**Graph Generation:**

Tree Map:

A tree map displays hierarchical data in the form of set of rectangles. Each rectangle displays a value. In this problem, the data is passed from a csv file. There are 10 random data points used to generate the tree map. Two points are marked for testing purposes. The tree map is constructed on a separate .js file and it extends itself from the main chart class that displays all the charts for the trials of the experiment. The Tree map is structured in such a way that the data values will populate randomly. Every time a user enters the trial, the points will be generated on different rectangles which makes it challenging for the users to guess the right value of the larger to the smaller mark. The code is based out of d3.v4 version.

Source : The Treemap.js code draws inspiration from <https://www.d3-graph-gallery.com/treemap> with some modifications made based on the requirements of the problem.

Radial Bar Chart:

Radial bar charts are plotted on a polar coordinate system. They are mainly used for aesthetic reasons. In our problem, the radial chart has 10 points. Two points are marked for testing purposes. The 10 points are randomly generated. The two points that are marked changes it’s position every time when the user visits the page for a trial. The concentric circles inside the radial chart also varies due to the randomness. It varies based on the random values and random indices from the display function. The radial chart is written as a js and it is extended from the main chart class that contains different types of charts for series of trials. The reason for choosing radial chart is that it becomes complex to measure the smaller to larger value and thus, we can compare the error rate with other charts.

Source : The RadialChart.js draws inspiration from <https://bl.ocks.org/bricedev/8aaef92e64007f882267> with some modifications made based on the requirement of the project.

**Design Specification:**

The application is designed for the purposes of judging the difference between the small and the large data points presented in the charts as close as possible. To fulfill the requirements, we have used 5 different chart types namely Bar chart, Pie chart, Donut chart, Radial chart and Tree map.

The start page just gives basic instructions to the user to begin the experiment. Bootstrap buttons are used to make the page look appropriate.

Each chart has 3 trials that brings the total to 15 trials per participant.

Reasons for choosing the below charts:

1. Bar Chart: The heights of the bar vary after every trial. The random placement of marked points makes it interesting to judge the values.
2. Pie Chart and Donut chart are more or less similar in which the size of the pie varies, and the points also keeps moving based out of randomness.
3. Radial Chart: The dotted concentric circles that multiplies or shrinks makes the points go in random order.
4. Tree Map: The rectangles vary in size, shape and placement which again makes it interesting for the user to judge the values.

We have not colored the charts so that users don’t get an opportunity to use colors to figure out the best possible answer. As the points are generated randomly, with two points that are marked, it allows our trials to be unique for every participant. While moving ahead in the trials, the users can enter the values and submit them which takes them to the next page. Once all the trials are completed, a ‘Thank you’ message is displayed which indicates the user that they are done with the experiment. Finally, the answers will be recorded in MongoDB.