

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING
SCIENCES ISLAMABAD

BS(DS) Data Analysis and Visualization - Fall-2022

Semester Project

Due Date: 11:59 PM 05th, December 2022.

Total Marks: 170

Instructions:

- ✓ Zero marks will be awarded to the students involved in plagiarism.
- ✓ You must submit a single zip folder of your code file, output screenshots, and filled self-evaluation form in the Google Classroom. Folder name should be your name followed by Roll No.
- ✓ Your code should be well commented, and understandable otherwise marks will be deducted.
- ✓ Be prepared for viva or anything else after the submission of assignment.
- ✓ This will be a group project with a maximum of two group members allowed. Each group member will do their part, there should be an even division of work, but the demo will be done individually. So, for the demo, each group member can be asked questions from the whole project and not from his own part.
- ✓ Every student will submit this self-evaluation form in both soft and hard form:
https://docs.google.com/spreadsheets/d/1WLSlAEChOuGtWzmxHJmCBptZlH1O4h/edit?usp=share_link&ouid=109449918253732865091&rtpof=true&sd=true

• **NO queries will be entertained before two days of submission.**

Project Statement:

In this project, you have to develop a graph and map visualization solution consisting of a dashboard (containing multiple visualizations), four visualizations are necessary requirements in your solution i.e.

- 1. Map visualization (to represent airports)**
- 2. Timeline visualization (to represent the date of bird strikes in your data)**
- 3. Graph Visualization (to represent other features on your dataset)**
- 4. Hierarchy Visualization (to represent total bird strikes on different airports of each origin state)**

The below sample visualization (consisting of a sketch of the four visualizations) consists of one map visualization located at the top left, one graph visualization of your choice (e.g. bar charts) at the top right, and one timeline visualization located at the top center, and hierarchy at the bottom center. (This sample is not mandatory you can change it if you can do something better)

Map visualization (to represent airports):

For this map visualization, you first need to scrape the data yourself and create a map representing all the airports of different origin states with some unique symbol or color on the map. All airports and their state names are given in the dataset file.

Timeline visualization (to represent the date of bird strikes in your data):

This is a simple visualization that represents the timeline (dates of bird-strike) of the current provided data. This timeline visualization will also act as a visual filter to allow the user to select timeline.

Graph Visualization (to represent other features on your dataset):

There is no limitation about how you visualize the graph data in this visualization. But the requirement is this whenever the user selects the timeline, your visualization should represent all the factors that are in favor of the bird-strike during that timeline and how much impact each factor has. Secondly, your map visualization should also be updated accordingly like during that timeline bird strikes happen at which airports you have to highlight now the affected airports from the other airports.

Hierarchy Visualization:

There is no limitation that which hierarchy structure you are going to use, but the requirement is to visualize the total number of bird strikes on the different airports of each origin state. On the

parent node there should be label for the origin state with total number of incidents and on child node there should be a label for the name of airport and no of bird strikes/incidents occur.

1. All the visualizations in the dashboard needs to be fully interactive (i.e. panning, zooming, selection etc.)
2. The visualizations need to be linked via **brushing and linking**.
3. **Bonus Work:** In at least one of your visualizations, you have to incorporate Focus + Context technique (such as Fisheye / Cartesian distortion) to showcase advance interactivity. You can only attempt bonus if you have completed the rest of the assignment.

IMPORTANT: *You are not required to reimplement any visualization technique from scratch, but you may re-use the existing examples on d3 and create a dashboard following the instructions given above. The main objective of the project is to learn creating effective dashboards with good interactivity.*

The Dataset:

BirdStrikes csv file:

https://drive.google.com/file/d/1LnykpS5AcLFsZcODVcJ9cTQOxsdIXL7L/view?usp=share_link

Code:

Submit your working code in a zip file before the above-mentioned deadline time.

(Note) You may complete the assignment in a single HTML file or use multiple files (e.g. one for CSS, one for HTML, and one for JavaScript etc.).

Hints:

You have to use D3 for this assignment. All visualization should be done using D3 calls. You may use other libraries (e.g., jQuery), but you must credit them in the HTML file you turn in. Extensive documentation for D3 is available on the internet (e.g.

<https://github.com/d3/d3/wiki> , <https://bl.ocks.org/mbostock> etc.).

D3 versions:

There are multiple versions of d3 available (e.g., v3, v4, v5 etc.). Keep in mind that if you use multiple visualizations from different versions, you may have difficulty in integrating the code. I would recommend you to use visualizations from one version only.

As mentioned earlier, the visualizations in the dashboard you create must be interactive (e.g. single item selection, multi items selections, highlighting, panning, geometric zooming etc).

Zooming/Panning examples:

Your visualization will decide which kind of interaction is required. There are numerous examples of dragging, zooming and panning available on d3 website e.g. (

<https://bl.ocks.org/mbostock/2b534b091d80a8de39219dd076b316cd> ,
<https://bl.ocks.org/mbostock/3127661b6f13f9316be745e77fdb084> ,) or Brush & Zoom together (e.g.
<https://bl.ocks.org/mbostock/f48fcd929a620ed97877e4678ab15e6> ,
<https://bl.ocks.org/mbostock/34f08d5e11952a80609169b7917d4172>).

Brushing and Linking examples:

The multiple visualizations (i.e. multiple views) in the dashboard should also be linked via brushing and linking. There are various examples of linking as well as brushing available on d3 website e.g. (LINKING: <http://bl.ocks.org/dukevis/6768900> ,

<http://bl.ocks.org/curran/f4041cac02f19ee460dfe8b709dc24e7> ,
http://projects.flowingdata.com/tut/linked_small_multiples_demo/
 (<https://flowingdata.com/2014/10/15/linked-small-multiples/>) and BRUSHING (<https://bl.ocks.org/mbostock/4063663>).

Graph/Tree examples:

Similarly, for the visualizations you choose, there are numerous working examples available on D3 website. For example you will find various examples in d3 for tree / graph visualizations

(<https://bl.ocks.org/mbostock/95aa92e2f4e8345aaa55a4a94d41ce37> ,
<https://bl.ocks.org/mbostock/9a8124ccde3a4e9625bc413b48f14b30> ,
<https://bl.ocks.org/mbostock/8fe6fa6ed1fa976e5dd76cfa4d816fec> ,
<https://bl.ocks.org/mbostock/e9ba78a2c1070980d1b530800ce7fa2b> ,
<https://observablehq.com/@d3/circlepacking> , <https://observablehq.com/@d3/radial-dendrogram?collection=@d3/d3-hierarchy>).

For other visualizations refer to <https://bl.ocks.org/mbostock> , <https://github.com/d3/d3/wiki/Gallery> or <https://observablehq.com/@d3/gallery>

Rubrics:

Module/Function	Marks
Map visualization (scraping etc. included)	35
Timeline visualization	15
Graph Visualization	15
Hierarchy Visualization	15
Zooming, Panning & Selection (single, multiple)	30
Brushing & linking	40

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