Bilkent University

Department of Computer Engineering

Senior Design Project

Consigliere

Project Specifications Report

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Oct 13, 2017

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Senior Design Project course CS491/2.

Contents

1. Introduction

In the last few years, people's daily lives have changed in many different ways. Simple things became more complicated and we started to take more responsibilities, and with more responsibilities, came higher expectations. Consequently, concepts such as making plans, using our time efficiently have gained more importance than ever before. Yet, it is a known fact that nowadays people struggle when it comes to planning a day and running errands. With the current technologies, it is possible to make a plan by entering the details such as time and place, and having reminder alerts for these tasks, but these applications do not help the user in terms of time efficiency and organization of their tasks.

Consigliere will be an iOS application that will work as a daily organizer and task manager. With Consigliere, we aim to help people use their time more efficiently and regain the time wasted on traffic. The user will simply need to enter whatever errands they have to run for that day and the application will provide an optimal plan for the user to complete these errands. This plan is designed by taking into account the roads the user will have to take to get to the locations of their tasks, and the traffic situation in the road. In addition, the app will estimate how much time the user will spend on an errand by analyzing the busyness of the location and the nature of the user's task. The app will also periodically check the traffic status of relevant roads and the crowd level of the locations in order to update the daily plan dynamically and send the user push notifications informing them of the opportunities to run their errands in a timely manner.

In this report, first a description of Consigliere will be provided. Then, insight about the constraints regarding Consigliere will be given. Afterwards, the professional and ethical issues will be listed and discussed. Finally, the functional and non-functional requirements of our project will be included.

1.1 Description

Consigliere is basically an application that enables users to plan and organize their errands in a time-efficient manner by suggesting dynamic daily plans. The applications main functionality will be mapping out a route that enables users to run their errands unerringly and efficiently. Main goal of our application is to help the users to finish his daily tasks in timely manner. It will also offer other several useful functionalities such as sending reminder notifications and saving parking spot to find the car easily.

What makes Consigliere different from classic task managers or map applications such as Google Maps or a regular daily planner is its incorporation of daily routine and task planning. Although most map applications provide route planning by selecting multiple points of interest, they fall short at optimizing the efficient route in terms of time and distance. Similarly, daily planners generally work just like agendas and only notifies the user about the upcoming events or tasks but they do not offer time management in terms of route optimization.

Consigliere will offer number of features such as authorization, task managing, optimization of daily plans, route planning according to several crucial constraints such as traffic intensity. Main challenge of this application is finding an optimized, relevant route that includes location of each errand that the user should run, which is basically an algorithmic and innovative approach to the travelling salesman problem [1]. Furthermore, the application will optimize the way that users run their daily errands in the interest of saving time using different factors such as traffic intensity, road conditions and crowdedness. It will also offer several useful functionalities such as reminders.

1.2 Constraints

1.2.1 Economic Constraints

- Usage of open source software will be free.
- Apple App Store charges fee of $99 USD annually for publishing iOS applications.
- For the start, application will be free to use.
- In order to maintain the application, ads might be displayed.
- Google Maps might require a fee if application traffic exceeds free usage limit. $ 0.50 USD / 1000 additional requests)
- Development of the application relies on personal budget of the project members.

1.2.2 Ethical Constraints

- Development of the app will abide to code of Ethics framed by the National Society of Professional Engineers [2] .
- Since user is expected to enter personal information to the app, personal privacy should be respected. Therefore, application should not provide personal information without the approval of user with third parties.
- As well as personal information, location of the tasks and current location or home address of user should not be taken in the background without approval of the user.

1.2.3 Implementation Constraints

- Android and iOS platforms are development platforms.
- GitHub will be used as version control tool throughout development.
- Open Source software will be used during development.
- Application will use Google Maps API primarily for the required map data.
- Application will be developed according to OOP paradigm.

- Android application will be developed in Java.
- iOS application will be developed in Swift.

