**CHAPTER TWO**

**Literature Review**

**2.1 Introduction**

This chapter seeks to show how the topic under investigation links to earlier research, current practice, or other fields of knowledge by citing relevant publications by other researchers that have addressed a related issue. Furthermore, this chapter will give a synthesis of current research on the topic, noting areas of agreement, disagreement, and gaps in the literature, to demonstrate the project topic's importance in the field and to identify prospects for further research.

**2.2 Literature Review**

Goel et al. (2022). Ratatouille: A tool for Novel Recipe Generation.

The challenge of automatic recipe production is both interesting and demanding because recipes must create ingredients and cooking instructions depending on the user's desired list of components. To generate such recipes, computational linguistics and machine learning are used. The evaluation of such recipes is currently difficult, and available metrics only offer a limited view of the quality of the created recipes.

The web application's architecture is based on the Python framework. ReactJS, a simple and lightweight library, is utilized for the front end, and Flask is used for the back end. The front end is detached from the backend utilizing microservices architecture to manage more user requests and prevent application disruption. The front end and back end are dockerized and hosted independently on the webserver. If the load increases in the future, the developer merely needs to repeat the docker.

In this paper, we employed a neural network-based LSTM model and a transformer-based GPT2 model to generate innovative recipes from a list of ingredients. We recorded the number of ingredients in each dish, which was not done in previous experiments. With a BLEU score of 0.806, the transformer-based GPT2 model surpasses the neural network-based LSTM model. The most significant problem we encountered was analyzing the created recipes. In the future, we plan to adopt GPT-Neo, which is based on the same architecture as GPT-3.

The biggest problem encountered throughout this research was a lack of funding and hardware. On Google Colab, we have restricted GPU, RAM, and disk space hours, which causes sessions to fail every 5 to 7 epochs.

Andreas et al. (2022). The Chef’s Choice: System for Allergen and Style Classification in Recipes.

Individuals who have allergic sensitivities to specific food allergies must exercise caution while browsing for recipes online, since it may be a matter of life and death for some. With the growth in the frequency of food allergies, it is becoming increasingly vital to take further steps to educate people with food allergies. A system that assists in choosing recipes might save time and minimize the frustration of affected persons. Instead of creating a specialized app into which the text must be transferred, integration with current technologies such as a web browser would save time and aid in scanning.

The following are the prerequisites for our suggested system:

1. Recipe style categorization
2. Allergy classification with ingredients.
3. Warnings for custom ingredients
4. Platform-independent architecture
5. Browser extension for common internet browsers.

Using the elements in a recipe, the suggested system should be able to identify style and allergies. A browser plugin should provide the findings together with the confidence for the multi-class classification (recipe style) and a list of allergy predictions with confidence for the multi-label classification (allergens in a recipe). Furthermore, the user should be able to define a custom list of distinct elements that should be taken into account while analyzing. Custom ingredients should provide a distinct warning than allergy detection.

This article sought to evaluate what an allergy and style detection system in recipes may look like, as well as how well a trained classifier works versus people. Given the abundance of allergies and components, a system that identifies allergens may surely assist the user in identifying whether or not internet recipes contain allergens. Furthermore, a system that is readily connected with existing technologies such as internet browsers might enhance system utilization and raise overall allergy awareness.

Marcela (2022). A Recipe for Food Literacy: Designing and Evaluating Technologies for Informed Food Choices

This thesis combines Human-Computer Interaction (HCI) with Nutrition Science. It studies how technologies, by researching and integrating technological features and nutrition content in their designs, might encourage food literacy and educated eating choices.

Sessions were held online and directly recorded using Microsoft TeamsTM. To acquire demographic data, Qualtrics XM was utilized. The evaluation and interview took an average of 60 minutes for each session. Interviews were conducted until data saturation was attained; saturation was defined as the absence of fresh material received by questioning further individuals that would contribute to the formulation of new themes.

Our first study was to develop and verify a set of food literacy criteria for technology design. We were able to establish heuristics through an iterative design approach that can effectively and efficiently detect a variety of food literacy concerns that lie under the umbrella of knowledge, awareness, and skills. Furthermore, we demonstrated that the same heuristics might be useful as formative design tools for designers. They can assist designers in identifying food literacy difficulties within various technologies and apps, considering how such technologies may affect others' planning and buying decisions, and self-reflecting on their own challenges.

Cataldo et al. (2021). Exploring the Effects of Natural Language Justifications in Food Recommender Systems.

The concept of using individualized suggestions to help individuals eat healthier has gained popularity in recent years. This concept is being examined by a research line focusing on health-aware food recommender systems, which take into account user information such as dietary preferences and limitations (e.g., allergies) to build an appropriate meal plan. The fundamental issue is that most popular internet-sourced recipes utilized in recommendation systems are unhealthy, and as a result, people prefer them.

Dataset. Recipes were drawn from a database of 4,671 recipes available online. Recipes were gathered and translated into English from a popular food community platform. The recipes included information such as their name, category, preparation difficulty, ingredients, (macro-) nutrients, calories, rating count, and average website rating. Furthermore, they featured binary markers such as vegetarian, vegan, lactose-free, and low-nickel.

We want to underline that the study may be used as a model for future research on healthy diet recommendations. We demonstrated that our algorithm successfully provides healthy suggestions since users who choose them reported that they did so for health-related reasons. Furthermore, we demonstrated how such advice should be presented to assist healthy eating choices.

