

Introduction to the problem you are solving and use cases of your app

People usually encounter a number of problems when visiting restaurants whose cuisines they are not familiar with. This problem is especially relevant to international students in the United States, whose diverse population determines that people in the country are accustomed to a variety of cuisines (Mexican, Italian, Japanese, Thai, etc.). International students, on the other hand, are not familiar with these cuisines, and in some cases have limited fluency in English as a second language. Many feel intimidated or embarrassed when visiting these unfamiliar restaurants, especially when they have to pick among unfamiliar dishes, and interact with the waiters/waitresses in English in front of their American friends. Even those who have spent years in the U.S. still cannot understand everything on the menu, and will need extra time looking up the words before deciding what to order.

As a result, a lot of international students are hesitant to go out and explore diverse cuisines, or to attend social activities with their American friends at these places. Even when visiting these places, they usually stick to what they know, and are afraid of trying new things because they are unsure whether they will like them or not.

This problem is not only applicable to international students in the U.S., it is common to anyone who hopes to explore different cuisines outside of their comfort zone. Therefore, we propose an app that can help break these cultural barriers and create a better order experience so that people are willing to try out different cuisines and take advantage of this diverse society.

Our app pushes a list of restaurants the users might be in based on their current location. The menu items are divided into different sections based on recommendations from others who share similar ethnic backgrounds with the user (e.g. reviews from Korean people if the user is Korean), and from those who are familiar with the cuisine in the restaurant (e.g. reviews from Chinese people for Chinese restaurants). Each menu item is translated into users' preferred language, and also contains photos and hyperlinks to ingredients, so that users can quickly understand how dishes are cooked and the ingredients they don't know on demand; users will even receive warnings on dishes that might conflict with their dietary constraints. Each dish also contains reviews from different ethnic groups (similar to recommended dishes), and a pronunciation guide to help users correctly pronounce the dish name while talking with waiters/waitresses.

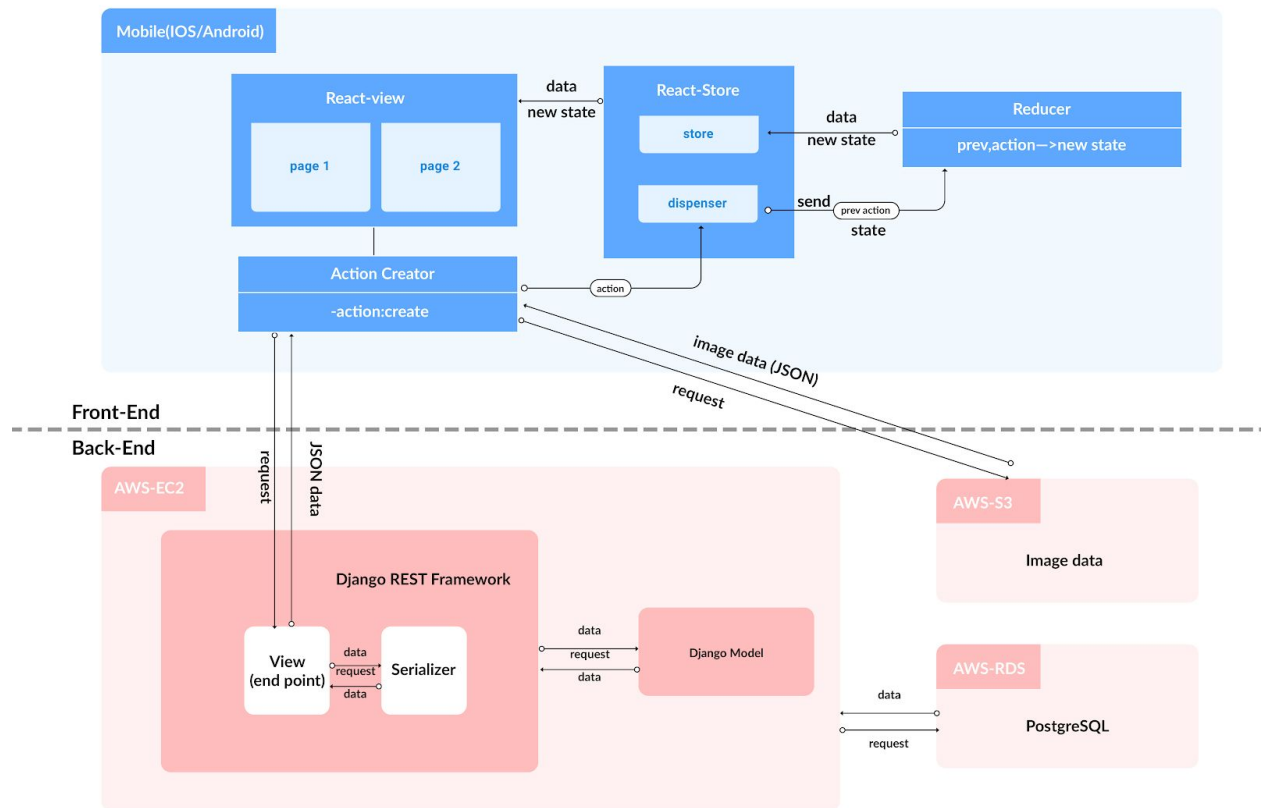
Through these features, we hope to make it easier for people to explore new cuisines, and find dishes outside of their comfort zones that they like. Our end goal is to break the cultural barrier of food.

