

Report

Munzer framework

Domain: An exploration of happiness worldwide and factors affecting it.

Why: To present findings and allow the user to interact with the visualizations for further details.

Who: General public with no pre-requisite knowledge about economic or happiness indicators.

What:

- i) **Data sources (see bibliography for URL):** World Happiness Report [1], Gini coefficient [2], Population growth [3], Human Development Index [4], Spatial Data [5].
- ii) **Relevance:** The world happiness[1] is used as the main focus to produce the choropleth with the spatial data. Other economic/social indicators are used to study its correlation with happiness.
- iii) **Creation process:** The spatial data [5] is passed onto the mapshaper [6] to obtain the topojson file format. Excel is also used to combine any dataset for ease of visualizing.

Why and How:

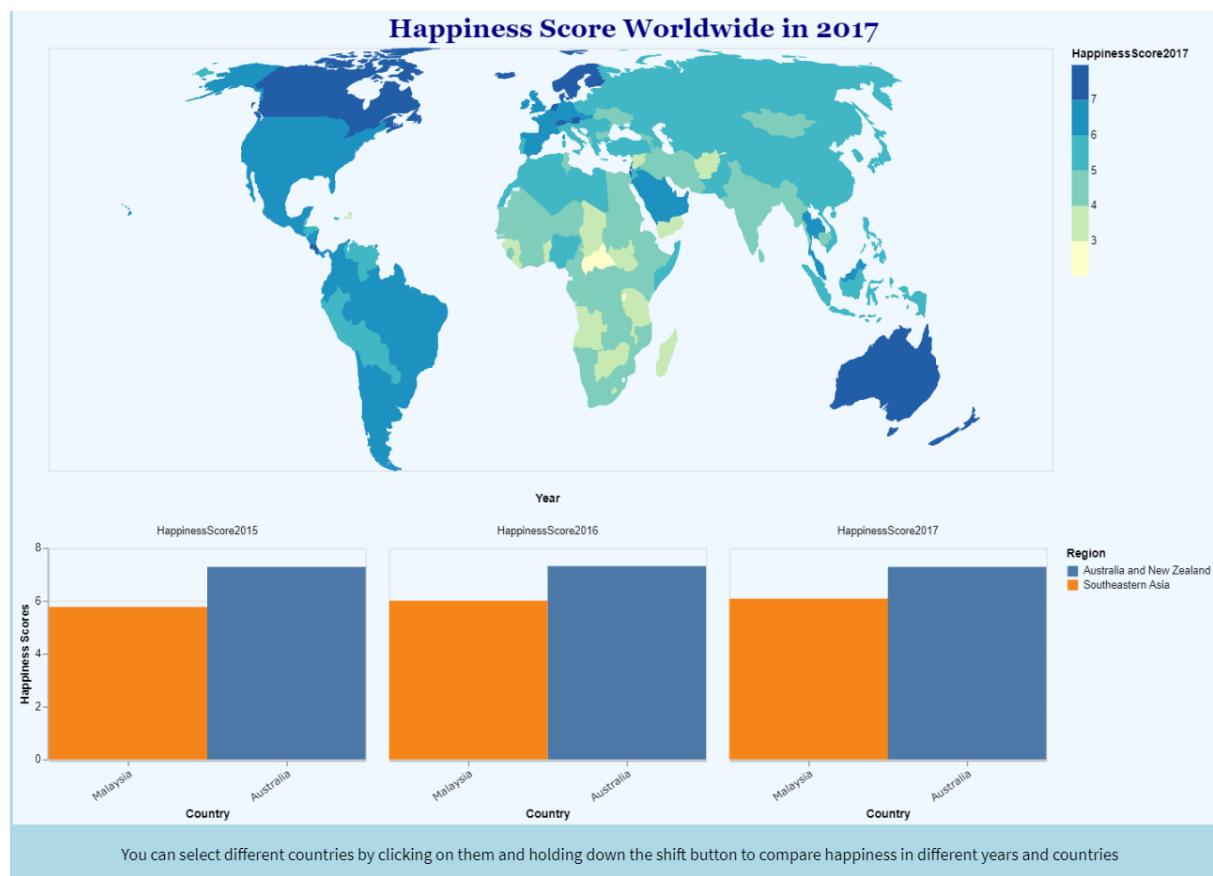


Figure 1

Figure 1 is the main happiness choropleth visualization. The aim is to show the happiness worldwide. User can select different countries to compare the changes in happiness for 2015, 2016 and 2017. This visualization idioms are chosen because it is simple to understand. To make it more interesting,

an interaction is added to allow the user to select multiple countries in the choropleth to see the countries values in the repeated bar charts.

