



Final Year Project Proposal

TU856

LilChef

Jamie Heffernan
C20483462

School of Computer Science
TU Dublin – City Campus

28/09/2023

Table of Contents

<i>Summary</i>	<i>4</i>
<i>Background (and References).....</i>	<i>4</i>
<i>Proposed Approach.....</i>	<i>4</i>
<i>Deliverables</i>	<i>5</i>
<i>Technical Requirements</i>	<i>6</i>
<i>Conclusion</i>	<i>6</i>
<i>References</i>	<i>7</i>
<i>Appendix A: First Project Review</i>	<i>8</i>
<i>Appendix B: Second Project Review.....</i>	<i>8</i>

Declaration

I hereby declare that the work described in this dissertation is, except where otherwise stated, entirely my own work and has not been submitted as an exercise for a degree at this or any other university.

Signed:

Jamie Heffernan

C20483462

28/09/2023

Summary

LilChef will be a mobile application with the aim of reducing food waste in the average household. I plan to do this by allowing a user to document and store recipes in the application as well as share them with other users. The user will be able to select a series of recipes and generate a shopping list with the exact ingredients required to ensure that no extra food will be bought that will just go to waste, the application will also allow users to share recipes with one another both within the app or directly to an email address if the other user does not have the app. The application will also feature a chatbot engineered with machine learning to advise the user on recipes and answer questions if they have any ie. How much rice do I need to serve two people and how much water do I add. The application will also feature a photo to recipe section where the user can take a photo of a series of ingredients and a machine learning algorithm will identify these ingredients and use generative AI to give the user a recipe based on their ingredients.

Background (and References)

I had the idea for LilChef while away on Erasmus where I noticed that not many students in their early twenties knew how to cook healthily and efficiently, instead opting to purchase food at random which they might cook which would often result in most of the food going to waste.

There are some recipes managing applications out there such as Paprika however these applications generally have non-user-friendly user interfaces with dated designs, I would like to streamline this in LilChef and make it as accessible as possible to all users regardless of their technical ability

There are recipe generators out there, but these use text input as a method to gather ingredients and tend to result in complex recipes with many obscure ingredients. I have not found any applications which use a photo and image processing to gather the ingredients for a recipe that use generative AI to produce a specific recipe output

Finally rather than googling a query regarding a recipe I would like the user to send a message by text or voice and use an AI chatbot to help a user solve their particular problem or question such as “What is an alternative to using an egg in a cake recipe, as I am allergic” These features are available in many separate applications but I have not been able to find an application which will allow the user to do all of these in one convenient location

Proposed Approach

I plan to design wireframes for the application on paper in a notebook before converting these into a more structured user-interface using Figma which will be much closer to the final design. Using Figma will allow for easier transfer of the application to the user interface as well as keeping the design more consistent and allowing me to plan the flow of the application.

Much more research is required into the machine learning and image processing aspect of the application but I have begun research into models such as YOLO which will allow for object detection and LLM's such as ChatGPT for the chatbot and recipe generation while researching prompt engineering further to reduce any malicious prompts a user may enter

The app will be implemented in the React Native JavaScript library to allow the simultaneous development of both an iOS and android application with reusable components to reduce the projects size and put an emphasis on reusability in line with modern development standards

Since we will be using Generative AI while allowing the user to enter whatever text they like we will have to ensure that the user cannot break the chatbot or have it reply in a way that violates the applications terms of service which will require extensive testing with automated tests to thoroughly test each component as it is developed within the app

Deliverables

I plan to deliver a mobile application which will allow a user to :

- Login and Register an account
- View list of stored recipes
- Add or remove a recipe
- View recipe in detail
 - Share recipe
- Select recipes for shopping list
- Generate shopping list from chosen recipes
- View shopping list
- Open camera and take photo of ingredients
 - This will use machine learning algorithms to identify ingredients from the photo
 - This list of ingredients will be passed to a prompt which will be engineered to generate a recipe and give a specific output so that the recipe can be added to the database of recipes
- Ask a question
 - This will open a chat dialogue with LilChef himself, this will be an LLM chatbot with specific prompt engineering to give tailored advice on recipes and answer any questions the user may have

Technical Requirements

The application will be written in the React Native JavaScript library to make a clean, user-friendly mobile application for both iOS and android

It will also rely on machine learning algorithms for object detection which will require further research.

We will also be using a LLM for the chatbot which will add further dependencies to the project but upon completion, the application will be available to use on a mobile phone with an active internet connection for optimum performance.

Conclusion

In conclusion LilChef will be a recipe organisation platform with the aim of teaching people of all ages how they can organise their weekly food shopping in an effort to improve their home-cooking skills, save money, reduce waste and reduce their reliance on other people and the internet while using the latest Artificial Intelligence technology to clear out any extra ingredients that a user may have laying around or are about to spoil

References

Hint:

Use Zotero to manage your references (see Brightspace resources).

Use the **Harvard** referencing style

- https://www.zotero.org/support/quick_start_guide

Appendix A: First Project Review

Hint: review a past project from the library website that relates to your project idea.

Title: Recipe Search Engine with Image Processing

Student: Catriona Reneghan

Description (brief):

ClearMyFridge is an online web application that allows a user to enter ingredients they wish to cook with. The aim of the web application is to reduce food wastage in the home, make cooking easy and inspire users to cook new recipes. The user can enter ingredients by the ingredient name or scanning the barcode on its packaging. The user can then view recipes containing the ingredients they entered. When a user logs in the recipes can be saved.

What is complex in this project:

This project also uses object detection to identify an ingredient to be used in a recipe which is then passed to the Edamam Food Database API to search for recipes that match the ingredient found

What technical architecture was used: Django and OpenCV with a react frontend

Explain key strengths and weaknesses of this project, as you see it.

The idea for ClearMyFridge is solid and has many similarities to my own idea, including sharing the same end-goal however the image processing aspect relies on the barcode of an object which may not be available with many ingredients you may wish to clear from your fridge such as fresh vegetables which do not have a barcode. The alternative to this is to enter the ingredient name but some ingredients may have different names depending on geographical location such as rocket/arugula and coriander/cilantro

Appendix B: Second Project Review

Hint: review a past project from the library website that relates to your project idea.

Title: Object Detection Aim Assist

Student: Ryan Alghmadi

Description (brief):

This project uses pre-trained weights for various games, to detect selected features in the live screen recording feed it captures. Object detection has been around for many years, and is now a common occurrence in many technologies that we take for granted. Detections made in security cameras are done by specially trained weights

designed to capture features such as humans and animals. Using another face recognition algorithm, it can detect if the humans are known, residents.

What is complex in this project:

The project uses YOLO, an object detection model which was trained to detect player movements in game similar to how a smart security camera might capture a persons movements to aid players in their gaming skills

What technical architecture was used:

YOLO

Explain key strengths and weaknesses of this project, as you see it.

The idea for using object detection in video games is a unique one which really captured my attention by training YOLO models to detect player movement and improve ones overall skills. This could be very similar to how I identify ingredients within my own application however the moral aspect of the project must be examined as it can be easily adapted to cheat in online multiplayer games and many game developers use technology to detect modifications such as this which may lead to unassuming users simply trying to practice receiving bans from game developers