Business case of who will use your app, why they want to use your app, and what is unique about your approach→ tony

Though our app will benefit anyone exploring new cuisines (e.g. travellers, food lovers), our primary target audience are international students in the U.S., who have to get familiar with different kinds of cuisines while living in the U.S.. Current applications like Yelp, TripAdvisor, and Google Map mainly target American audience, who already understand the dishes and the ingredient names, and probably have different taste preferences compared to international students. Through our research, we often found that international students tend to not trust reviews and recommendations from these apps, and would either love to see recommendations from people of their ethnic groups, or people who know the cuisine well. No existing app satisfies the need. International students also tend to not understand ingredient names and dish names, which they can look up manually in Google Translate, but switching between applications and looking up everything can quickly become frustrating. With this specific target audience in mind, our application is tailored to address these needs, which will not only help international students better order in different ethnic restaurants, but also help restaurants gain more customers.

Our primary revenue source will be through advertisements of restaurants, which is similar to Yelp. However, since our app brings value to both users and restaurants, we will also consider forming partnerships with restaurants or exploring a freemium model and offer advanced features for premium users.

- Architecture



tation including overall architecture, implementation status, external services you utilized in order to solve the problem in an efficient way, as well as the development status in the second platform -> See below!

Implementation (John)

Overall Architecture

- Back-End: DRE (Django RESTful Framework)
- Front-End: React Native (iOS only for this version)
- Server: Heroku server (Not AWS EC2 as we described on the diagram above)
- Asset: We store and manage our Image files on AWS S3.

Implementation Status

- Back-End
 - We wrote total 9 API endpoints for Login, Fetching Restaurant List, Create Restaurant Page, Create Comment, Fetching comments, Retrieve Restaurant Page, Retrieve Menu, and so on.
- Front-End
 - All pages are fully implemented for low-fidelity design.
 - Wrote Jest Test Cases

External Services

- Rather than finding all menu and restaurant by our hands, we crawl the data of restaurant (including restaurant's coordinate, name and so on) from FourSquare API and merge with our PostgreSQL database.

Development Status in the second platform

- Server
 - Deployed it on Heroku
 - Set up AWS S3
- Client
 - We're still working on deploying on iOS AppStore.
- Key information gained through the development and user testing of each sprint's learning prototype -> Victor & Danrui

First learning prototype

- User Testing: We interviewed 6 users to understand their needs and problems in eating and ordering at restaurant. Then we used affinity mapping to categorize findings. Then, we conducted a competitive analysis of Yelp, UberEats, TripAdvisor and Google Translate. We found that even online menu and reviews are available on existing products, no product specifically targets the use case in which people are not familiar with the cuisine and thus cannot understand the ingredients. From this primary research we set up project direction in helping ordering in different ethnic restaurant.
- Development: After we have gathered information about users, we started a research on the resources that will be required for us to build the application that can address users' needs and problems. To allow users to see the menus of the restaurants in the application, we looked up third-party APIs that we can use to fetch the menus of the restaurants. For the application architecture, we decided

to implement the application in React Native, a Javascript framework that allows mobile application deployment in both Android and iOS. For server side development, we decided to use Django RESTful Framework and deploy the application on AWS server.

