



Faculty of ICT, Mahidol University

Project 2: Prototype IR System

by

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Submitted to

Subject ID: ITCS414

Subject Name: Information Storage and Retrieval

Instructor: Assoc. Prof. Dr. Suppawong Tuarob

A report submitted

as the partial fulfillment of the requirements for the project

Semester 1/2023

Introduction

This report describes the creation of a Full Text Food Search Engine as part of a project for Information Storage Retrieval. The Elasticsearch and Flask-powered search engine is intended to give extensive food-related search capabilities.

Problem

This project's major goal is to efficiently retrieve specific food-related information from a large and diverse dataset. There is a major demand for a targeted search tool that can give consumers with exact and contextually relevant results in a user-friendly manner in the digital age, where an overwhelming amount of culinary content is available online.

Existing Relevant Systems

General-purpose search engines and other Elasticsearch-based applications are examples of comparable systems. Our Full Text Food Search Engine, on the other hand, distinguishes itself by focusing solely on the culinary domain, with the goal of providing more refined and relevant search results for food-related inquiries.

Implementation

Our Full Text Food Search Engine was implemented using Elasticsearch and Flask. Data was collected from the BBC Good Food website, and we organized into an Excel table before being exported as (ND)JSON format for indexing in Elasticsearch. The system utilizes a user-friendly interface to accept search queries and displays relevant results based on keyword relevance as we use the default TF-IDF setting algorithms. The engine can handle one-word queries, multiple-word queries, and partial matches, providing users with comprehensive food-related information.

Tools and Software

- Elasticsearch: To provide powerful full-text search capabilities.
- Flask: As a Python based lightweight web application framework to manage the user interface and server-side logic.

Source of Data

We've gathered data from “<https://www.bbcgoodfood.com/recipes/collection/easy-recipes>” organized it into an Excel table, and then exported it as JSON format to enhance search functionality in Elasticsearch.

