**Web-Based GIS Assignment 2 – Technical Report**

*Student no: 201578549*

**Motivation**

This project was inspired by the Facebook group [Walks in Leeds](https://www.facebook.com/groups/235138591475168/), which was started in lockdown in 2021 when walking was the excitement of the day, as a way for locals to share their favourite routes with others.

Being new to Leeds, I enjoyed following some of the routes posted on the group and it led me to discovering parts of Leeds which I wouldn’t have otherwise. However, it occurred to me that it would be much easier to choose which route to follow if they were displayed on an interactive map, if you could filter between walk lengths, and if you could submit your own routes to share with others to that same map.

**Requirements**

The data requirements for this project were straightforward, as I simply mapped the routes which I have personally done around Leeds. To map these, I used an [online tool](https://geojson.io/) for creating GeoJSON polylines which can then be saved as a feature layer and imported to the site.

**Technologies and Features**

* The site was hosted by the dialogplus server and the map was implemented using the Leaflet API.
* All the HTML was placed within a sidebar which is based on the [leaflet example](https://noerw.github.io/leaflet-sidebar-v2/examples/) of the implementation of the [V2 sidebar](https://turbo87.github.io/sidebar-v2/) plugin. The style of the sidebar was changed by editing the sidebar plugin CSS stylesheet.
* Basemap control was implemented using the leaflet basemap control [plugin](https://github.com/consbio/Leaflet.Basemaps), and OSM and Google tiles are used to populate the map.
* Functions were written so that on hovering over routes, these are highlighted, and when clicked the map zooms in to show the route and displays information on the ‘routes’ tab.
* When imported, the routes are sorted into four groups depending on their length so that they can be filtered by length on the map.
* The leaflet ‘Draw’ [plugin](https://github.com/Leaflet/Leaflet.draw) was implemented so that the user can draw their own route on the map, and when they finish, they are told the length of their route.
* A html contact form was created using the W3Schools [tutorial](https://www.w3schools.com/howto/howto_css_contact_form.asp), which submits information using the ‘POST’ method to the ‘contact\_form.php’ script which accesses the dialogplus server and inserts the information into a previously created table.
* An html form was created which appears when the user completes a drawn route. The form asks them to add a description to their route and includes a hidden variable which is the GeoJSON of their route converted to a string, and is imported from JavaScript using jQuery. The submission is successfully added to the database using ‘route\_submit.php’.

**Issues Encountered**

* I had hoped to implement a geolocated marker so that users are able to view their location when they’re following a route on the map. This was attempted using the map.locate() function from the Leaflet library but was unsuccessful because the functionality is only allowed on secure HTTPS. If the site could be moved to a HTTPS address this functionality could be activated.
* An attempt was made to convert the user’s drawn routes stored in the database back to GeoJSON to be shown on the map once these had been approved. Complications were encountered which are suspected to be a result of the special characters included in the ‘stringified’ GeoJSON route interfering with the execution of the code.

**Further Development**

* Further effort could be invested into implementing geolocation, either by finding another plugin which can be run on an unsecured http site, or by using a secure https host.
* More attempts could be made to implement display of user’s submitted routes once they are approved. Other ways to store a GeoJSON formatted variable in a database table should be explored.
* Only a few routes are currently displayed (the routes which I have personally been on). To make the site a more useful resources, many more routes should be added.

**Security Considerations**

* A ‘sanitise’ function has been added to both PHP scripts which fetch form data to be added to the database. One of their uses is to remove any characters which could be used as an SQL injection attack.

All the relevant code can be found in the [Github repository](https://github.com/kialuna/Leeds-Walking-Routes).

# References

**Agafonkin Vladimir** Using GeoJSON with Leaflet [Online]. - https://leafletjs.com/examples/geojson/.

**capie69** Leaflet Map API with Google Satellite Layer [duplicate] [Online]. - https://stackoverflow.com/questions/9394190/leaflet-map-api-with-google-satellite-layer.

**Svinjica** How to draw a polyline using the mouse and leaflet.js [Online]. - https://stackoverflow.com/questions/42939633/how-to-draw-a-polyline-using-the-mouse-and-leaflet-js.

**TomazicM** Getting total length of polyline from Leaflet draw? [Online]. - https://gis.stackexchange.com/questions/422864/getting-total-length-of-polyline-from-leaflet-draw.