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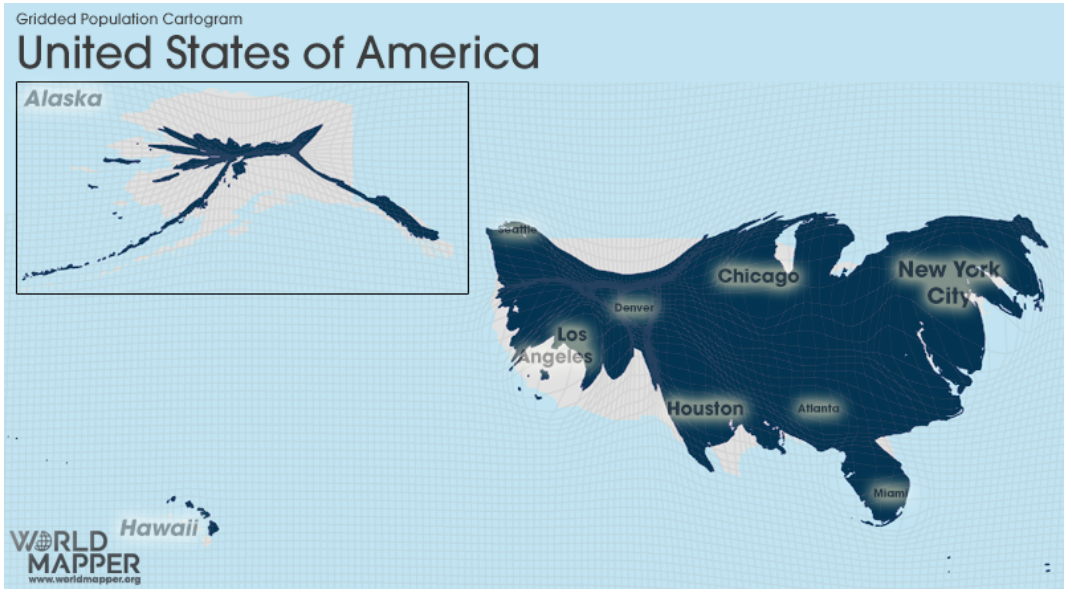
Assignment 3

(Due: 21.11.2022)

Task 1 Visual encoding/Perception

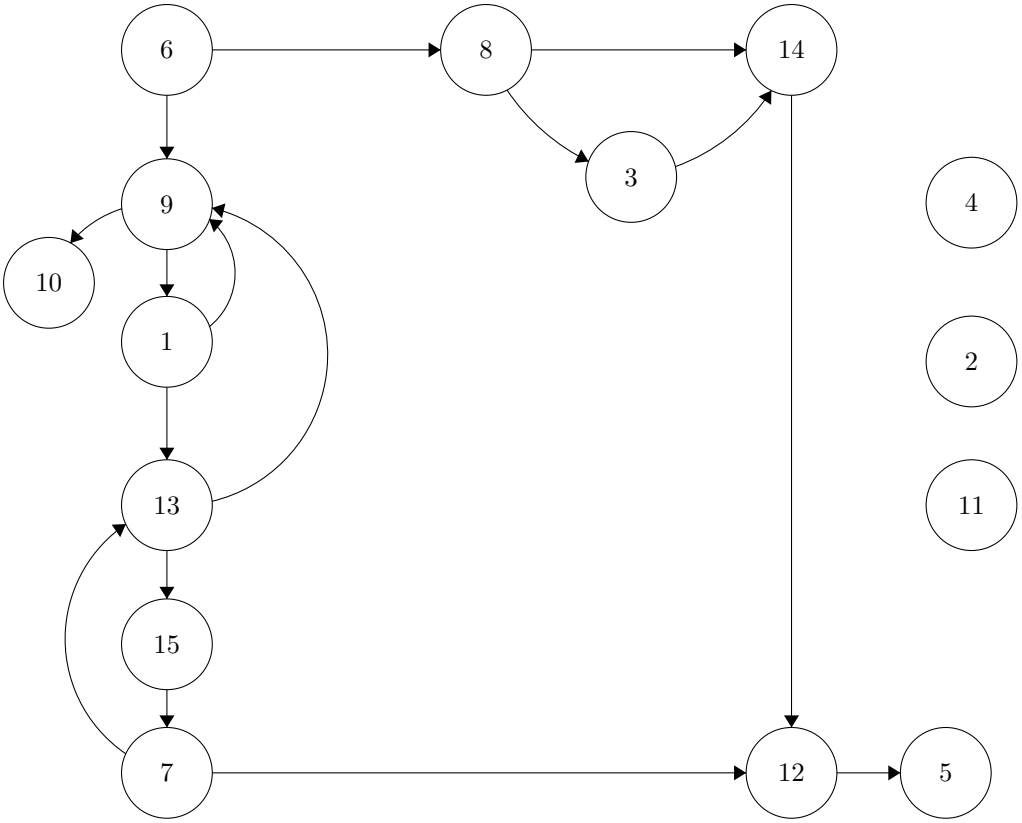
(a) Perception from visual encoding point of view is experiment based and it tracks eye movements. Perception is measured on criterias like response time and accuracy of detection (pre-attentive processing). In the given figure for corona cases, the visualization can lead to distorted perception because in stage 1 the eye does rapid parallel processing of low -level properties like like density, color. In the given map, the red color is densely distributed on east part of USA. Stage 2 is pattern perception and in this figure, there is an impression that red dots are sparse in west and in east the color is uniformly red on map. Also overall red dots are mostly in USA and very scarce in Canada and Mexico. In the final stage 3, there is goal-oriented processing by active sequential scanning that leads to conclusions from the perceived image. In the given example, dense distribution of red color dots on USA map can lead to conclusion that Canada border should remain closed.

