# MM 802 - Visualization Mini-project (11%)

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**Due: Sunday, March 15, 2020**

**The design and development parts of this mini-project must be done by teams of two students. Each team can appoint a team member to submit a copy of the mini-project files and the mini-project report.**

## Objectives

This mini-project is intended to give you experience in developing client-server WEB applications incorporating **interactive data visualization** aspects. The project work gives you an opportunity to learn more about the HTTP protocol, WEB servers, and tools for examining, implementing, and debugging dynamic generation of HTML documents. The report part of the project aims at enhancing your technical writing skills.

## Project Context

Many organizations and projects rely on deriving insights from large amounts of diverse types of data. Simulation experiments, for example, are characterized by the generation of large amounts of timed events by many simulated entities. The WEB, on the other hand, is a rich source of diverse types of data (e.g., medical, governmental, financial, scientific, etc.) Raw data becomes more useful when we apply methods of deriving insight from it. Data visualization is the art of mapping data to visual constructs (e.g., graphs, gauges, and maps) that facilitate visual exploration, and pattern identification. Current advances in Internet computing allow the design and deployment of servers that provide storage, retrieval, and visualization.

WEB developers can use the available tools to automatically generate dynamic HTML documents capable of providing interactive data visualization constructs. Such constructs encourage user engagement by providing preferred dynamic views of the data. This mini-project gives you more experience in this direction. The enabling technologies of interest here include:

- Server side (and client side) programming languages (e.g., *Javascript* and *PHP*)
- Developer libraries that support functions such as HTML document traversal and manipulation, event handling, animation, etc., across a number of browsers (e.g., *jQuery*)
- Developer libraries that provide data visualization functions (e.g., *d3.js*, *FusionCharts*, *Chart.js*, and *Highcharts*)

– Libraries and tools that require less programming effort than developer libraries, and provide precomposed visual constructs and predesigned themes (e.g., *Kartograph*, *Leaflet*, and *Polymaps*)

## Requirements

The requirements of this project are simple, but challenging. You are to determine what questions are interesting and of value to ask with respect to interactive data visualization, and then answer these questions. In particular, you are required to do the following:

1. Select an application domain and sources of data for the domain. Develop a list of interesting questions that you can examine for the selected domain using the general class of tools mentioned above.

2. Develop server-side (and/or client-side) dynamic HTML pages that provide the user with the necessary interactive data visualization needed to answer the questions.

3. Submit a report describing your findings (see the details below).

4. Submit the developed programs and sample data to demonstrate your project work. Include a 'readme' file explaining the submitted program and data files.

## Deliverables

Typeset a project report (5 to 7 pages) with the following (minimal set) of sections.

– **Title frame:** include the following information:

  - **Title:** MM802 - Visualization Mini-project
  - **Date:** submission date
  - **Name:** *your name* (with *your team member name*)
  - **Project Title:** *choose a suitable title; don't use a generic title such as 'Project Report'*

– **Abstract:** Write **5 to 8 lines** abstract highlighting the important aspects in your project. The reader should be informed not only about the key points in the project, but also get motivated to read more.

– **Introduction:** Your introduction should cover the following aspects:

  - The application domain of your visualization project
  - Mention the questions of interest, and motivate the usefulness of finding answers
  - If your study involves importing datasets, describe the available datasets (sources on the Internet, format, size, etc.)

    - Relation to other existing work (e.g., a visualization site on the Internet that inspired you with your project work)

  - **Project Status:**

    - Indicate if you have reached your goals, and the project is working as intended, or if you have encountered difficulties that caused the project to be incomplete.
    - Outline the work done by each team member.

  - **Development Environment:** Explain the important aspects of your development environment such as your network configuration (clients, servers, mobile devices, cloud resources etc.), software tools, and important options setting of the software.

  - **Development Work:** This section may cover the following aspects:

    - Explain the software libraries and tools that you have used, extended, adapted, or developed.
    - Describe how to use your project.
    - Include a suitable set of sample output figures to explain your work.
    - Describe any important limitation(s) of your current implementation.

  - **Concluding Remarks:** You may conclude with brief descriptions of the following aspects:

    - What has been accomplished in the project
    - Lessons learned from the project
    - Possible future extensions to the project work

## Notes

- Some pointers to literature on some of the above tools will be mentioned in the classroom.

## Grading

**15 points:** Identification of an application domain, explanation of the data obtained in relation to the questions formalized

**60 points:** Quality of the development work done, documentation of the submitted programs, quality of the project demonstration

**25 points:** Quality of the project report (conformance to the layout specified above, and quality of the material in each section)

**20 points:** Presentation quality that will be conducted during the lecture time. Each group will be allocated 15 minutes to present. In each presentation, each group must state briefly the project application domain; the dataset and the tools used; the formalized questions; and a quick demo that shows the functionality of the developed programs.

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