Part 1 – Channeling Hans

Using the given *GCI\_CompleteData4.csv* data file, we bind it to the *countries* and use d3 to enter and subsequently update the circles. As for the circles and their positioning, *Population* of each country represents the size of the bubble and the X and Y axes are plotted and scaled as per the *GDP* and the *Global Competitiveness Index* (GCI) respectively. A timeline is provided below to either go through the years or choose a particular year that filters the data for that year.

Key Features:

1. *X-axis* is scaled logarithmically to ensure uniform distribution of the GDP values across the width of the SVG. Similarly, *Y-axis* is scaled linearly against the GCI values. Appropriate *labels and scale ticks* appended to provide precise measures. The current year is displayed at the top.
2. Color scale used with the *SchemeCategory10* that d3 provides and scaled ordinally according to the *Region* values in the dataset. A *legend* representing the same is shown to provide an overview of the *colors* used for each of the *regions*.
3. Hovering over any of the country bubbles provides a *tooltip* view for the country name and it’s corresponding *GDP and GCI value* for the current year. In addition to this, *dashed help lines* get plotted on either axis from the center of the circles to help trace the exact precise value.
4. There are *Play* and *Reset* buttons to play the animation in series from 2007 continuous up to 2017 through a series of transitional updates and to stop the transition and reset the animation back to year 2007 respectively.
5. *Year buttons* are provided on the buttons-bar to give the ability to view the visualization for that particular year. Clicking on any of the year during the continuous animation, just stops the animation at that selected year.
6. The *missing GCI values* are handled gracefully by fading out the bubbles whenever a GCI value goes missing for a year. This helps with the perception of the graph as a whole and does not highlight the missing points significantly. They remain faded and continue to move along the X-axis to show the respective GDP values that we have for them.

Part 2 – Extending Hans

One thing that carries on from the previous visualization is the *Buttons-bar* and the *Play* and *Reset* functionality. To ensure coherent UX, the buttons and the control of the animation is common to both the parts and is placed in between. Again, the current year is displayed at the top. Following are the design rationale for each of the tasks:

1. Trail – This feature is provided *on-click* of the circle representing each country. From the successive transition, you’ll see the trail for the selected country. This is done by fading out the other countries. The *reset button* can be used to come out again of the trail. *On-hover* controls implemented above still continue to work so as to maintain the readability.
2. Multi-variate visualization – This is achieved as we give *two dropdown menus* to select the countries for comparison in terms of the *12 Pillars of GCI*. The selections are ‘Ireland’ and ‘India’ by default at the start. The changes on the dropdown selection are recorded and subsequently the bar charts are modified. Bar charts are used in this task because of the firm conviction that they do the best job in terms of binary comparisons. Here, we achieve that by plotting *grouped bars* for each of the 12 pillars and show them in *two different colors* representing each country (accompanying *legend* for the same). The year control, as said earlier, is common with the previous solution and we can easily *Play*, *Reset* or flip one by one through the years. One important *optimization* done here in terms of code is that *only the pillar values* are fetched at the start and maintained in a *map* which is then used throughout for the transitions and updates. A similar *on-hover* functionality as before is shown here with the user able to view the exact value of the pillar.