Second Learning prototype

- User Testing: We created a low-fidelity prototype of our design using Balsamiq and have our target users to have an evaluation of our prototype. We learned from users that overall they think the app is useful and helpful to them. We also gathered feedback to improve the system like: visually indicate which dishes are recommended by whom in the full menu as well. Rethink the checkout process and when to let users write dish reviews. Based on this we iterate our prototype and go on implementation
- Development: After we built the low-fidelity prototype of user interface, we started to build an end-to-end prototype can demonstrate the basic features of the application. While building the end-to-end prototype, we realized that the third-party APIs that we looked up during the research are only available for enterprises. While looking for an alternative, we realized that there isn't actually useful API that we can use and that we have to manually crawl the data. We crawled a small amount of data from Foursquare and integrated the data into our application.

Third Learning prototype

- User Testing: We gathered feedback from presentation, CIC judges and target users about our functional app. Overall, we found our app have a good feedback. From TA's feedback, we decided to choose the check-out function as an optional one as it wasn't an important solution to the problem. We also gained a suggestion about localization so that the app can be useful when users travel to other countries. Therefore, we implemented the localization and translation function of ingredients and dish names.
- Development: After gathering feedback, we learned that we need some additional implementation for localization feature of the application, especially caching the translation of menu description to provide users better context of the menu without extra latency. Also, while trying to deploy the application to AWS server, we learned that Heroku server is a better option for the early stage of the deployment and deployed the server to Heroku server

Lessons Learned

Technique

- Localization: It's not difficult to implement localization but it's the most important feature for our app since our target audiences are from many different countries with different language barrier and our goal is to resolve their linguistic anxiety. We used 'i18N' library (You can easily find it online) for primary language support.
- Cross-Platform: We chose React Native because it's cross-platform. But we had some of components only works on iOS (i.e. Button from Native-Base library). But we could avoid this problem by validating/testing different components with Jest testing Framework.
- Data Crawling: We tried to fetch all data for restaurants and menus but sending concurrent requests caused Distributed Denial of Service (aka. DDoS) attack. So We set the index of the restaurant data and send fetch requests. It took 3 days to fetch about one-third of all data and it's enough for our prototype.

Process

- Minimum Viable Product (MVP): In our project, we followed agile development process and used minimum viable product method to develop our app. For example, we identified users' most important problem in ordering restaurant is that they don't know about other languages' dish name and have no idea about what is recommended. Therefore, we develop the localization and recommendation function first as our minimum viable product.
- Group Management: We used facebook group messenger to communicate and make a project plan at the beginning to oversee our progress in research, design and development.
- Diversity brings inspiration: Our group have both designers and developers. Therefore, we view our project in different aspects and learned a lot from each other. Learning technique limitation in design process and getting clear on users' pain points in development process bring a lot of inspiration for all of us.

User

- Users' customized ingredient: Sometimes, because of culture difference, users may feel weird about some ingredient and they are unknown to this. For example, a soup made of dog bone will be weird to some people. Therefore, we found besides recommended dishes, users would also like to know about the ingredients that are not popular or acceptable in their culture and got notified by this so that they can enjoy their meal more.

Future Plans

Computer vision for scraping menus

Although we have scraped menus of most of the restaurants from Foursquare API, we do not have information of some of the restaurants because they did not publish their menus online. To resolve this issue, we are going to implement a feature that allows users to take a photo of the physical copy of menu while visiting a restaurant. The photo taken by user will be parsed through computer vision technology and the parsed data will be stored in our database.

Caching Translation of Menu Description

The localization feature of the application allowed users to use most of the features of the application in users' own languages. However, the descriptions of the foods are not provided in user's native language yet. For this, we are going to provide translation of menu description via Google Translate API. However, using Google Translate API every time the user access the application will put more latency on the application and thus affect user experience. To avoid this extra latency, we will cache the translation of menu description in our database when the first user access the menu description that has not been translated yet. By caching the translation, the users will be able to get the translation of menu description without extra latency and get better context of the food.

Deployment on Play Store & App Store

The backend server of the application has been deployed in Heroku server, but the application itself has not been deployed to Play Store or App Store. After the high fidelity user interface and additional features are implemented, the application will be deployed to Play Store and App Store, and the users will be able to use our service through Android and iOS devices.

Only one submission per team is required for this assignment.

Answers to FAQ:

As with your interview writeups at the beginning of the semester, students often ask about the line spacing, font/point size, etc. We are not prescriptive about these factors. Instead, you should focus on telling your complete story. If it's more than 5 pages, that's

fine. If you can't fill 4 pages double-spaced, then you probably need to be more thorough in your analysis and writeup. Diagrams, graphs, and images are acceptable content.