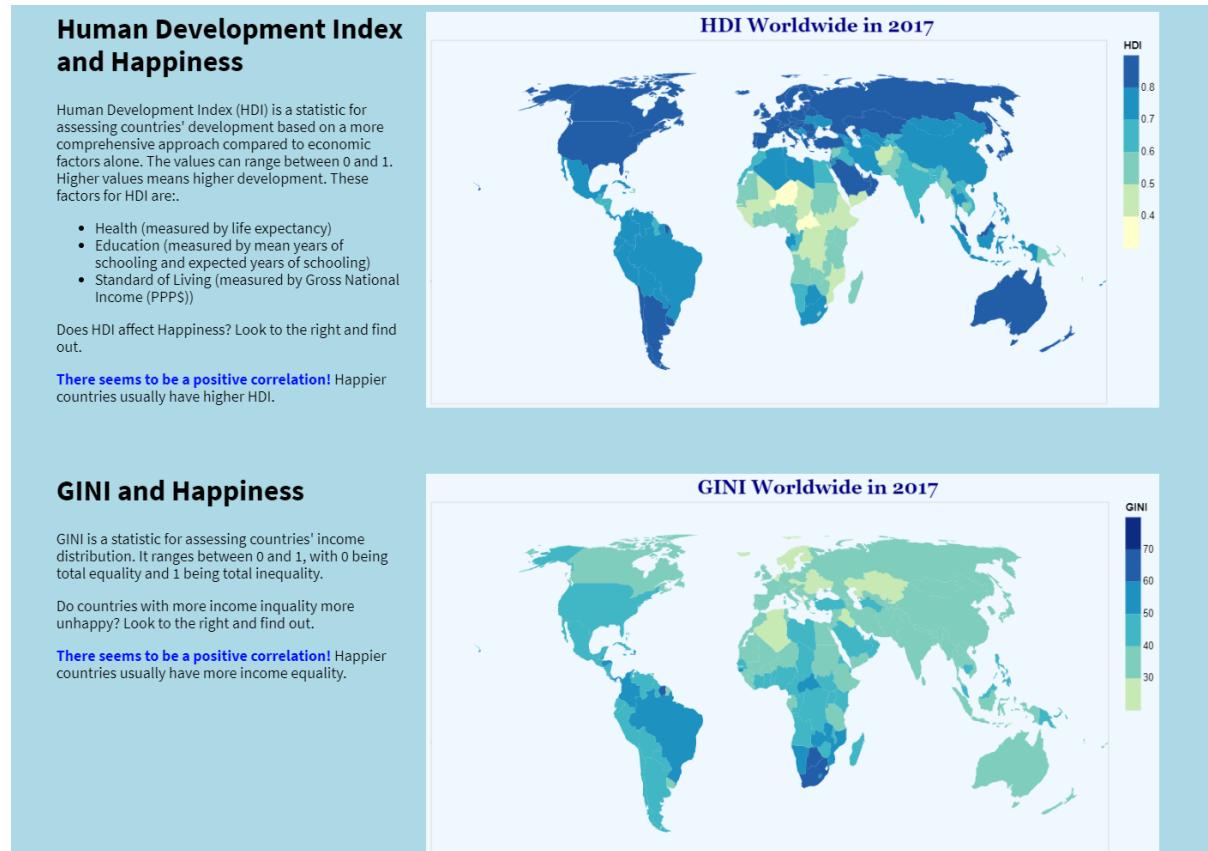


Figure 2

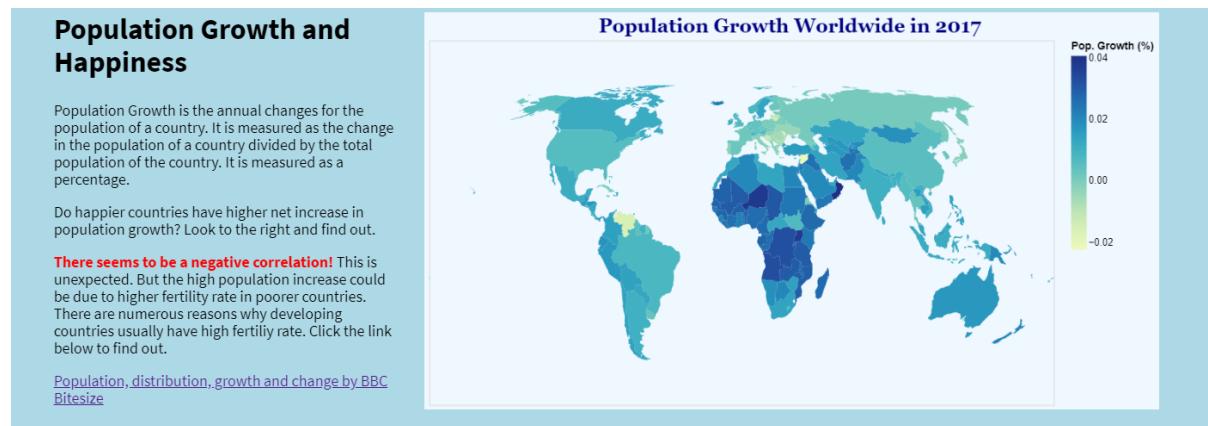


Figure 3

Figure 2 and 3 is the choropleths showing HDI, GINI and Population Growth. This gives a more broader view of the indicators worldwide. There is also some basic explanation on the left for the indicators. The visualization idiom is chosen to be able to show the worldwide values for these quantitative indicators in a understandable way.

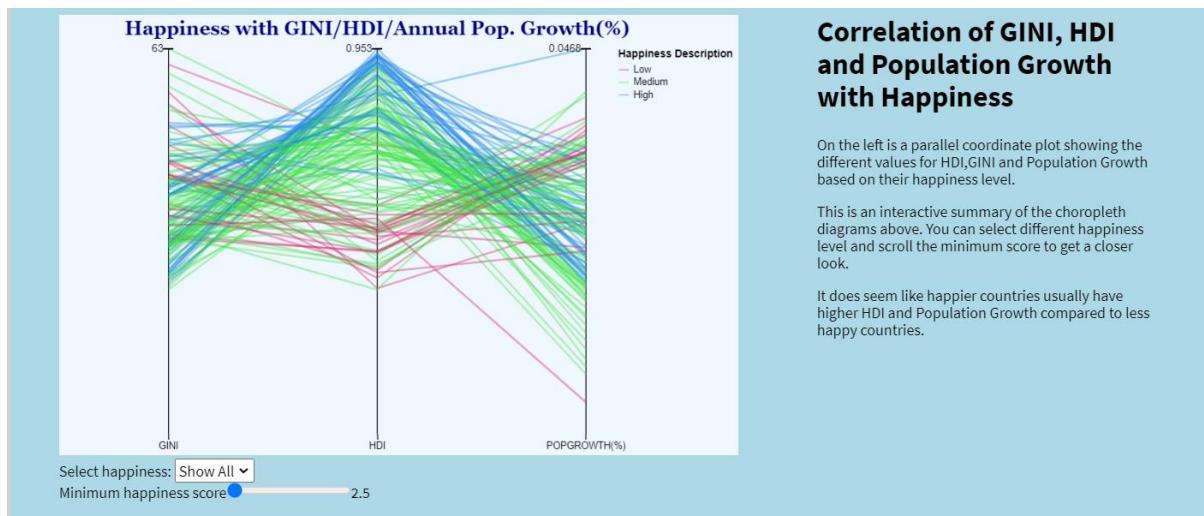


Figure 4

Figure 4 is the interactive summary of the three choropleths. User can select for a certain happiness level or adjust the minimum happiness score using the filters/selection. This is to give a more direct comparison with the factors and happiness and a more detailed view. The visualization idiom is chosen to show the quantitative indicators with relation to the happiness level. Interaction is added for more readability if the default view is too complicated or messy.

