Real-time Re-Recommendation System for POI Visits
Design Document

Team 22
Client and Advisor: Goce Trajcevski
James Eehuis
Dheepak Nalluri
Andrew Peters
John Smolinski
Geng Sun
sdmay20-22@iastate.edu
https://sdmay20-22.sd.ece.iastate.edu

Executive Summary

Development Standards & Practices Used
(TBD)

Summary of Requirements
- Map/Routing System
- POI listing and targeting system
- System prioritizer for user distribution
- Database interface

Applicable Courses from Iowa State University Curriculum
- Com S 309
- SE 319
- Com S 363
- Com S 327
- Com S 228
- Com S 227
- Com S 311
- SE 329
- SE 339

New Skills/Knowledge acquired that was not taught in courses
(TBD)

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1 Introduction

1-1 Acknowledgement

This project is sponsored by Iowa State University. Project client and faculty advisor is Goce Trajcevski. The final product will belong to and is owned by Iowa State University.

1-2 Problem and Project Statement

Product wanted

The product that is wanted to be derived from this project is an application that can handle taking in multiple points of interest on a contemporary map and derive possible and best possible avenue routes to get to each place in a timely manner. This is all being done with the added application of updating the users in a timely manner of sudden shifts in route prediction and sudden user changes to.

General problems

As an application that must accommodate multiple users at once, One of the costliest problems to solve is how to handle the volume of users in an efficient way, in how they all request information regularly. A second added feature of this product is the research needed to evaluate if perdition based machine learning to "suggest" location for users to go to based on previous entries the user has inputted and exactly how we evaluate the cost to benefit ratio of it, in its entirety. The final problem of this application is the constraints and features truly wanted in this application and if that can be fully established in the time given and how to make the system flexible enough so great changes can be made to accomplish the client's goals without making the cost too great.

Proposed Solutions

We intend to set up a queue sequencer on a server that will dicktake which user requires what information first. For this to work properly all information that is wanted will have constraints put on them and/or weighted value of who requires less info goes first. The constraints will require more information from the client. The machine learning research will have to have an overall meeting to discuss the current knowledge and skill of such systems and what it would cost to sufficiently improve them and time to implement such a system. The whole system is going to be divided into smaller systems that can be used separately from each other. This is in the hope that an overall system can be made that is easy to implement new features if needed by the fact that whatever it is required to rely on is in small enough code bases for ease of quick learning.

1-3 Operational Environment

The end use of this application is expected to work on android devices and PC. support of other OS system is currently out of the scope of this project. Both devices are needed to have access to the internet in order to use the application in a basic form. GPS location detection is needed to take hold of any feature in the product that requires to know where you are.

1-4 Requirements
Functional Requirements
- Map/Routing System
- POI listing and targeting system
- Database interface
- System prioritizer for user distribution

User Interface Requirements
- POI information
- Allow change of routes and destinations during routing
- View map
- Search destinations

1-5 Intended Users and Uses
Users of this application are to be expected to be anyone with mobile android devices. A number of users in total that is expected are unknown but the product is scalable to all numbers of users. Users would be using this application in order to determine efficient routing to and between places. They may also use this application simply to look for places to go under certain terms in a given area and have a route and time given to. Changes mid-route are expected by users and a timely update will be given.

1-6 Assumptions and Limitations
The assumptions for this project are listed:
- The maximum number of simultaneous users is currently unknown but the project is scalable
- Having access to databases for routing and mapping purposes
- Having access to the server for user prioritization of information
The limitation of this project are listed:
- This app will be used within a limited area which means the user will only use this in USA
- The POI will be generated based on Google API and social communication tools

1-7 Expected End Product and Deliverables

This project has multiple end goals and deliverables expected. The first of which is a context-sensitive suggestion system, this system will allow our users to ask it for optimal POI routes. The system will look at the user and data given from the outside world and generate an optimal route for the user. A second major key deliverable for this project is a mobile application that will enable our users to use the system described above. Currently our expected end product will be a Meta-Learning or Deep-Learning module, however, our group is lacking experience designing things of this nature. So if we are unable to progress with Deep\Meta learning we will look into making a reactive based system instead.

2 Specifications and Analysis

2-1 Proposed Design

Our system is comprised of two main sections the front-end portion and the back-end portion. Our front-end would be comprised of the Map UI that the user would be interacting with. While our back-end would be encompassed by the User Prioritization system and the sequencer.

The Map UI will display three main elements. The first UI element will be the map display. The second element will be the search bar where the user will be able to enter their points of interest. The last element will be the list of current points of interest that the user has selected.

