The F0 Telemetry Tracker is a Python-based project that provides a graphical user interface (GUI) designed to offer beginner-friendly information during an F1 Grand Prix. The primary goal of the project is to help new fans learn about the sport, particularly given its rapid growth in popularity in the United States in recent years. This document outlines the features of the telemetry tracker and the requirements for running it.

The project centers on a single, intuitive GUI that delivers simple yet crucial information about a Grand Prix weekend. The GUI is divided into two main sections: race session data and regulation data. The race session data leverages the FastF1 API to provide information not only about race sessions but also qualifying, practice sessions, and sprint races, all of which are displayed in the left-hand text widget.

Additionally, the GUI features a track visualization tool to further aid newcomers to envision the race. The regulation data section covers six key aspects of the sport: car specifications, tires, race procedures, scoring, flags, and penalties. These six features are essential for understanding the fundamentals of the sport and are presented in a clear, accessible format for users on the right hand text widget.

Despite its simplicity, the telemetry tracker offers a rich set of features. As previously mentioned, the race session functionality fetches telemetry data for every F1 race session from 2018 to 2024. Users can select a specific season and session type, then load the data to view the results in the left-hand text widget. The session data is organized in a proper grid format, displaying the finishing order along with the driver's position, name, team, and lap time. Additionally, users can explore the selected track using the "Visualize Track" feature, which shows a detailed map of the circuit, complete with marked corners and the start/finish line.

The race data also includes sprint races, which were introduced to Formula One in 2021. Supporting sprint races required adjustments to the core code to ensure they function correctly across all relevant seasons.

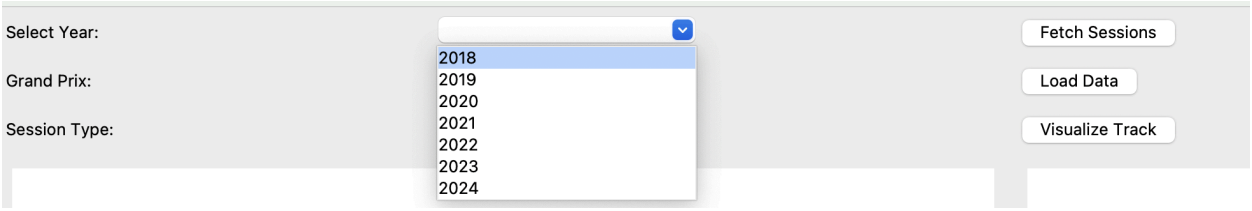
Starting the GUI is as straightforward as using it. Users need to ensure they are running Python 3.9 or later, have installed the required libraries, and maintain a stable internet connection. The necessary libraries include FastF1 (version 3.1.0 or later), Pandas (version 2.0.0 or later), Matplotlib (version 3.7.0 or later), NumPy (version 1.24.0 or later), and Requests (version 2.31.0 or later). These dependencies can be installed using a single command "pip3 install -r requirements.txt", which makes setup quick and hassle-free. Once the libraries are installed, the user is ready to launch and explore the tracker.

After launching the GUI, users can begin by selecting a season from the "Select Year" dropdown menu, which provides options from 2018 to 2024 ( since this is when the API data works the best ). Then the user can select the "Fetch Sessions" button to gather all of the race sessions that have happened for that year.

