Semester Project in Computer Science II: EcoLens – Raising awareness around food habits

Andrea Giovanni Perozziello
Advisor: Robert West Co-Advisor: Kristina Gligoric
Data Science Lab
Department of Computer Science, EPFL Lausanne, Switzerland

***Abstract*—In a world where the food industry accounts for at least 30% of GHG emissions, eating habits play a key role in the well-being of our ecosystem, and there is therefore a growing responsibility on the individual to make informed decisions about his consumption [1], [2], [3].**
With more than 30 eateries on the EPFL campus, it is not always easy for consumers to assess how sustainable the meals are, given the overwhelming amount of options and lack of clarity in relation to sustainability.
Finally, having a simple means at hand of informing and incentivising consumers in their everyday lives would allow them to take more educated choices when ordering food; perhaps the user, guided by our application, could also reconsider choices made outside the campus. [4]

The author thanks the Data Science Lab, Ecolens, the Zero Emission Group [5], and the Act for Change Lab [6] for their invaluable support during the development of this project.

1. Introduction

Climate change is one of the greatest issues of our lifetimes, animal agriculture alone is responsible for more than a third of global greenhouse gases emissions [1].

The ability to inform people about what impact certain food choices have will play a vital role in the rate of growth of the climate crisis. By sharing such information, the individual would have a deeper understanding of the underlying problems related to food consumption.

This project aims to develop an application providing clear and objective information about food served on campus and the impacts it has. The user will be able to check every menu in detail, with a score describing the ecological impact, and eventually get rewarded when choosing low-impact dishes.

In particular, our app offers the following features:

1) The user can monitor all the restaurants on campus, and their menu.
2) The user can filter restaurants by distance from their current position, or according to their favourites.
3) The user can filter menus based on their diet (e.g. vegetarian, vegan, etc...).
4) Through a ranking system, the user can compare himself with the other users. Faculties are ranked in a similar manner, based on the score of their students.

A. Structure of the Report

In Chapter 2 we present the architecture of the software we developed. Each component is detailed in a specific subsection.
Chapter 3 gives an overview of the iOS application, and a brief explanation of the main views that compose it.
Finally, Chapter 4 concludes the report and highlights directions for future work.

2. Architecture

Our app features three main components. First, a Web Service using "Apache Tomcat" as a container [7].

Second, a MySql database storage where information is stored.
Finally, a mobile app that can query information from the above-mentioned components.

Figure 1 shows the described architecture.

Fig. 1. Content Diagram of the application

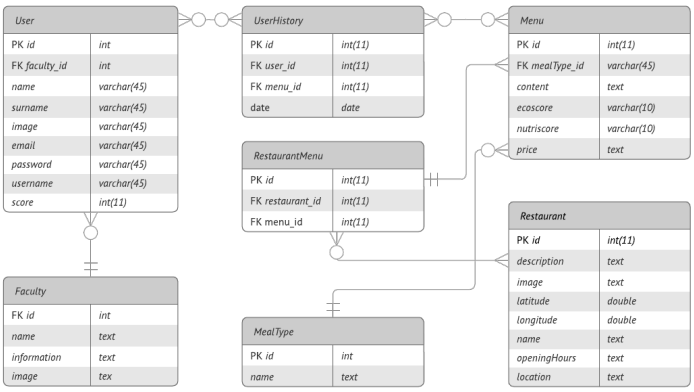

Fig. 2. Database schema

A. Web Service

HTTP responses and requests are managed inside the web service we developed by using servlets, which act as interface with the mobile application. Servlets have been implemented to provide the data needed for the visualizations supported in the app (i.e., restaurant name, user score, etc.). To accomplish that, two types of HTTP methods have been used inside the Web application: GET and POST.
In order to retrieve the data, which we will then graph in the application, a request is made for every specified user or faculty by using a servlet. This servlet retrieves the averaged or absolute value of each user or faculty. The score for all requested users and faculties are then visualized in the app by a graph chart representation.

B. Database

The MySql database is composed of seven tables illustrated in figure 2.

3. The iOS app

The iOS application is written in Swift and developed in Xcode. The implementation mostly consisted in connecting different "Views" which communicate among them, and underneath interact with the Web service we developed.
The "Views" are SwiftUI views [8]. SwiftUI is a new framework released by Apple in 2019, which allows the creation of user interfaces using a declarative syntax. These user interfaces can then be used on any Apple device, using just one set of tools and APIs. In the following, we present and describe the most relevant views of the app.

A. Home

As Figure 3 indicates, this is the root view, in other words the first view displayed to the user. If the user is not yet logged in, a page sheet will appear requesting authentication. In this view, the user can access all the restaurant and menu related information. The view displays a tab-bar at the bottom where the user can navigate to the rankings view (illustrated in Figure 4) and to the settings view. At the top-right is present a rounded button with the user image to navigate to the user profile view (see Figure 5).

B. Ranking

The ranking view displays two ordered lists for both users and faculties. All users are sorted by their average score. Similarly, the same is done for the faculties (see Figure 4).

C. Profile

In the profile view (see Figure 5), the user can see all their personal information. Towards the bottom of the page, a bar chart is displayed. According to which segmented button is selected, this chart can either display the absolute or the averaged score. The absolute score gives the score of each entered meal, whereas, the averaged score refers to the mean score of the entered menus up to that point. Hovering with the finger on any bar of the chart will display the associated value.

