that you applied (if any), such as normalisation by area or population.
    - A justification for the type of map idiom used. For example, explain why you chose to create a proportional symbol map instead of a choropleth map or a dot map.

Hints for Creating an Outstanding Map

- Your dataset should not be too large. While it is technically possible to load datasets of multiple megabytes, large datasets must be avoided if possible, because your final visualisation will load slowly. To reduce the size of your dataset, you may
    - remove attributes that are not needed,
    - remove geometry that is not shown on your map by clipping the geometry (see the week 8 studio exercise),
    - simplify detailed geometry with mapshaper.
- Your map shoul include a graticule, that is, lines of constant longitude and latitude. The naturalearthdata.com site provides shapefiles with graticules at different resolutions. The maps below include a graticule with a 30-degree resolution.
- Consider including additional map layers if useful and relevant for your map. For example, you may want to include lakes and rivers, major roads, major cities, etc. Naturalearthdata.com is the best resource for map layers that show the entire world or large sections of Earth.
- Including a shaded relief image for showing terrain or including satellite images or other raster imagery would be great but is not trivial with Vega-Lite, so this is optional.
- It is tempting to include very detailed geometry in maps. However, it is often better to use simpler geometry (also known as “generalised” geometry), as details are distracting and add a lot of noise and visual clutter. The first map below uses data for a scale of 1:10 million. This is too detailed for this map scale. The second map uses data for a scale of 1:110 million. The outlines of continents are much less noisy and visually pleasing to look at. If your geometry data is too detailed, use mapshaper to simplify it.





- Use figure-ground: select bright and desaturated colours for larger areas and elements that are the ground of your map. For example, in the second map above, the continents and the oceans are shown with bright colours, and all lines (including outlines of continents) are bright grey or blue. In the second map, only the small dots indicating major cities use pure black.
- http://colorbrewer.org is an essential tool for selecting colours for maps.
- Select map projections judicially. Start with the “equirectangular” projection, then use https://projectionwizard.org for selecting an optimum projection when mapping only parts of the world. Modify your projection in Vega-Lite: https://vega.github.io/vega-lite/docs/projection.html#projection-types Note that TopoJSON can only contain longitude/latitude coordinates. Mapshaper.org can convert from various Cartesian coordinate systems to

spherical longitude and latitude coordinates in case your geometry is not in longitude/latitude coordinates.
- You can use map idioms that require additional tools to build besides Vega-Lite, such as bin maps or dot maps.

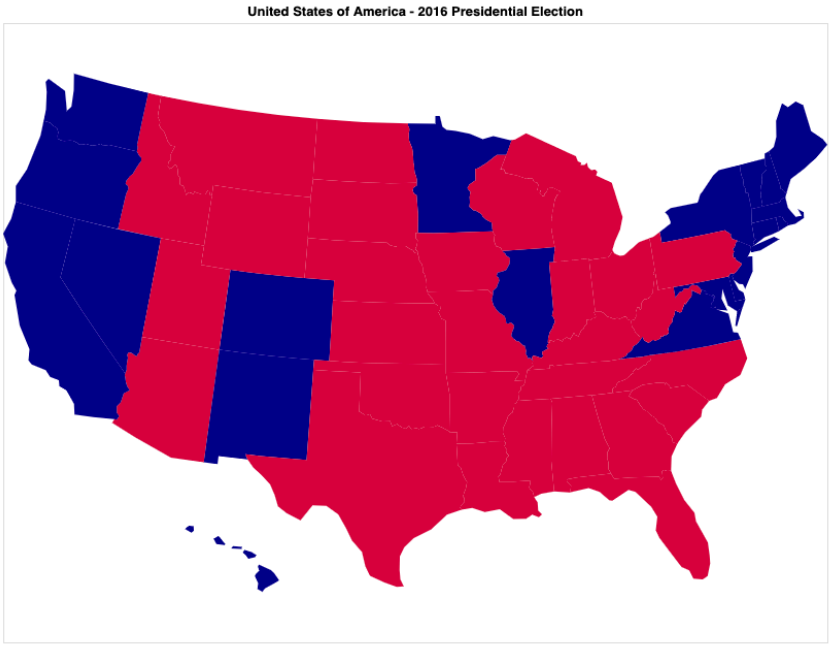
Marking Rubric

0 points when the URL is not included, does not work, or does not link to a Vega-Lite map embedded in a HTML document. Minus 20% for each of the following issues:

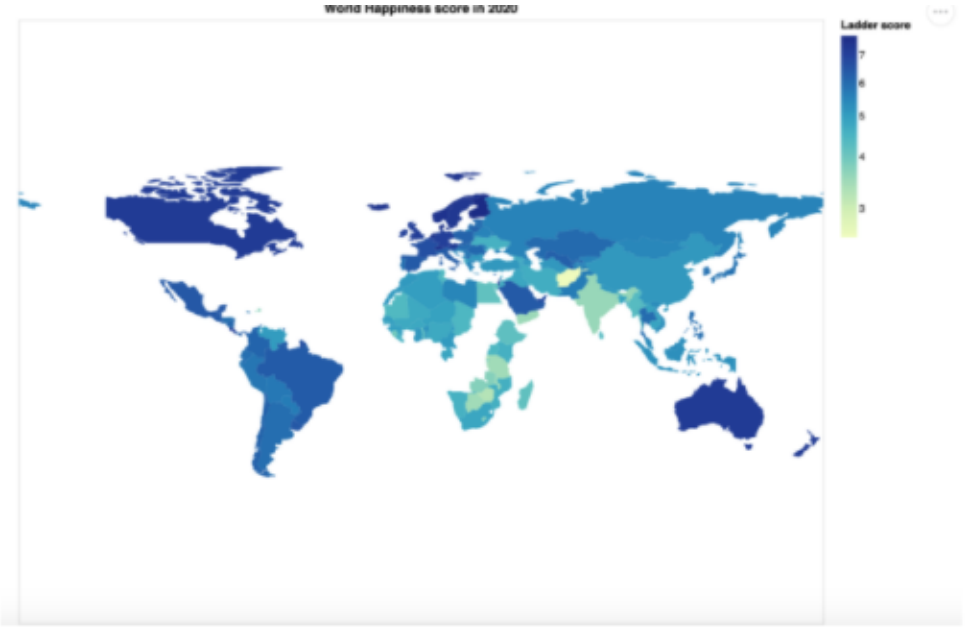
- Data is not normalised for a map idiom that requires normalised data (e.g. choropleth).
- An inappropriate map projection is used, especially when a world map projection is used for a regional map. The projection parameters are not appropriate (hint: use https://projectionwizard.org)
- The map contains too much empty white space (as in the example below), or the area shown is zoomed out (e.g., a map showing the entire world when the topic is for Australia only).

- An inappropriate map idiom is used (for example, a choropleth map for absolute values).
- The map does not contain a graticule, an ocean background (for a world map), countries, states, or other reference layer. An example is shown

below:



- Data absence creates holes in choropleth maps, as in the example below.



- A legend is essential to understanding, but it is lacking.
- The colour channel is wrong for the mapped data, for example, a diverging colour scale is used for a sequential attribute.

- Map symbols coalesce such that information is not readable, or too many different colours are used, as in the example below.

- Legends, titles and tooltips use attribute names, such as “pop_sqkm”.
- The mapped information topic or units are not indicated.
- Poor map title (a good title may contain the topic, the area, and a time).