Information Visualization

Renaud Blanch

time allowed: **2h**
no document allowed except a sheet of paper with hand-written notes.

instructions:
Please answer all the questions. If there is any ambiguity in the questions, explain your hypotheses.

Question 1 (8pts)
The image below is a static view of the Gapminder visualisation showing some development indicators for countries.
a) Give the **visual encoding** used in this visualisation (i.e. list the attributes of the data shown by the graph, and give for each of them its type and the graphical variable used for its encoding), e.g. using Card *et al.* taxonomy.

Bertin proposed four graphic judgments that may be available for the visual variables: association, selection, order and quantity.
b) Give **concrete examples** showing that **size** does not provide **association**; and that **color** provides **selection**.
c) Which visual variables allow **quantity** judgments on this chart?

The population of China is about 10 times larger than the population of Russia (1.38B vs. 144M). The areas of the circles are accurate, but we tend to underestimate this ratio.
d) What psychophysical **law** describes this phenomenon, and how can it be formulated in terms of ratio between **stimuli magnitude** (areas in this case) and **perception** ?

GAPMINDER WORLD 2012
Mapping the Wealth and Health of Nations
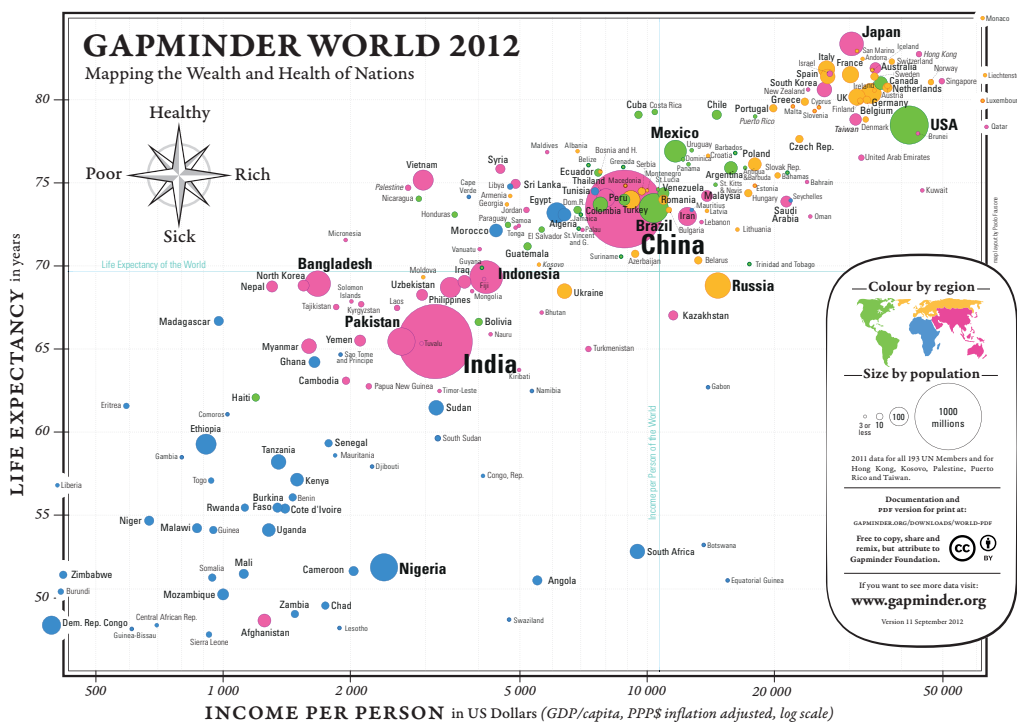
Question 2 (5pts)

The image below, from the TWO-N data visualisation agency, shows durations of space missions for every astronaut that have been to space until 2014 (male astronauts are shown in green whereas female astronauts are shown in white).

a) Give the **visual mapping** for those charts using Card et al. taxonomy.

b) Explain why this encoding is good/bad according to **Bertin's criterions**.