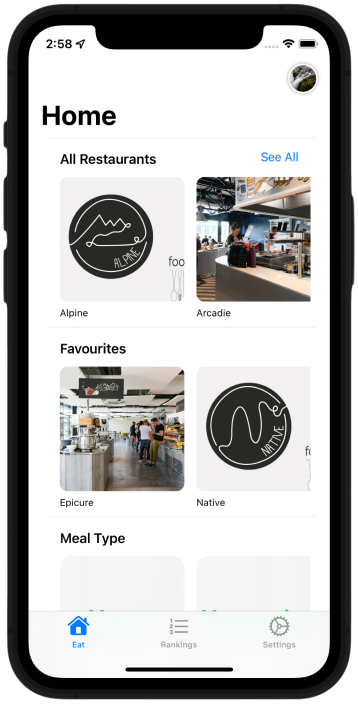

Fig. 3. The Home view, with its restaurants, and the menus filtering options

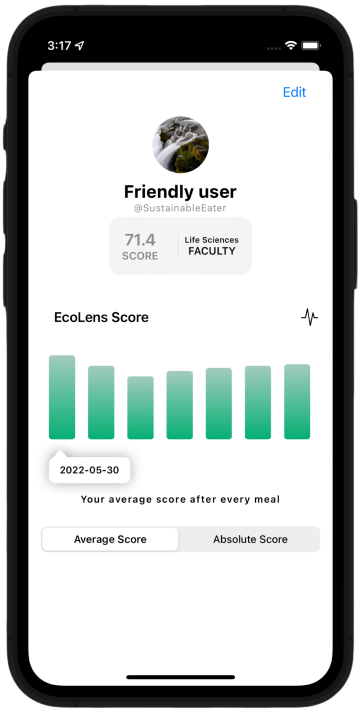

Fig. 5. The profile view displaying a bar chart for the average value of the given user

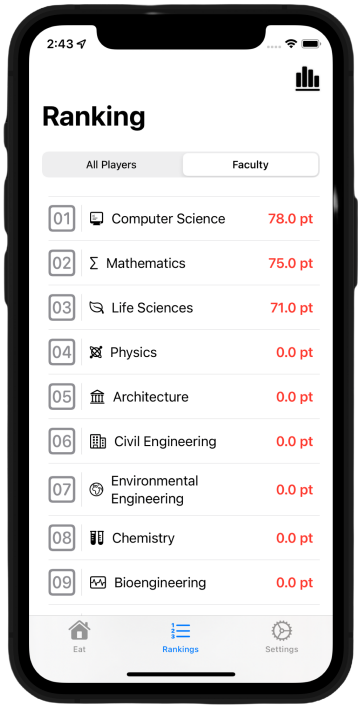

Fig. 4. The ranking view for all univeristy's faculties

4. Conclusion & Future Work

We have presented an iOS app to aid people achieve a more eco-friendly diet in their everyday life on campus.

The difficulties we faced during the development of the project mostly concerned the web application, due to some uncertainties: these troubles were linked to retrieval of the data to present in the app. No suitable API has indeed been found. For this reason, with more time, its design could be substantially improved and its functionalities augmented.

A feature for allowing users to create a team or join an existing one will also be implemented. The team contest will work similarly to the faculty contest. This would improve the more playful aspect of the application, which would be conducive to better educating people about their consumption choices.

Also, the GUI could be reworked to gain more appeal.

Summarizing, the main directions for future work are:

1) Improve the web service implementation.

2) Find a suitable API to provide the application with real restaurant and menu data.
3) Team contest feature to be implemented.
4) The GUI design objectives are still to be fully achieved.

Future work by EcoLens would include: publishing the iOS application on the Apple Store to make it available for the EPFL community. Following this, we would aim to develop the Android version of the application, and finally to establish a coherent business model.

Through the development of this app, we hope that the consumer can better face the ecological and moral consequences of their actions, aided by the naive gratification of competition.

The whole project can be found on GitHub[1].

REFERENCES

[1] X. Xu, P. Sharma, S. Shu, T.-S. Lin, P. Ciais, F. N. Tubiello, P. Smith, N. Campbell, and A. K. Jain, "Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods," *Nature Food*, vol. 2, no. 9, pp. 724–732, Sep. 2021, number: 9 Publisher: Nature Publishing Group. [Online]. Available: https://www.nature.com/articles/s43016-021-00358-x

[2] J. Poore and T. Nemecek, "Reducing food's environmental impacts through producers and consumers," *Science*, vol. 360, no. 6392, pp. 987–992, Jun. 2018. [Online]. Available: https://www.science.org/doi/10.1126/science.aaq0216

[3] "You want to reduce the carbon footprint of your food? Focus on what you eat, not whether your food is local." [Online]. Available: https://ourworldindata.org/food-choice-vs-eating-local

[4] "EcoLens – Raising awareness around food habits." [Online]. Available: https://www.epfl.ch/about/sustainability/community/act4changelab/projects/ecolens-2/

[5] "Zero Emission Group: Research activities' carbon accounting." [Online]. Available: https://www.epfl.ch/labs/skil/en/skil-for-credit/credited-projects/zero-emission-group-research-activities-carbon-accounting/

[6] "Act for change." [Online]. Available: https://www.epfl.ch/about/sustainability/community/act4change/

[7] "Apache Tomcat® - Welcome!" [Online]. Available: https://tomcat.apache.org/

[8] A. Inc, "SwiftUI Overview - Xcode - Apple Developer." [Online]. Available: https://developer.apple.com/xcode/swiftui/

[1] "Github page of epfl-dlab EcoLens repository", https://github.com/epfl-dlab/ecolens