DSCI-560: Data Science Practicum Laboratory Assignment 7
Instructor: Young Cho, Ph.D.
Oil Wells Data Analysis Visualization

This assignment focuses on providing you with experience in tools that allow you to present your data-wrangling results. In this lab, you will work with your team to associate and plot the data you extracted in the previous lab. You will create map layers to plot the position of the wells and represent the additional information we collected along with it.

1) Initial Setup

We will use web-related tools and platforms, as well as the MySQL database, for this assignment.
Please use a Linux environment. (Make sure to document any setup steps/requirements for running your scripts in the document you submit)
Do not spend much time on the installation and setup; instead, invest your time exploring the concepts and improvising your submission.

2) Webpage and Mapping

For this task, you will focus on creating map layers to plot the wells and represent the additional information we collected along with it.
Set up an Apache web server and create a webpage with a section for the map to be displayed.
Integrate maps for your data using libraries (You may use any map APIs and platforms available, including OpenLayers, as mentioned in the sample links below, or consider alternatives like Leaflet, etc.)

https://openlayers.org/en/latest/examples/overlay.html

Configure the map to display a base map and set the initial view. Then, push pins (markers) will be added to the map to indicate the locations of the wells. Each push pin should correspond to a well location. This can be done differently, depending on the platform that you decide to use. Ensure that the coordinates (latitude and longitude) from your database are used to position the push pins accurately.
Implement a mechanism that displays a popup window with detailed information when a push pin is clicked.

https://openlayers.org/en/latest/examples/popup.html

The popup should display all the data related to the well, including well-specific information, well-specific simulation data, and any additional data collected from the website.
Thoroughly test your web page to ensure the map, push pins, and popups work correctly. Make sure that the data is presented neatly and easily read within the popups.
Document your code and provide instructions on how to use your web application.

3) Resources

Introduction to OpenLayers: https://www.youtube.com/watch?v=DqzJ6pwSwWk
Node.js for MySQL: https://www.w3schools.com/nodejs/nodejs_mysql.asp

4) Team Discussions

Your team is expected to meet in-person/virtually each day of the week and discuss the assignment progress and the next steps. Document and compile minutes of all meetings in a separate file called 'meeting_notes_L7_<team_name>.pdf'

5) Submission

Make one submission per team. Each team must submit all the code files for the working solution, a readme document containing information for running the code in PDF format, and a document that outlines the minutes of all team meetings in PDF format.

Please include a detailed GitHub history describing what each team member submitted.

For the demo video submission, prepare one video per team that demonstrates the entire working solution, explains how the data tables were loaded, demonstrates query results, and talks about the design decisions made along with reasoning for the same. Also, include details about how your team preprocessed the data. Please include the team's name and the names of all members in the video.

There will be a 50% penalty for all late submissions.