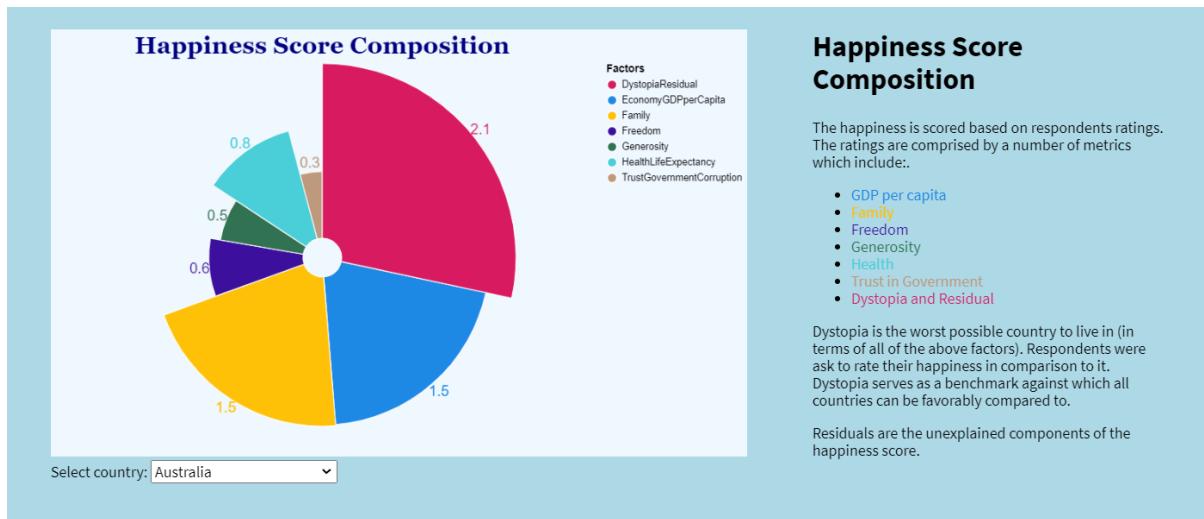


Figure 5

Figure 5 is the radial plot of the happiness score composition. Users can select a specific country to explore its score composition. This allows the user to see the makeup of the country's score. The radial plot is chosen because the data has a part-to-whole relationship and it is more accurate than a pie chart.

Summary of happiness in different regions

Below is a unit chart showing the level of happiness in different parts of the world. Each cell represents a country.

The first chart shows the number of countries by region.

In the next three charts, you can see the countries categorised by happiness level. Overall, many of the Sub-Saharan countries are not too happy, while most of the developed world is happy.

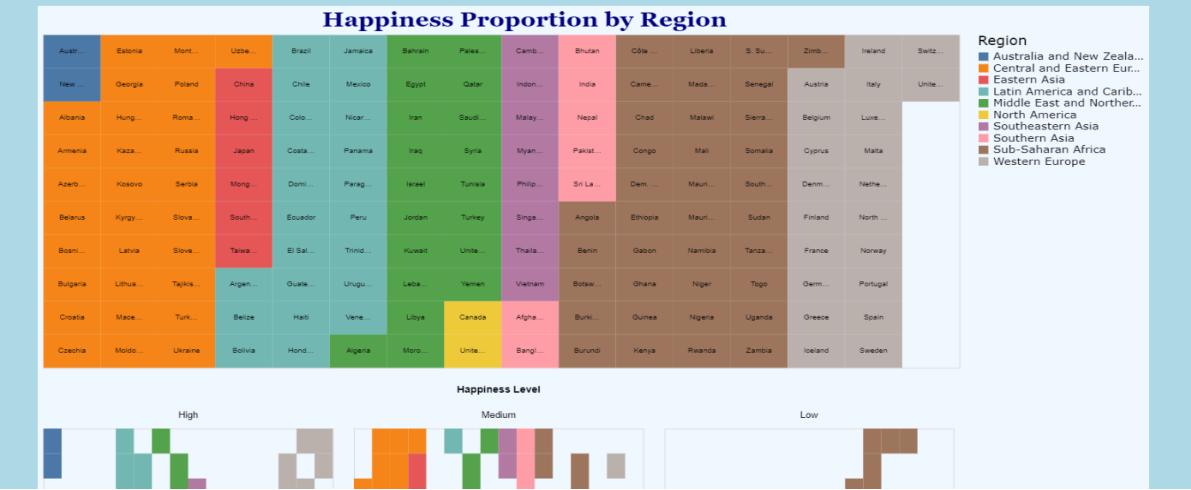


Figure 6

Figure 6 is the unit chart which shows a summary of happiness in different regions. The first chart aims to give a summary of different countries and its regions. The bottom three is faceted into three happiness level so that the user can see which regions are more/less happy. The unit chart is chosen because the data has a part-to-whole relationship. It is also a unique idiom.

All the visualizations contain tooltips to allow the users to view the data underneath aside from the interactive tools stated.

Inspiration:

The visualizations are built upon the examples in the vega lite library [7]. The examples are figure 7,8 and 9. Figure 10 is from Amit Kapoor's example [8].