The user prioritization system will be a system to decide when all of the users in the system will receive updates. This will be accomplished mainly by giving the most priority for receiving an update to users that are the closest to the point of interest.
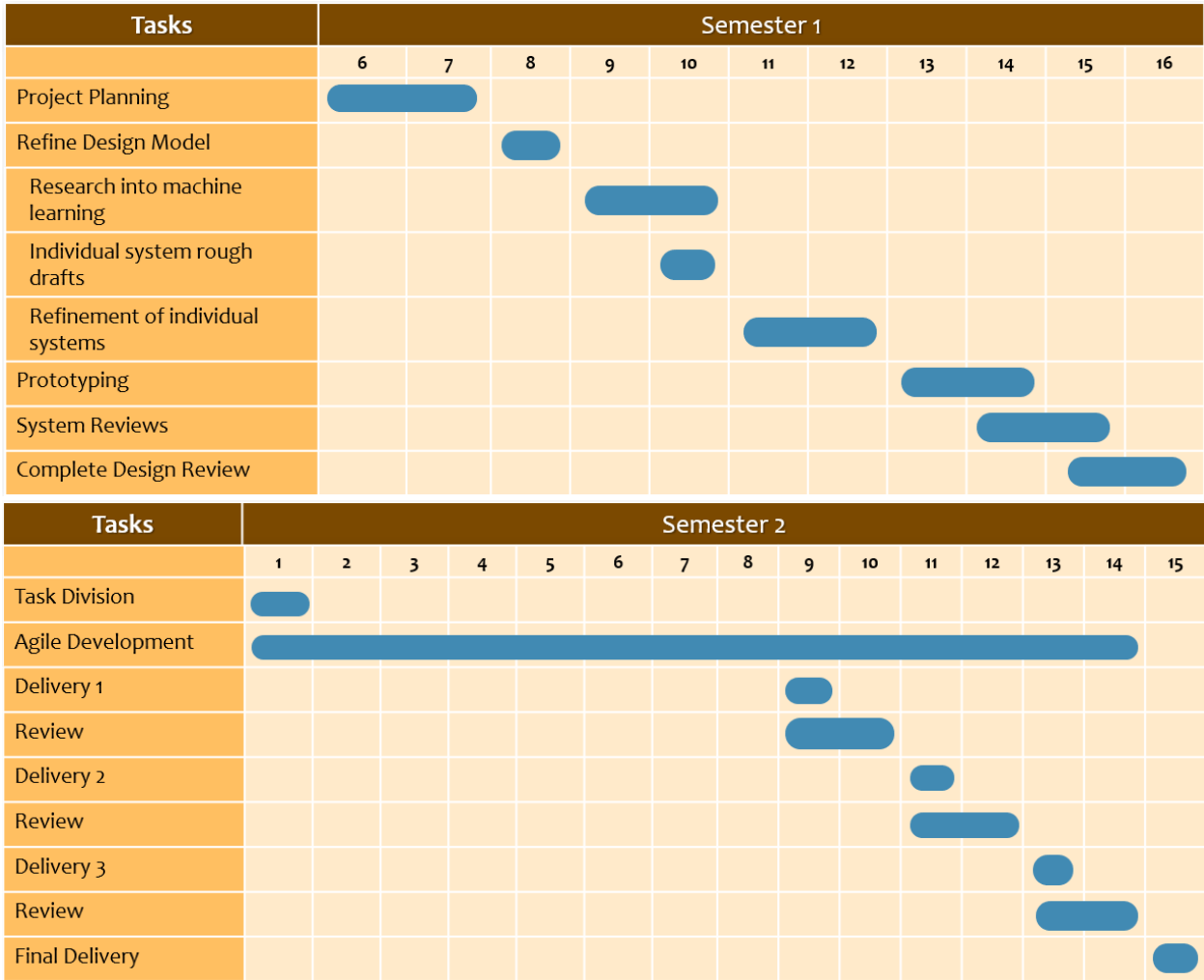
The sequencer will be responsible for taking all of the points of interest that the user currently has selected. The sequencer will then sequence these points of interests in the most optimal route for the user.

2-2 Design Analysis

We discussed the general overview of the project. Some things that we have decided on for the system architecture is that there will be a prioritization system, range and limitations of machine learning, and implementation and research(client-server application). Our design analysis so far has been working because our prototype system architecture comes together in an explainable fashion.

Continuing our design, we will start designing the system architecture in more detail(Exploring subsystems).

2-3 Development Process

Tasks	Semester 1										
	6	7	8	9	10	11	12	13	14	15	16
Project Planning	██	██									
Refine Design Model			██								
Research into machine learning				██							
Individual system rough drafts					██						
Refinement of individual systems						██					
Prototyping								██			
System Reviews									██		
Complete Design Review										██	

Tasks	Semester 2														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Task Division	██														
Agile Development	██	██	██	██	██	██	██	██	██	██	██	██	██	██	
Delivery 1									██						
Review									██	██					
Delivery 2											██				
Review											██	██			
Delivery 3													██		
Review													██	██	
Final Delivery															██

2-4 Design Plan
The plan for our design will be composed of several milestones, each one will consist of a process of quality checking at each completion point. As mentioned above our system

will be composed of two main sections, and as such we have developed a series of steps to achieve our goals with each one.

Our first main section that will receive the main focus of development near the beginning is the backend system. This system is going to see most of our focus since we have determined it to be the backbone of our project. The first main milestone that we laid out for this section is the development of a clean and useful database. Once we have the agreed upon look of our data structures moving into producing a round trip in the system will be much smoother. Leading to the next milestone which will consist of seeing that our backend system is able to communicate with some mock frontend. This communication will be simply a one way from server to mock points. Once we have accomplished the task of sending data down, we will shift gears to focus on the process of sending data up. Making our next milestone the creation of a reverse round trip, meaning that we will develop a mock front end to demo out our functionality of data being sent to our server and reacting accordingly. Currently these are the primary milestones for this section, however, we anticipate that these will change much during our development and planning.

Our second main section as listed above is our Front-end map UI. This system will be dependent on the milestones listed above, and thus will be our secondary main focus and will receive less attention at early stages. We still have drawn up a few milestones for this section and expect that we will be adding many more in the coming months. Our first main milestone is the task of displaying data onto a map. This task will consist of using the data created in our backend and plotting it out for the user onto our map. Next, we will move into allowing user interaction with this data. This milestone is left intentionally vague as we aren't positive as to what kind of interaction we will expect to allow. Our final vague milestone for this section is to enable for conversations to be established between our front and backend. Again we are unsure how these conversations will play out or how we expect to display, however, we know that this will be an important step.

All of the milestones given above are a general idea of we expect to design our project. The milestones allow for more indication as to why we labeled our major sections as major sections, and give a more clear indication as to what our plan will look like during development.

3 Statement of Work…(End of Design Document v1)