1.2.4 Sustainability Constraints

- The traffic data will be updated constantly for providing up to date service to users.
- The application will collect user feedback for better business relationships, quality enhancement and stronger customer retention.
- The application will provide an in-app bug reporter for bug reporting and enhancement requests for better service.

1.2.5 Language Constraints

- Initial interface language of Consigliere will be English.

1.3 Professional and Ethical Issues

Our application will be collecting personal data from the end users. This data mostly consists of the necessary location data such as user's current location, his/her work and home addresses. Moreover, other personal data such as users' daily schedule will also be collected. This set of data are crucial for generating the daily plans. However, users may have privacy and security concerns. To solve this potential issue, we will prepare a User License Agreement and a Privacy Policy that gives a clear briefing on what data we will be collecting and for how we will use that data. Hence, the app will not collect any data without the user's explicit consent. We will not share user's private data with any third-party apps or websites for profit. Additionally, we will collect the minimum data available in order to provide the best functionality for the application.

2. Requirements

2.1 Functional Requirements

2.1.1 User Profile

- Anyone with a valid email address will be able to sign up to use Consigliere.
- Their data and entered tasks will be bound to their user account and synchronized across other devices.

2.1.2 Daily Planner

- The user will be presented with a daily plan on how to complete their errands in the most efficient way possible. The plan will be devised in a similar way to the Traveling Salesman Problem [1].
- The daily plan will consider the traffic data of the roads in order to not let the user get stuck in traffic while going to a certain task's location.
- The application will even reroute the user to do other tasks if the roads will open up in the meantime.
- The application will try to predict how much time the user will spend while doing an errand, and adjust the daily plan accordingly; for instance, if the user's task at the bank will take a considerable amount of time and the traffic will clear up during the time he/she spends at the bank; then the application will first direct the user to the bank even if it may be further away from the user's location.
- The application will consider the busyness of the locations at different times of day and guide the user to complete their tasks in the most appropriate order as possible, combined with the aforementioned optimization approaches.
- The application tries to look at the user's task and constraints in a holistic manner and tries to offer the most time-efficient way that is possible to complete all of the tasks from start to finish.

- The application will try to analyze the patterns of the user in order to determine their preference regarding the tasks and their respective locations.
- The application will periodically check the traffic and the crowdedness of locations and update the daily plan as the day progresses.
- The application will save the location of the parking spot that the user parked his/her car.
- The application will send the user push notifications if the traffic has cleared up or the busyness of a location has gone down either expectedly or unexpectedly, prompting the user to complete their tasks in a timely manner. The app will provide the information of how much time the prompted task will take in terms of travel and the actual errand time.

2.1.3 Task Management

- The application will try to extract the location and the task type from the task input. This is to minimize the burden of specifying the location for each task individually.
- Should the application not be able to extract the location or extracts it with some error, the user will be able to go into more detail and specifically set the location for each of their tasks, if they wish to do so.

2.2 Non-Functional Requirements

2.2.1 Usability

- The user interface must exhibit conceptual integrity and simplicity.
- The user interface should be user-friendly.
- Novice users must be able to install the application and operate its major use cases with little or no training.

2.2.2 Supportability

- Dependencies in the design of the system should be minimized to allow quick updates in the future.

2.2.3 Reliability

- The traffic data used by the application must be up-to-date and accurate.
- The suggested routes must be accurate and route suggestions must consider temporary factors such as roads under maintenance and construction, or road closures.

2.2.4 Efficiency

- The system should be able to complete the planning task under 10 seconds.
- The response time of the system should be less then 100 milliseconds.

2.2.5 Security

- The system should ensure security of personal data of the users.

2.2.6 Scalability

- The system should support up to 15 task/stops per day

3. References

[1] "Traveling Salesman Problem", *Math.uwaterloo.ca*, 2017. [Online]. Available: http://www.math.uwaterloo.ca/tsp/. [Accessed: 15- Oct- 2017].

[2] Code of Ethics National Society of Professional Engineers, nspe,org, 2016. https:// www.nspe.org/resources/ethics/code-ethics/. Accessed: 2017-10-8.