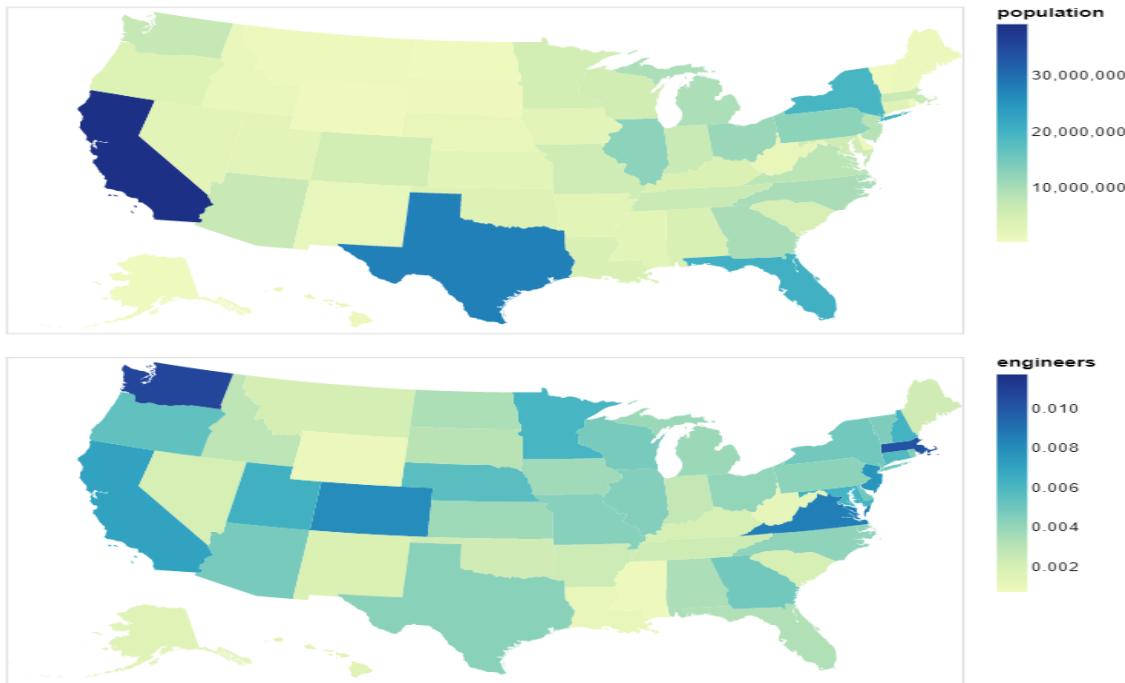
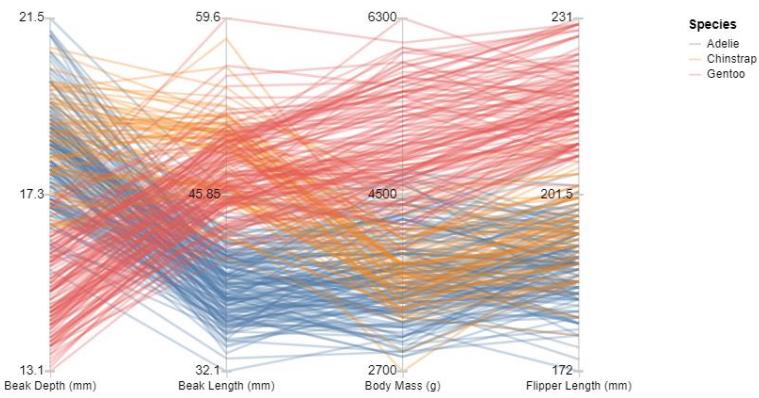


Figure 7

Parallel Coordinate Plot

Though Vega-Lite supports only one scale per axes, one can create a parallel coordinate plot by folding variables, using `|joinaggregate|` to normalize their values and using ticks and rules to manually create axes.

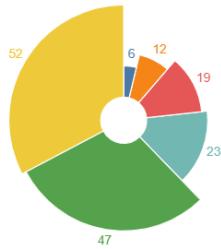


[View this example in the online editor](#)

Figure 8

Radial Plot

This radial plot uses both angular and radial extent to convey multiple dimensions of data. However, this approach is not perceptually effective, as viewers will most likely be drawn to the total area of the shape, conflating the two dimensions. This example also demonstrates a way to add labels to circular plots.



[View this example in the online editor](#)

Figure 9

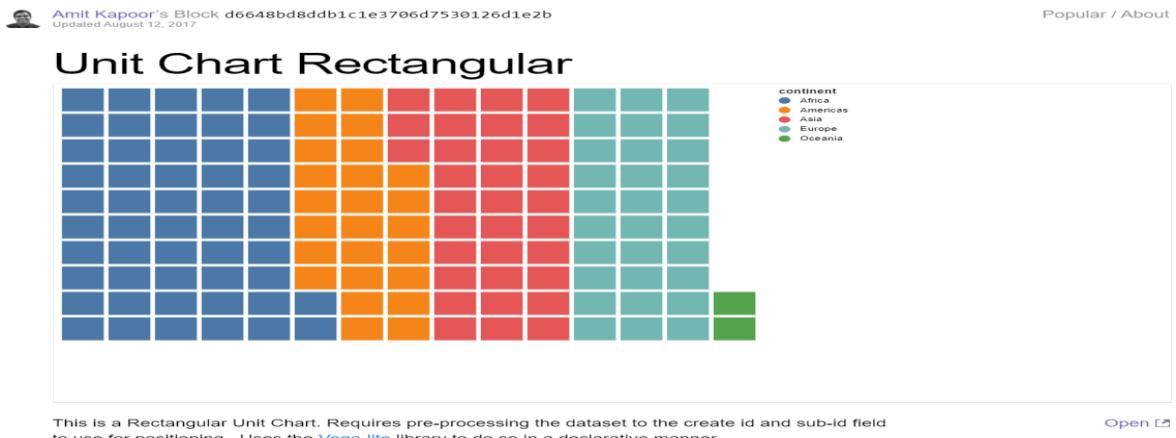


Figure 10

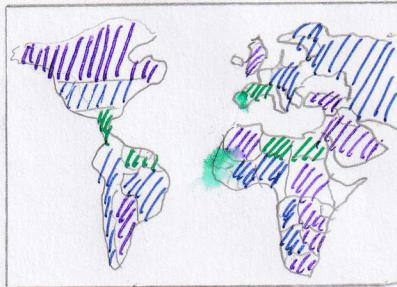
Color used in the visualization is chosen using Coloring for Colorblindness [9] to ensure readability. Note to marker: annotation for the visualizations are already done up to maximum. Since the topojson file does not contain the latitude and longitude, it is impossible to encode the labels.