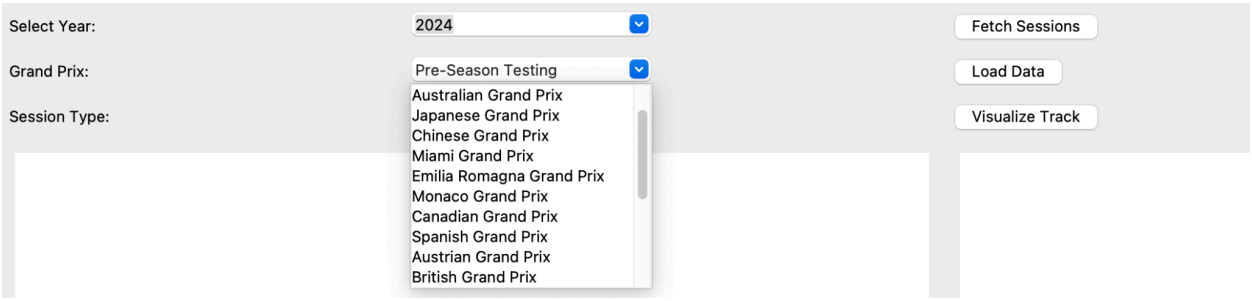
Afterwards, users can select the specific race session type, such as Practice (FP1, FP2, FP3), Qualifying, Race. Some races from the 2021 season are sprint weekends, in which there will be FP1, Sprint Qualifying, Sprint Race, Qualifying, Race. These races are less common but do occur. After finalizing the choice of race session the user can click the "Load Data" button which will display the session results in the left-hand text widget, formatted to show the drivers position, number, name, team, final time, and last lap. For a more interactive experience, users can also select the "Visualize Track" feature to explore a detailed 2D map of the selected circuit, complete with corner markings and the start/finish line. Additionally, the tracker provides 6 additional buttons to give the user prominent information on Formula one regulations such as: car specifications, tires, race procedures, scoring, flags, and penalties which populate the right-hand text widget. To get a better visual understanding of the GUI, attached below is an annotated image of the GUI to help users get race data.

For clarification, the “Visualize Track” feature can be used as either the fourth or fifth step in the process. Since the track layout remains consistent across practice sessions, qualifying, and the race, the only visual difference in the track display will be the header on the figure, which indicates the chosen session type. If “Visualize Track” is selected before specifying a session type, the session defaults to FP1, and the header will reflect this. It is important to note that the “Visualize Track” feature generates a separate figure to display the circuit, and selecting another race will replace the previous track display. Additionally, the regulation data is designed to be accessible at any time, allowing users to view it regardless of the selected session type or year.

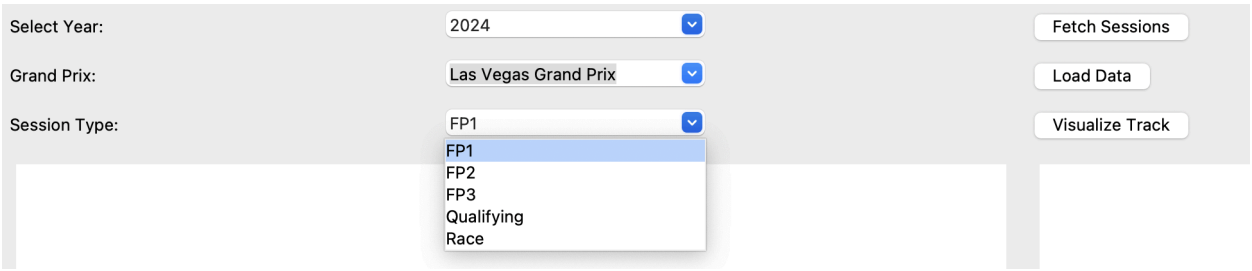
Below is a set of images illustrating the race data selection process. The first image shows the dropdown menu for year selection, allowing the user to choose any season from 2018 to 2024.