(b) Populated countries are shown larger on gridded population cartogram. When we show the number of cumulative confirmed on this map, we can mitigate the distortion due to population density.

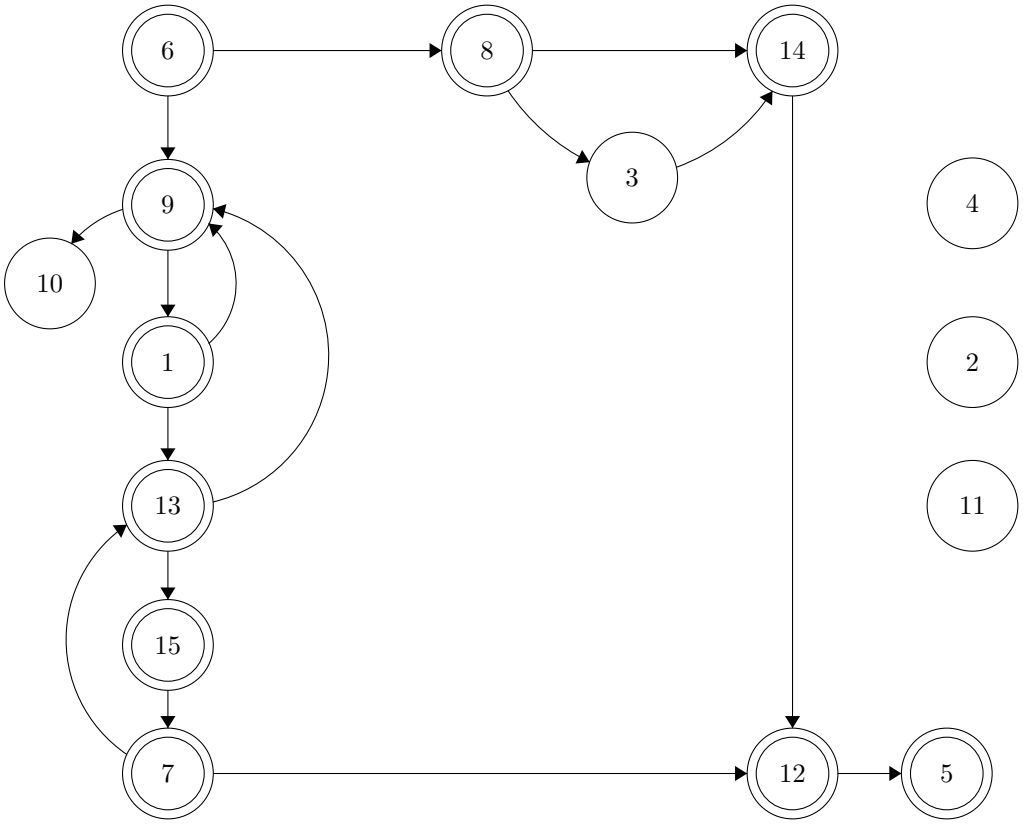


Task 2 Gestalt Laws

- Continuity - According to Gestalt law of continuity, our brain visualizes movement also in static images. Therefore while looking at nodes, our eyes perceive a unity between independent nodes when a continuous line connects them.



- Similarity - According to Gestalt law of similarity, our eyes look for similar visual characteristics and groups these elements together. Similar characteristics in images can be either color, shape or size. In this particular sketch, the similar visuals are nodes with two outer layers.



Task 3 Perceived Causality

- For same data, different types of graphs results to different 'cognitive reasoning'. Drawing conclusions (that students having breakfast get higher GPA) from visualization graphs which show 'number of breakfast eaten per week' on X-axis and 'GPA received' on Y-axis is a reasoning error. This is because the graphs only show the correlation between the two variables and has necessarily no direct relation that one event leads to other event (causation). The error in judgement from visual representation is called perceived causality.

  High levels of data aggregation lead to higher perceived causality in data. For example, people in independent researches were more convinced from bar chart (text also has same effect) that students having breakfast achieved higher GPA. On the other hand, line chart and scatter plot with lower aggregation of data (distributed data points with visible outliers) were considered casual and did not make people agree easily to the cause-effect scenario in the visualized data.

  It is thus important to analyse if visualization represents correlation or causation because when correlation is presented in form of graphs- especially in types of graph with high aggregation of data- then it can be easily mistaken as causation and lead to error in decision making. For example: a graph showing increase in crime with rising temperatures. Here, one event is independent of another, even if it can be argued that more people come out during warmer temperatures, this correlation cannot be taken as basis or seen as causation to make any decisions.

  The kind of visualization technique used influences the interpretation of data and information extraction.

Task 4 Change Blindness Test

- Impl
- I have made graph such that each bar has a unique color.
- Depends on the height of the bar. I could notice a change of about 20 pixels for the low height bar. But I needed more than 50 pixels to notice the change in the high height bar.