Bibliography

- 1) Sustainable Development Solutions Network. (2019). World Happiness Report (Version 2) [Data file]. Retrieved from: <https://www.kaggle.com/unssdsn/world-happiness?select=2017.csv>
- 2) Gapminder.org. (2018). Gini coefficient (Version 3) [Data file]. Retrieved from: <https://www.gapminder.org/data/>
- 3) Gapminder.org. Population growth (annual %) [Data file]. Retrieved from: <https://www.gapminder.org/data/>
- 4) Gapminder.org. Human Development Index [Data file]. Retrieved from: <https://www.gapminder.org/data/>
- 5) Natural Earth. 1:110m Cultural Vectors [Data file]. Retrieved from: <https://www.naturalearthdata.com/downloads/110m-cultural-vectors/>
- 6) Mapshaper. Retrieved from: <https://mapshaper.org/>
- 7) Example Gallery. (n.d.) Retrieved from: <https://vega.github.io/vega-lite/examples/>
- 8) Kapoor, A. (2017 August 12). Unit Chart Regular. Retrieved from: <https://bl.ocks.org/amitkaps/d6648bd8ddb1c1e3706d7530126d1e2b>
- 9) Nichols, D. (n.d.). Coloring for Colorblindness. Retrieved from: <https://davidmathlogic.com/colorblind/#%23D81B60-%231E88E5-%23FFC107-%23004D40-%236d4881-%23e0435c-%233c0f9d-%2380e6d4-%23307252-%23b6b451-%234aced7-%233f2297-%236bcbe7>

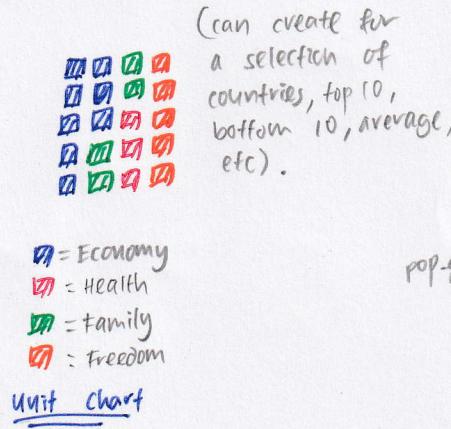
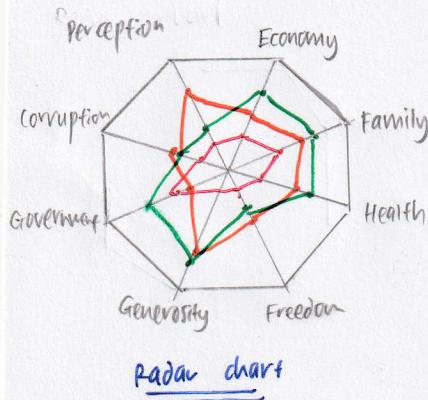
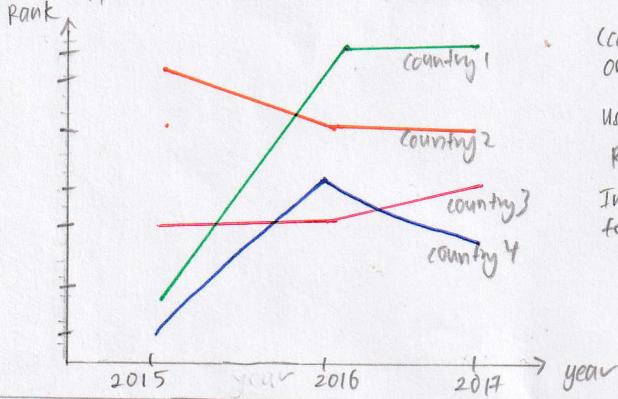
Appendix

Ideas

1) Happiness choropleth world map

(can create a faceted for GINI/HDI, etc)
put some interaction such as move through years.

2) Happiness factor score contribution

3) Happiness ranking using slope graph

(can we rank or happiness value)
use aggregation by Region also possible
Interaction for top k ranks.

4) Happiness by region using isotype

Asia

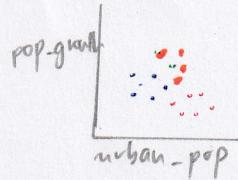
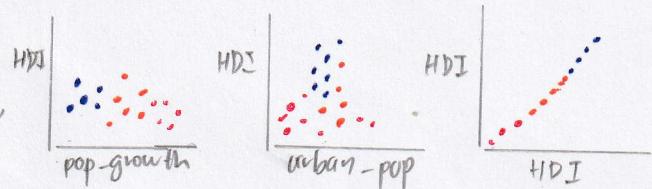


Each person represent n number of people.
(can use as proportion of number of people in the region).

Europe



Oceania

5) factors affecting happiness using SPLOM

• = happy
● = moderate
○ = unhappy

use interaction (such as scrolling + zooming)

Filter

② and ④ possible to combine. Both deal with proportion.

① could also be done using a unit chart.

Both requires some sort of aggregation, maybe could create a selection that would change both of them simultaneously.

④ might also be redundant if ① has highlighter.

Categorize

1) world happiness overview



2) Happiness ranking over years



3) Happiness score calculation
OR
Happiness by region



4) Correlation of factors affecting happiness

Combine and Refine

① and ④. Use a highlighter for regions + tooltip or trivial.