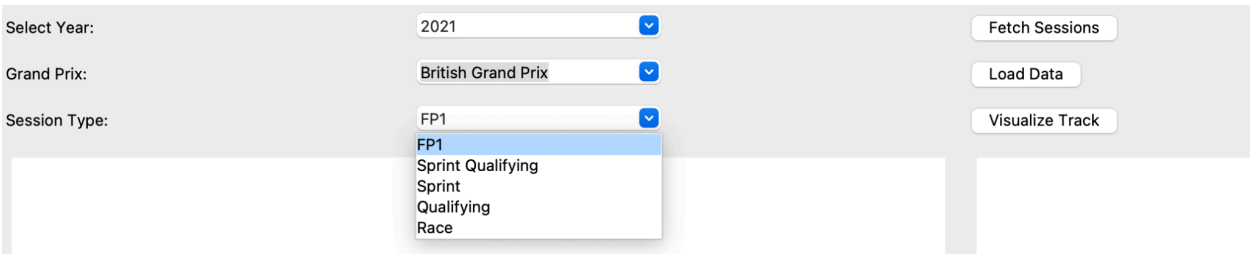

In this example, the year 2024 was selected. It is important to remember to click the "Fetch Sessions" button after choosing the year; otherwise, the "Grand Prix" and "Session Type" dropdown menus will not be populated. Once the Grand Prix dropdown menu is populated, the user can select any race from the chosen season.



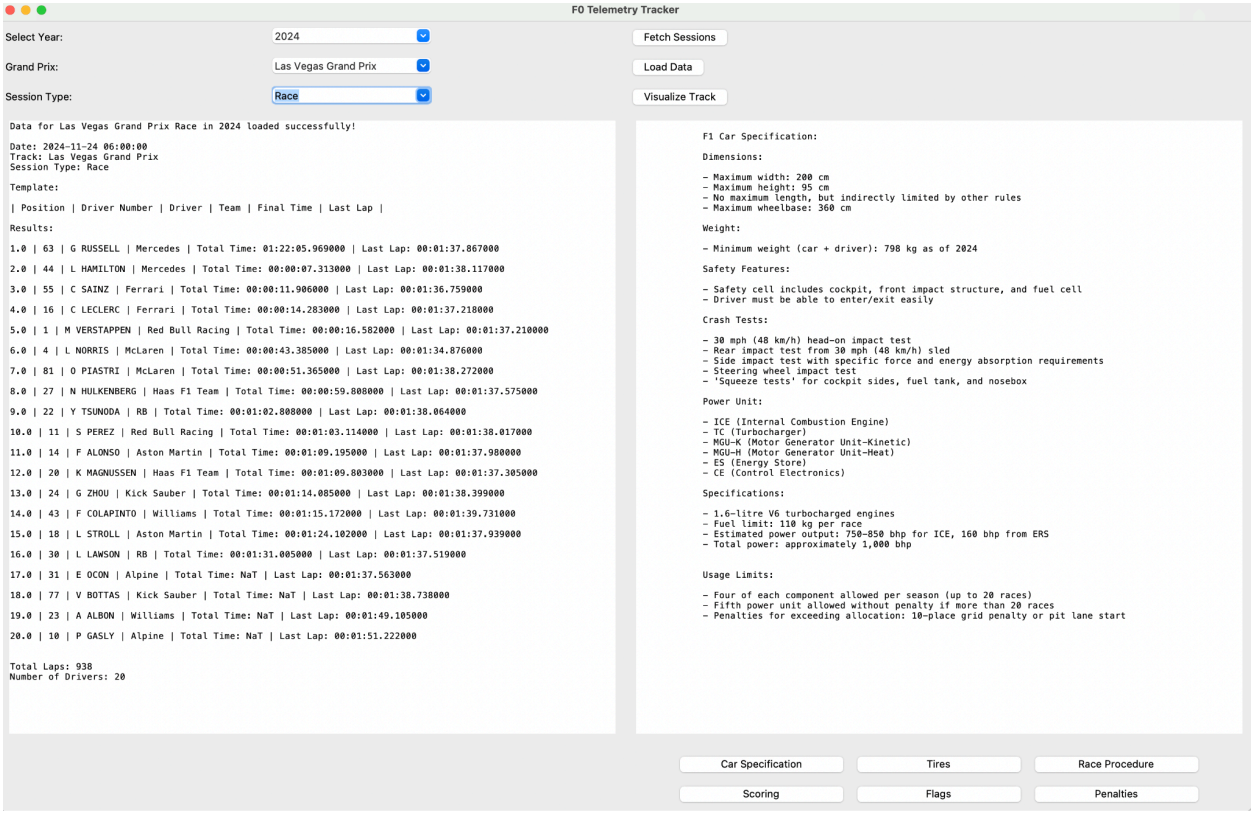

Continuing with the example, the Las Vegas Grand Prix has been selected. The user can now choose the session type from the available options: FP1, FP2, FP3, Qualifying, or the Race.