c) Explain why using **color** to encode male/female is a better choice than **shape** or **value** according to Bertin's criterions.
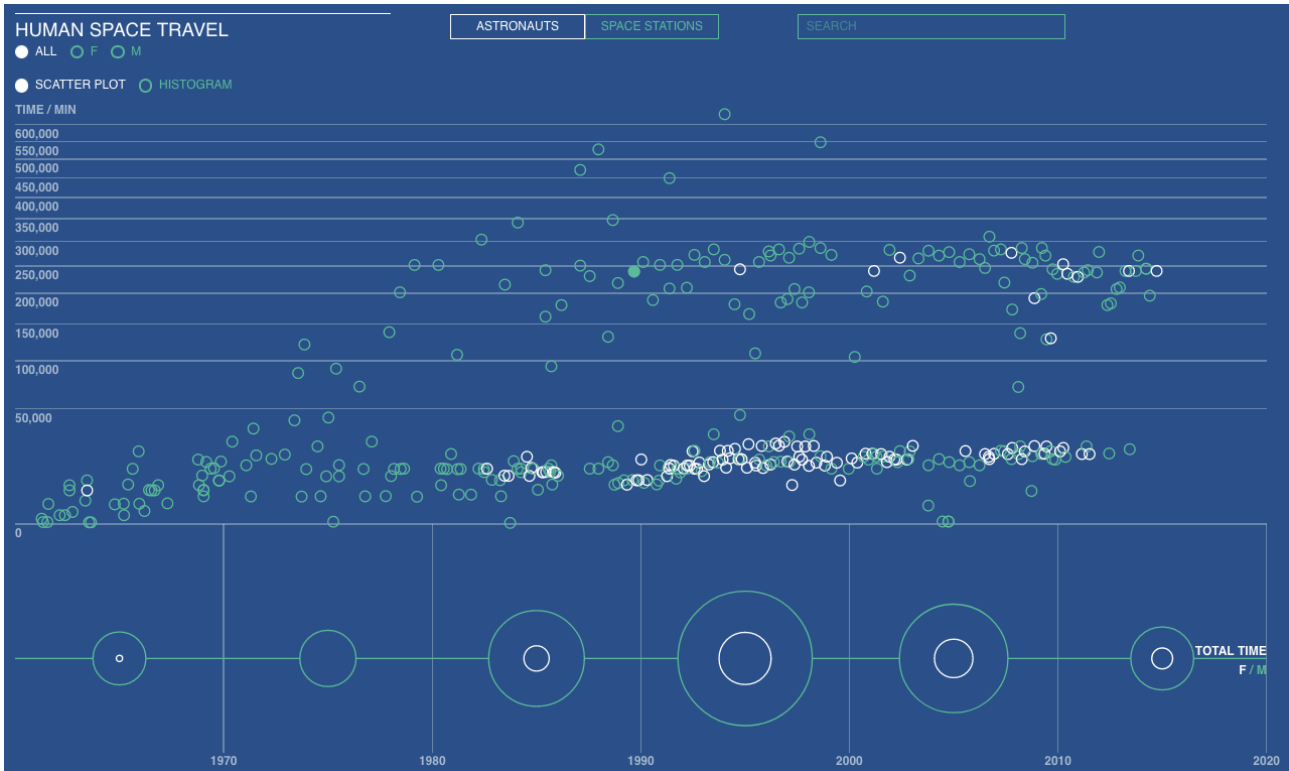
Question 3 (7pts)

A group of 10 friends (f_1…f_{10}) try to choose a restaurant among a list of 5 possibilities (A, B, …E) for the dinner. To do so, each of them express a preference by ordering the five restaurants with a unique rank (1st, 2nd, …5th).

A way to combine those preferences is to assign points to ranks and to sum those points to get a global ordering. They are different ways to assign points to ranks:

- the Borda count: 4 points for 1st, 3 for 2nd, 2 for 3rd, 1 for 4th and 0 for 5th
- the Nauru method: 1 point for 1st, 1/2 for 2nd, 1/3 for 3rd, 1/4 for 4th and 1/5 for 5th
- a geometric progression: 1 point for 1st, 1/2 for 2nd, 1/4 for 3rd, 1/8 for 4th and 1/16 for 5th

a) How would you represent this information so that the raw preferences can be perceived, and that the global ordering for the various points distributions can be compared ? Provide visual mapping specification and visualisation sketches.

b) **Justify** your design.