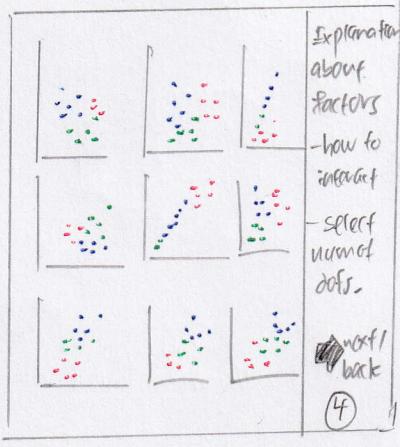
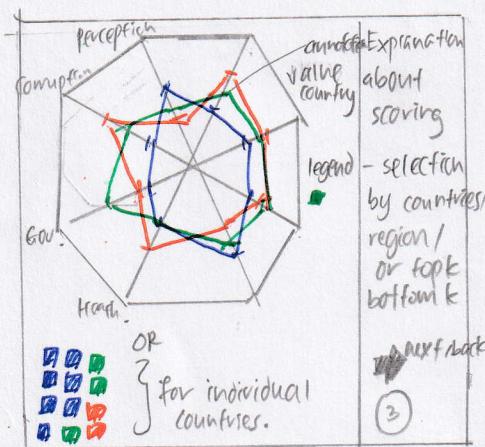
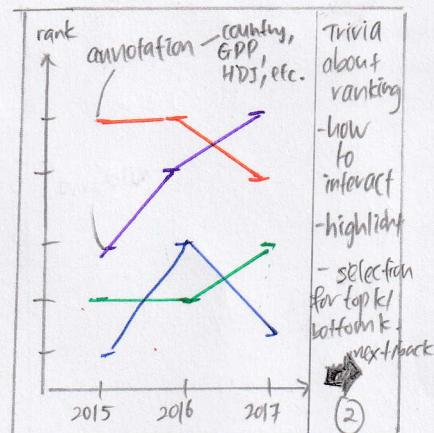
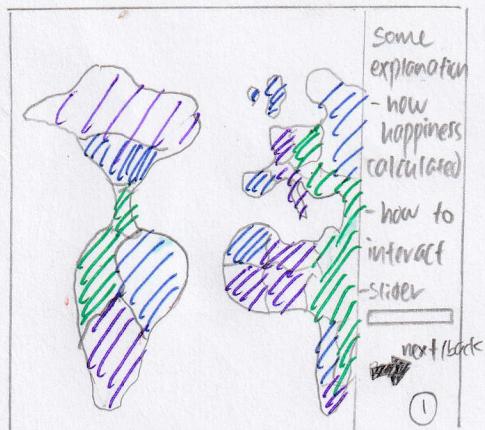
① and ⑤ could potentially be combined. Create a faceted choropleth for happiness + GINI + HDI + etc.

Questions

① Implementation viable?

② Interactivity between visualizations or within themselves?

Layout



Title: Narration View

Author: Goh Ngee Jway

Date: 20/10/2020

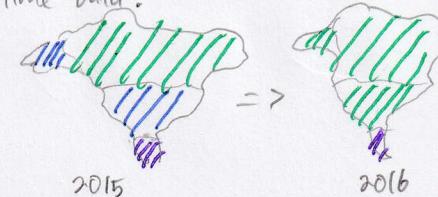
sheet: #2

Task: Guided Narration

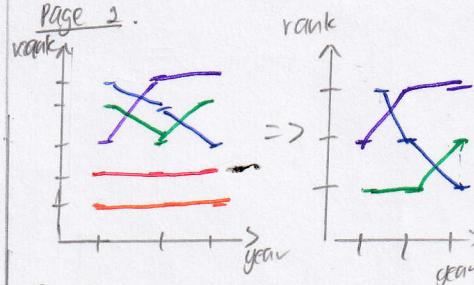
Operations =

Page 1.

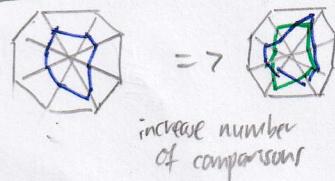
change based on different time data.



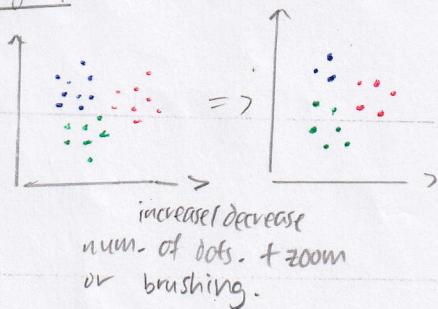
Page 2.



Page 3



Page 4



Focus

- 1) Explanation + guided walkthrough of what each vis is supposed to tell.
- 2) Individual interaction must be sufficient enough to warrant separate pages.

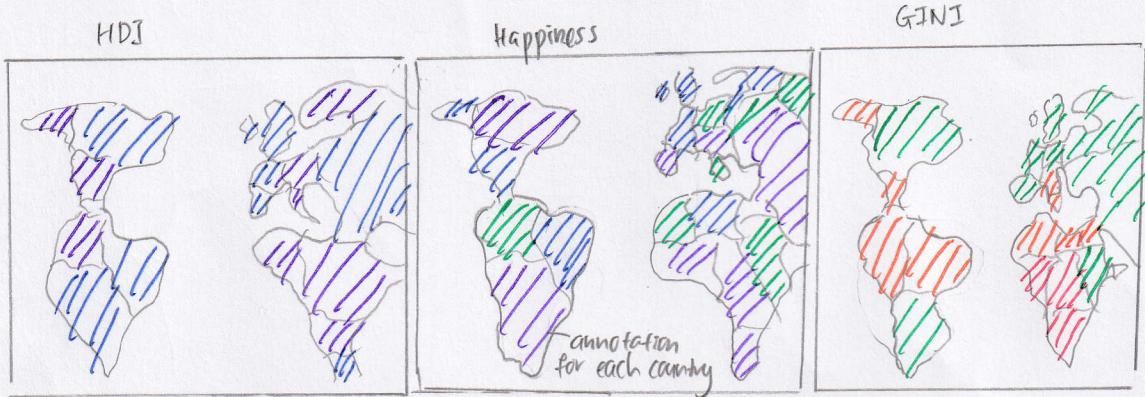
Discussion

- 1) No interaction between visualizations. Less clutter.
- 2) More guidance / storytelling possible.

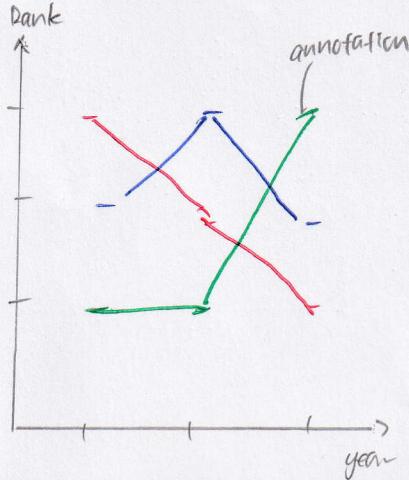
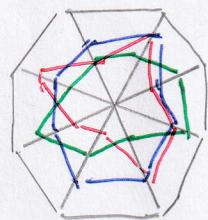
3)

Layout

Title Explanation



Filters \Rightarrow highlight, selection.