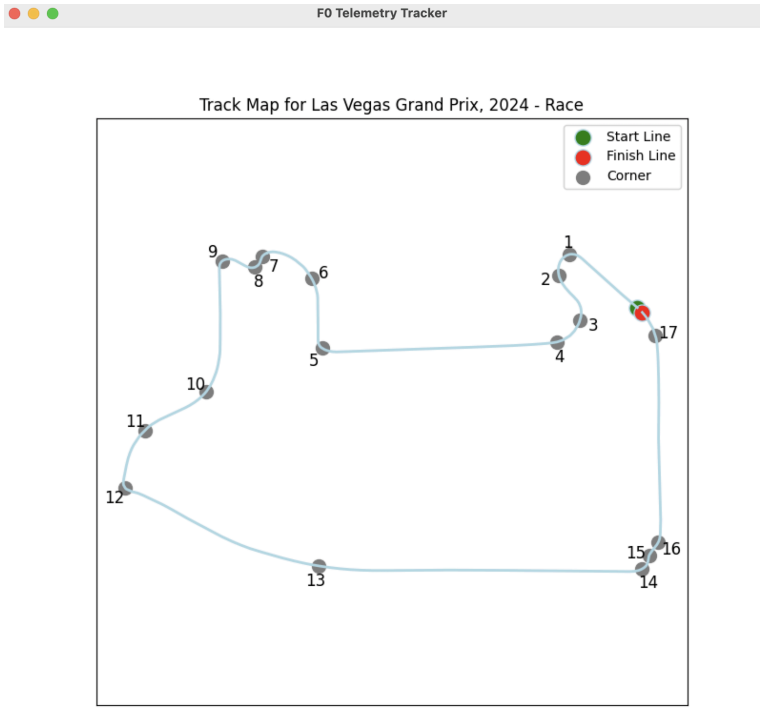

As previously mentioned, sprint races are included in the tracker, though their session data differs slightly. Below is an example from the 2021 British Grand Prix, which features: FP1, Sprint Qualifying, Sprint Race, Qualifying, and the Race.



Continuing with our example, the filled in GUI is shown below, displaying all the race session data. Additionally, the regulation data section is populated with the car specifications as an example.




Below is the separate figure displaying the track layout for the Las Vegas Grand Prix.



If you encounter issues while using the F0 Telemetry Tracker, there are a few common problems and solutions to consider. If the GUI doesn't launch, ensure that Python 3.9 or later is installed and all required libraries are properly configured. If dropdown menus fail to populate, make sure you have selected a year and clicked the "Fetch Sessions" button, and verify that you have a stable internet connection for the FastF1 API to retrieve session data. For issues with the "Visualize Track" feature, confirm that a valid session and year have been selected, and check your Matplotlib installation, as it is used to generate the track figures. Regulation data can be accessed at any time, regardless of the selected session or year, by clicking the relevant button for topics such as car specifications or penalties. For further assistance, refer to the images in this document or consult the FastF1 API documentation ( https://pypi.org/project/fastf1/ ) if any problems persist.

In conclusion, the F0 Telemetry Tracker is designed to provide a user-friendly interface for both new and experienced Formula One fans. It combines telemetry data from race sessions with valuable regulatory information to create a comprehensive tool for following F1 events. With its simple setup process, clear display of session results, and interactive track visualization, the tracker enhances the viewing experience for fans while offering easy access to essential data and regulations. This documentation serves as a helpful guide for beginners watching the sport of Formula one, making it easier to get into the sport.