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| ESILV A5 DIA3 2024-2025 |
| Webscraping & Applied ML Project |
| Part 1 : Carbon Footprint Travel Optimizer |

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# Introduction : Presenting the project

In an era of escalating climate crisis, global tourism plays a significant yet often overlooked role in environmental degradation. While many travelers dream of exploring exotic destinations, few consider the carbon footprint of their holiday choices. Global transportation accounts for approximately 24% of CO2 emissions, with tourism-related travel contributing substantially to this figure.

Take for exemple Maria, an enthusiastic traveler planning her annual vacation. She's torn between a dream trip to the Maldives and a potential hiking adventure in the nearby mountain ranges. Unbeknownst to her, her destination choice could mean the difference between generating 2.5 tons of CO2 or just 0.3 tons for her trip. A long-haul flight to a tropical paradise could equal the annual carbon emissions of an average car, while a local eco-friendly destination could dramatically reduce her environmental impact.

The idea of calculating the carbon impact of our travels emerges as an innovative solution to transform holiday travel decision-making. Unlike traditional booking platforms that prioritize picturesque destinations and lowest prices, this project aims to empower travelers with a revolutionary approach: choosing vacation spots based on the travelers’ environmental impact.

By providing real-time carbon emissions data, alternative destination suggestions, and comprehensive environmental impact analysis, the application transforms holiday planning from a purely aesthetic or economic calculation to a holistic, environmentally responsible choice. It's more than a travel tool—it's a platform for conscious tourism, enabling users to explore the world while minimizing their ecological footprint.

The project responds to a critical need in modern travel: helping wanderlust-driven individuals make informed, sustainable choices that protect the very destinations they want to explore. It bridges the gap between travel excitement and environmental responsibility, proving that meaningful experiences don't have to come at the planet's expense.

# Technical part: User’s journey

## Application Programming Interface

Using an API, it will provide the user an easy interface where he can navigate and choose his destinations wisely.

I plan to use streamlit, because I already have knowledge of how to use it and I found it easy to code and relevant for this project.

Globally the users will be able to input for exemple:

* Origin city
* Destination cities (multiple choice to compare the lowest carbon impact travel)
* Number of travelers
* Travel dates
* Travel class (Economy, Business, First)
* Trip type (One-way or Round trip)

Then the application will scrape flight data from our sources (Google Flights and ICAO’s Carbon Calculator to cross-reference emission data).

It will rank the flights based on their environmental impact and display flight details (e.g : Carbon emissions, price, airline, flight duration…)

## Data Sources and Feasibility Assessment

As mentioned previously, our data comes from Google Flight and ICAO (for now). I have already tried to scrape both sites using Selenium and Beautiful Soup but made few easy tests.

I had over options of sites like TripAdvisor, SkyScanner and others but Google Flights provides us comprehensive flight information, low carbon impact flights, real-time pricing, and multiple route options. It’s the most complete site I have found for the project.

I also wanted a site that delivers precise data (numbers) of carbon emissions for flights from one place to another. So, after some research I found ICAO, which seems well fed. It misses some places but it’s still very complete.

I want to use it to complete the study and more precise data about the traveler’s impact.

## Challenges

I might encounter some challenges; I risk having issues with data consistency because of the varying formats across different sources. I might need to normalize everything.

Also, I can meet some restrictions with ICAO, so I’ll have to find other ways to calculate the emissions or other sources.

The websites are dynamic it can be tricky to scrap them.

# Next Steps

Here are the next steps I’ll have to do:

* Refine scraping algorithm
* Develop robust data normalization
* Create user-friendly interface
* Implement machine learning for emissions prediction

# Conclusion of this first part

In a world where every individual action counts, the Carbon Footprint Travel Optimizer offers a tangible, technology-driven approach to making travel more sustainable. It transforms the abstract concept of carbon reduction into a practical, accessible tool that empowers travelers to make a difference—one flight, one trip, one destination at a time.

The project is not just about reducing emissions; it's about reimagining travel as a responsible, conscious experience that respects our planet's delicate ecological balance.