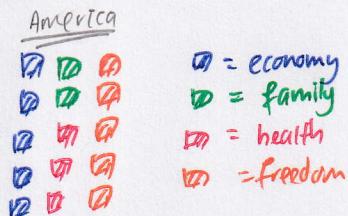
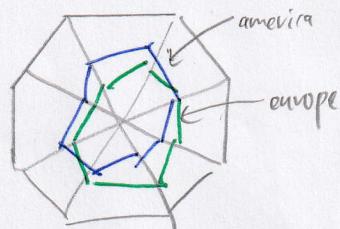


Operations

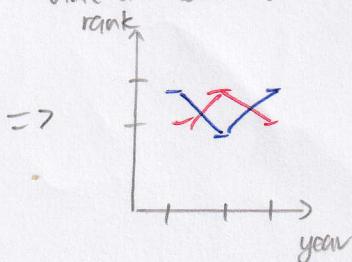
- Multiple selection for continent change radar chart and unit chart

Continent: Americas or Europe

top 10
bottom 10



- Selection on map for different countries



Title: partitioned poster.
Author: Goh Ngee Juay
Date: 20/10/2020
Sheet: #3
Task: Exploration

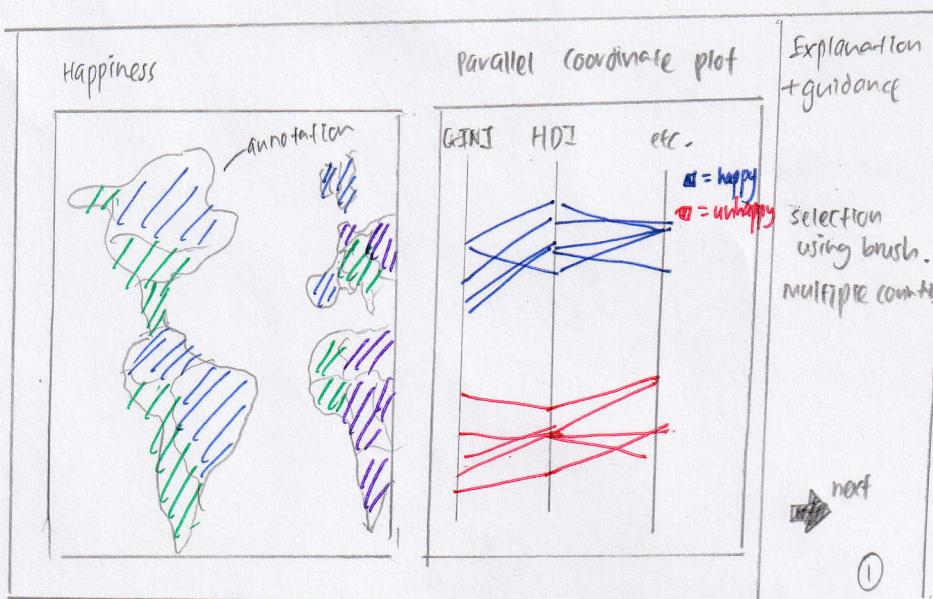
Focus

- Interaction between visualizations.
- All the visualizations in one page.
- combine visualizations if possible.

Discussion

- Radar chart and unit chart showing only a portion of data. Cannot have too many, otherwise clutter.
- If using continent selection, what measure appropriate? Mean, median?
- Better/more interactive visualization - interaction
- Less guidance. Need more direction to tell user what to do.
- color confusion in radar/unit chart.

Layout



Title: Partition narration
Author: Goh Ngel Juay

Date: 20/10/2020

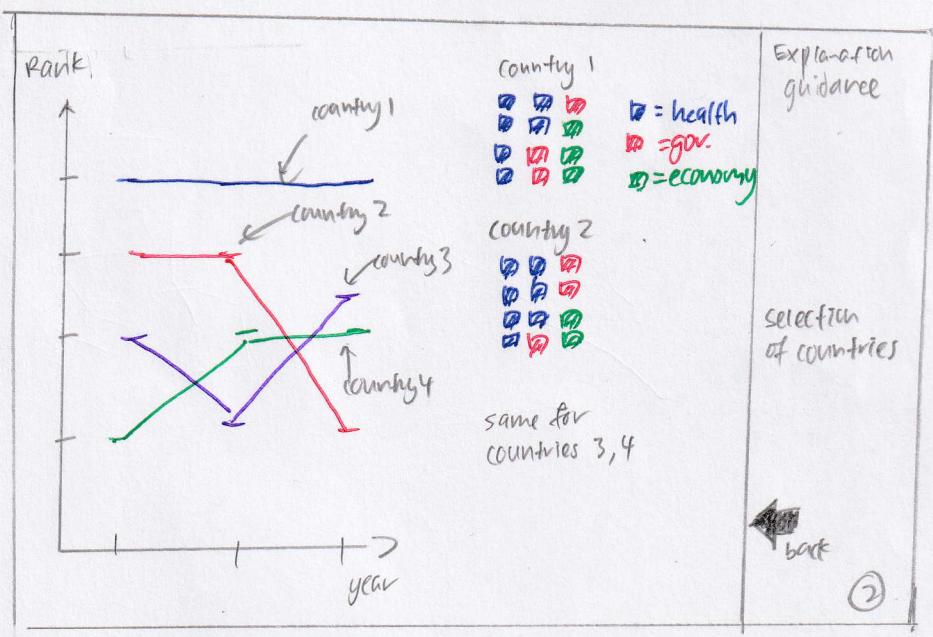
sheet: #4

task: Balance between narration and exploration

Focus

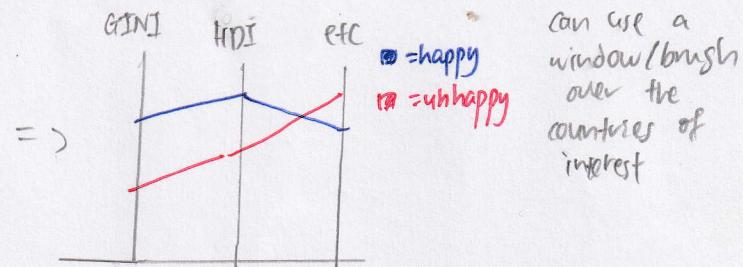
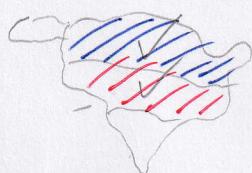
1) combination of visualizations that go well with each other (in terms of interaction)

2) sufficient explanation as narration/guidance.