Sarah and Joyce. (2022). Challenges to acquiring and using food literacy: Perspectives of young Canadian adults

Obesity rates have risen in tandem with the growing consumption of processed and ultra-processed, low-nutrient, and energy-dense foods, such as sweetened drinks, which are often mass-produced, aggressively promoted, and widely available. This has also contributed to greater food consumption away from home and eating outside of typical meal arrangements (eating at the kitchen table in households or eating at regular times of day).

To acquire eligible individuals, purposeful and theoretical sampling strategies were utilized. Individual interviews were conducted in a separate room and took between 30 and 45 minutes to complete. A semi-structured interview guide with face validity testing was employed. Demographic data was also collected.

This study shed light on the obstacles and opportunities for obtaining and applying food literacy as seen through the eyes of Canadian young people who have just moved to independent living. Possible solutions to these difficulties are many and multidimensional and will require more study into personal, societal, and environmental aspects, as well as health-related consequences.

**2.3 Summary of Related Literature Reviews**

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| --- | --- | --- |
| **Author & Year** | **Title & Description** | **Merit and Demerits** |
| Goel et al. (2022). | Ratatouille: A tool for Novel Recipe Generation.  Novel Recipe Generation is a problem in the field of Natural Language Processing in which the main interest is to generate realistic, novel cooking recipes. | the transformer-based GPT2 model surpasses the neural network-based LSTM model.  The system architecture is based on GPT-2. |
| Andreas et al. (2022) | The Chef’s Choice: System for Allergen and Style Classification in Recipes.  The goal is to develop a system that can be used for online recipe sites and adds an extra degree of security by detecting allergies and providing more information about discovered allergens and the recipe style. | The method assists individuals in selecting the proper recipe before the user inspects the recipe more closely to ensure there are no allergies present.  The machine learning process suffered from a lack of dataset, data quality, and class imbalance. |
| Marcela (2022). | A Recipe for Food Literacy: Designing and Evaluating Technologies for Informed Food Choices.  The study looks at how alternative technology designs combining food literacy ideas impact food choices in a grocery store using a contextual approach. | The results of the study suggest that the approach can be effective.  Despite the importance of cost, neither MFG nor PBGA directly addresses food insecurity. |
| Cataldo et al. (2021). | Exploring the Effects of Natural Language Justifications in Food Recommender Systems.  This study provides a way to produce and convey a natural language reasoning that emphasizes the nutritional content, or health risks and advantages of recommended meals, to encourage users to pick healthier suggestions by making more educated eating selections. | The system algorithm provides healthy suggestions to its users.  Delay in providing suggestions. |
| Sarah and Joyce. (2022). | Challenges to acquiring and using food literacy: Perspectives of young Canadian adults.  The purpose of the study was to investigate the idea of food literacy through the eyes of young Canadian people who had just moved to independent living. | It improved our understanding of participants' eating experiences, including obstacles to gaining food literacy.  The limited sample size of Canadian university students in Western Canada, which may not be indicative of the perspectives and experiences of young adults from various backgrounds and geographical places. |

**2.4 HTML**

HTML stands for HyperText Markup Language. It is a standard markup language for web page creation. It allows the creation and structure of sections, paragraphs, and links using HTML elements (the building blocks of a web page) such as tags and attributes (Astari, 2023).

HTML has a lot of use cases, namely:

* **Web development**. Developers use HTML code to design how a browser displays web page elements, such as text, hyperlinks, and media files.
* **Internet navigation**. Users can easily navigate and insert links between related pages and websites as HTML is heavily used to embed hyperlinks.
* **Web documentation**. HTML makes it possible to organize and format documents, similarly to Microsoft Word.

It’s also worth noting that HTML is not considered a programming language as it can’t create dynamic functionality. It is now considered an official web standard. The World Wide Web Consortium (W3C) maintains and develops HTML specifications, along with providing regular updates (Astari, 2023).

**2.5 JavaScript**

JavaScript is a lightweight programming language that web developers commonly use to create more dynamic interactions when developing web pages, applications, servers, and or even games (Jordana, 2022).

Developers generally use JavaScript alongside [HTML](https://www.hostinger.com/tutorials/html-cheat-sheet) and [CSS](https://www.hostinger.com/tutorials/css-cheat-sheet) The scripting language works well with CSS in formatting HTML elements. However, JavaScript still maintains user interaction, something that CSS cannot do by itself (Jordana, 2022).

The initial versions of the scripting language were for internal use only. After Netscape submitted it to [ECMA International](https://www.ecma-international.org/) as a standard specification for web browsers, JavaScript pioneered the release of ECMAScript (Jordana, 2022).

It was a general-purpose scripting language to ensure web pages’ interoperability across different browsers and devices (Jordana, 2022).

JavaScript has continued to grow alongside new browsers like Mozilla Firefox and Google Chrome since then. The latter even started developing the first modern JavaScript engine, called V8, which compiles bytecode into native machine code (Jordana, 2022).

Today, JavaScript has plenty of frameworks and libraries to simplify complex projects, such as [AngularJS](https://www.hostinger.com/tutorials/what-is-angular), [jQuery](https://www.hostinger.com/tutorials/what-is-jquery/), and [ReactJS](https://www.hostinger.com/tutorials/what-is-react) (Jordana, 2022).

Originally run on the client-side, the JavaScript implementation has branched out to the server-side after the Node.js development ‒ a cross-platform server environment built on the Google Chrome JavaScript V8 engine (Jordana, 2022).

While it caters to web-based programs the most, JavaScript programming features have other implementations in different areas (Jordana, 2022).

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