- Excel format

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Formulas

Data

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	name	ID	minutes	n_step	n_ingredient	ingredient	description	step	history	region		
1	Gourmet Mushroom Risotto	1001	45	8	11	['chicken broth', 'olive oil', 'portobello mushrooms', 'mushrooms', 'garlic', 'onion', 'tomato sauce', 'white wine', 'parmesan cheese', 'salt', 'pepper']	This mushroom risotto is a creamy and flavorful dish. It features a base of chicken broth, olive oil, and portobello mushrooms. The risotto is cooked until it is al dente and topped with a generous amount of parmesan cheese.	Gather all ingredients. Heat olive oil in a large pot over medium heat. Add onion and garlic, sauté until fragrant. Add mushrooms and cook until softened. Add rice and stir to coat. Gradually add chicken broth, stirring frequently until absorbed. Add white wine and simmer until evaporated. Stir in parmesan cheese and season with salt and pepper.	Originates from Italian cuisine. Risotto is a traditional Italian dish.	Italian		
2	Chicken Alfredo Pasta	1002	30	6	9	['fettuccine pasta', 'boneless chicken breasts', 'alfredo sauce', 'parmesan cheese', 'salt', 'pepper']	Creamy Alfredo pasta with chicken. The sauce is made with butter, cream, and parmesan cheese.	Cook pasta according to package instructions. Meanwhile, cook chicken breasts in a skillet until cooked through. Prepare Alfredo sauce by melting butter in a saucepan, adding cream and parmesan cheese, and stirring until smooth. Season with salt and pepper.	Alfredo pasta is named after Alfredo Di Leo, an Italian chef.	Italian		
3	Vegetarian Thai Green Curry	1003	40	7	12	['tofu', 'green curry paste', 'coconut milk', 'vegetables', 'chicken thighs', 'salt', 'pepper']	A flavorful and aromatic Thai dish. It features tofu, green curry paste, coconut milk, and a variety of vegetables.	In a pot, combine curry paste and coconut milk. Bring to a boil, then reduce heat and simmer. Add tofu and vegetables, cooking until tender. Season with salt and pepper.	Green curry is a staple in Thai cuisine.	Thai		
4	Spaghetti Bolognese	1004	35	5	10	['ground beef', 'onion', 'garlic', 'tomato sauce', 'white wine', 'parmesan cheese', 'salt', 'pepper']	Classic Italian Bolognese sauce served over spaghetti. The sauce is made with ground beef, onion, garlic, and tomato sauce.	In a pan, sauté onions and garlic until fragrant. Add ground beef and cook until browned. Add tomato sauce and white wine, simmering until the sauce is thick. Stir in parmesan cheese and season with salt and pepper.	Bolognese sauce originates from the Bologna region in Italy.	Italian		
5	Grilled Lemon Herb Chicken	1005	25	4	8	['chicken breasts', 'lemon', 'olive oil', 'herbs', 'salt', 'pepper']	Juicy and flavorful grilled chicken. The chicken is marinated in a mixture of lemon juice, olive oil, and herbs.	Combine olive oil, lemon juice, and herbs in a bowl. Marinate chicken breasts in the mixture for at least 30 minutes. Grill chicken over medium heat until cooked through.	Grilled lemon herb chicken is a popular dish in Mediterranean cuisine.	Mediterranean		
6	Shrimp and Vegetable Stir-Fry	1006	20	5	9	['shrimp', 'broccoli', 'bell peppers', 'soy sauce', 'garlic', 'onion', 'salt', 'pepper']	Quick and healthy stir-fry. It features shrimp, broccoli, bell peppers, and a soy sauce dressing.	Quick and healthy stir-fry. Heat oil in a wok over high heat. Add shrimp and cook until pink. Add vegetables and stir-fry until tender. Add soy sauce and season with salt and pepper.	Sauté garlic and ginger in oil. Stir-frying is a cooking technique used in many Asian cuisines.	Asian		
7	Caprese Salad	1007	15	3	6	['tomatoes', 'fresh mozzarella', 'basil', 'olive oil', 'salt', 'pepper']	A refreshing salad featuring tomatoes, fresh mozzarella, and basil. It is dressed with olive oil and salt.	Slice tomatoes and mozzarella into rounds. Arrange them on a plate with fresh basil leaves. Drizzle with olive oil and season with salt and pepper.	The Caprese salad originates from the Capri island in Italy.	Italian		
8	beef and Vegetable Stir-Fry	1008	30	6	11	['beef sirloin strips', 'broccoli', 'carrots', 'soy sauce', 'garlic', 'onion', 'salt', 'pepper']	Savory and satisfying beef stir-fry. It features beef sirloin strips, broccoli, carrots, and a soy sauce dressing.	Toss beef strips with cornstarch. Heat oil in a wok over high heat. Add beef and cook until browned. Add vegetables and stir-fry until tender. Add soy sauce and season with salt and pepper.	Stir-frying is a common cooking technique in Chinese cuisine.	Asian		
