Take-home Project Instruction

October 1, 2020

1 What is given

The project consists of two parts:

1.1 Server

A completed server is given to you in `project\server\`. You do not need to modify it. To run the server, you need `Python 3.7` and `pipenv`. To start the server, run the following commands (assuming you start at the project root directory):

```
cd server
pipenv install
pipenv shell
python server.py
```

Once running, the server will listen on `127.0.0.1:5000`. The server will handle `connect` event through Socket.IO protocol (https://socket.io). On a `connect` event, the server starts to send `data` event through Socket.IO protocol at a frequency of 1 Hz. The `data` event carries a JSON object as its payload. A typical example of the JSON object is:

```
{
    'time': 1601405408833,
    'Benzene': 1.56,
    'Acetone': 0.32,
    'latitude': 20,
    'longitude': 30
}
```

The meaning of each field in the JSON object is as follows:

Field	Description
time	Sampling time. Milliseconds since 1 January 1970 UTC, monotonically increasing.
Benzene	Concentration of Benzene, value in range of [1, 2].
Acetone	Concentration of Acetone, value in range of [0, 1].
latitude	Sampling latitude, value in range of [-90, 90]
longitude	Sampling longitude, value in range of [0, 360]

You can test the Socket.IO server using https://amritb.github.io/socketio-client-tool/:

- Connect to "http://127.0.0.1:5000", leaving path and options empty
- Listen to "data"

1.2 Client

An incomplete client is given to you in `project\client\`. It is a React project (https://reactjs.org/). To run the client, you need `Node LTS version` (https://nodejs.org/en/) and `npm`. To start the client, run the following commands (assuming you start at the project root directory):

```
cd client
npm install
npm start
```

If successful, you will get:

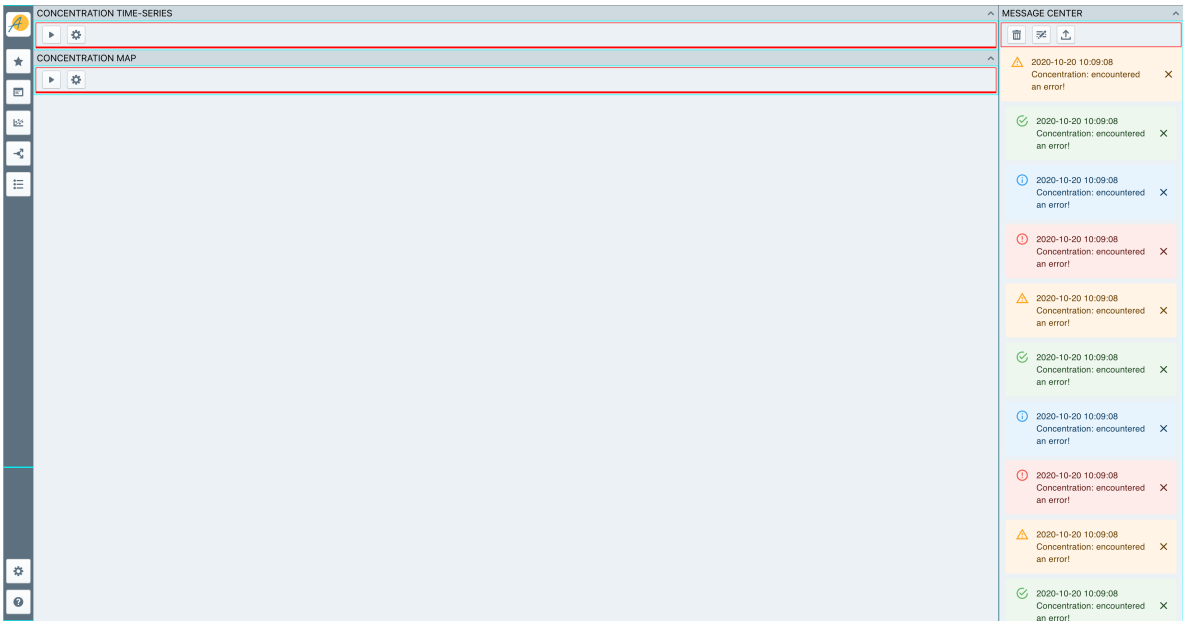

Figure 1: The initial client.

2 What is the task

Your task is to add code in the client to achieve:

- Connect to the server through Socket.IO protocol;
- After connecting to the server, retrieve the JSON object by handling the `data` event;
- In the "CONCENTRATION TIME-SERIES" panel, add a chart to visualize the temporal variation of Benzene and Acetone concentrations. The x-axis is time, the y-axis is concentration. You will use `time`, `Benzene`, and `Acetone` from the JSON object described in Section 1.1.
- In the "CONCENTRATION MAP" panel, add a map to visualize the GPS track. You will use `latitude`, and `longitude` from the JSON object described in Section 1.1.

You can only make modifications in:

- `project\client\package.json`
- `project\client\src\components\concentration\`

Things to remember:

- You can use open source libraries.
- If you use an access token for a map service, please make sure it works in your submission.
- Please delete `project\client\node_modules` when submitting your code.

3 What is evaluated

- Coding style: make sure you follow good coding styles (https://javascript.info/coding-style), use a linter to check your code before submission.
- Data visualization