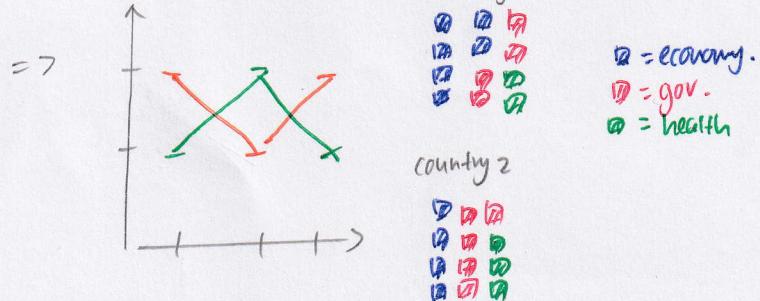
operations

page ①



page ②

countries: Country 1 ✓
Country 2 ✓



Discussion

1) Balance between sheet # 2 and # 3.

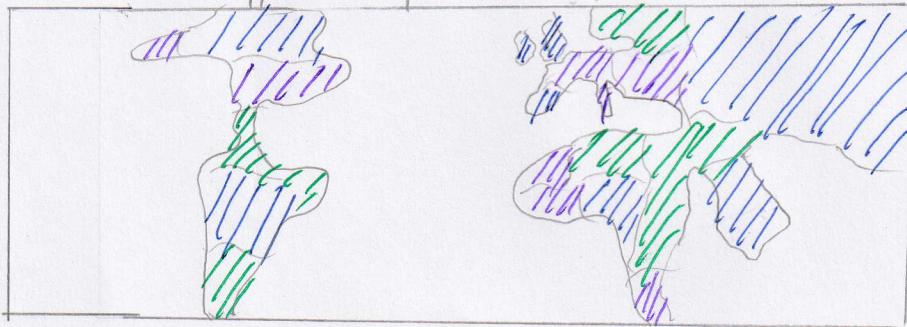
2) Is page(2) too detailed (country view vs region view) - Need a default selection of countries (top n or preselected).

3) page 2 color confusion.

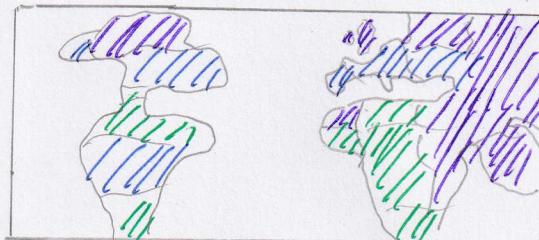
Layout

Main Title
Subheadings

Happiness choropleth Title / Explanation

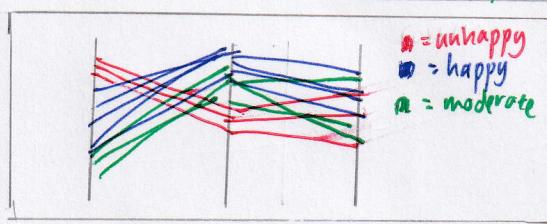


HDI / GINI / Pop. Growth
Title / Explanation

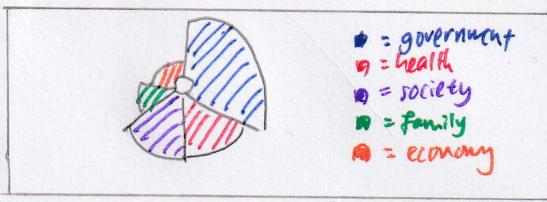


■ = unhappy
■ = happy
■ = moderate

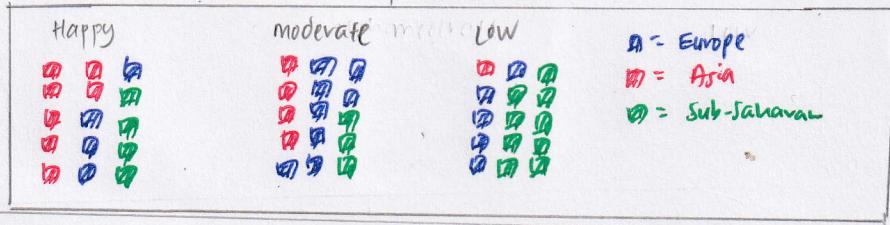
Correlation of GINI / HDI
Pop. Growth with Happiness
Title / Explanation



Happiness Score Composition
Title / Explanation



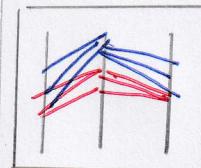
Happiness in Different Regions
Title / Explanation



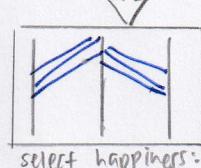
■ = Europe
■ = Asia
■ = Sub-Saharan

Title: Final View
Author: Goh Ng ee Juay
Date: 20/10/2020
Sheet: H5
Task: Final HTML view

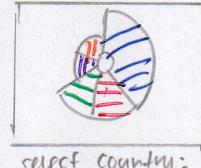
Operations



select happiness: None



select happiness: Happy



select country: Australia



select country: Malaysia

Focus

- 1) background on the visualizations, such as explanation - keep it simple to avoid clutter.
- 2) Explain the interactions.
- 3) Layout of vis must be logical (eg ordering).

Detail

- 1) use html / CSS for website design.
- 2) use Vega Lite for visualizations.
- 3) Excel if need to combine dataset.
- 4) TopoJSON files for the choropleth.
- 5) Time to build: 8 weeks.