9	Vegetarian Quinoa Salad	1009	25	4	9	['quinoa', 'cherry tomatoes', 'cucumber', 'olive oil', 'lemon juice', 'salt', 'pepper']	Light and nutritious quinoa salad. It features quinoa, cherry tomatoes, cucumber, and a lemon dressing.	Cook quinoa according to package instructions. Meanwhile, prepare dressing by mixing olive oil, lemon juice, and salt. Add quinoa, tomatoes, and cucumber to a bowl. Toss with dressing.	Quinoa, native to South America, is a healthy grain.	International		
10	Mango Salsa Chicken	1010	40	5	10	['chicken thighs', 'mango', 'onion', 'cilantro', 'lime juice', 'salt', 'pepper']	Sweet and spicy mango salsa. It features chicken thighs, mango, onion, and cilantro.	Season chicken thighs with salt and pepper. Cook in a skillet until cooked through. Meanwhile, prepare salsa by combining mango, onion, and cilantro. Sauté chicken thighs with mango salsa.	Mango salsa has its roots in Mexican cuisine.	Mexican		
11	Lemon Garlic Roasted Vegetables	1011	35	4	8	['potatoes', 'carrots', 'broccoli', 'olive oil', 'lemon juice', 'garlic', 'salt', 'pepper']	Roasted medley of vegetables. It features potatoes, carrots, broccoli, and a lemon-garlic dressing.	Preheat oven and toss vegetables with olive oil, lemon juice, and garlic. Roast in the oven until tender and golden.	Roasting vegetables is a simple and healthy cooking method.	International		
12	Sushi Rolls (Maki)	1012	60	7	10	['sushi rice', 'nori seaweed', 'fish', 'vegetables', 'soy sauce', 'wasabi', 'pickled ginger']	Create your own sushi rolls. It features sushi rice, nori seaweed, and a variety of fillings.	Prepare sushi rice with vinegar and salt. Spread nori seaweed on a mat. Add fillings and roll tightly. Slice into bite-sized pieces.	Sushi has a long history in Japan. It is a popular dish worldwide.	Japanese		
13	Ramen Noodle Soup	1013	45	5	11	['ramen noodles', 'chicken', 'soft-boiled egg', 'soy sauce', 'sesame oil', 'green onions', 'pickled ginger']	Hearty ramen noodle soup. It features ramen noodles, chicken, and a soy sauce dressing.	Cook ramen noodles according to package instructions. Meanwhile, prepare broth by simmering chicken and soy sauce. Top with soft-boiled egg, green onions, and pickled ginger.	Ramen originated in China but became a staple in Japan.	Japanese		
14	Tempura	1014	40	6	8	['shrimp', 'vegetables', 'sweet potato', 'zucchini', 'tempura batter', 'oil']	Light and crispy tempura. It features shrimp, vegetables, and a tempura batter.	Prepare tempura batter by mixing flour, cornstarch, and cold water. Dip ingredients in the batter and fry in hot oil until golden.	Tempura was introduced to Japan by Portuguese missionaries.	Japanese		
15	Teriyaki Chicken	1015	35	4	7	['chicken thighs', 'soy sauce', 'mirin', 'brown sugar', 'garlic', 'onion', 'salt', 'pepper']	Grilled chicken glazed with teriyaki sauce. The sauce is made with soy sauce, mirin, and brown sugar.	Combine soy sauce, mirin, and brown sugar in a bowl. Marinate chicken thighs in the mixture. Grill chicken over medium heat until cooked through.	Teriyaki, meaning "shine by fire", is a popular Japanese cooking style.	Japanese		
16	Miso Soup	1016	20	3	7	['dashi', 'tofu', 'miso paste', 'green onions', 'salt']	A comforting and nutritious soup. It features dashi, tofu, and miso paste.	Bring dashi to a simmer. Add tofu and miso paste, stirring until combined. Garnish with green onions.	Miso soup is a traditional Japanese soup.	Japanese		
17	Okonomiyaki (Japanese Pancake)	1017	30	5	9	['cabbage', 'flour', 'eggs', 'bacon', 'soy sauce', 'ketchup', 'mayo']	Savory Japanese pancake. It features cabbage, flour, and eggs.	Mix shredded cabbage, flour, and eggs in a bowl. Add other ingredients and cook on a griddle until cooked through.	Okonomiyaki, meaning "what you want", is a popular Japanese street food.	Japanese		
18	Sashimi	1018	20	2	5	['fresh raw fish', 'salmon', 'tuna', 'scallops', 'wasabi', 'pickled ginger']	Delicate slices of fresh raw fish. It features salmon, tuna, and scallops.	Slice fresh raw fish into thin pieces. Serve with wasabi and pickled ginger.	Sashimi has ancient roots in Japanese cuisine.	Japanese		
19	Yakitori (Grilled Chicken Skewers)	1019	25	4	8	['chicken thighs', 'soy sauce', 'mirin', 'brown sugar', 'garlic', 'onion', 'salt', 'pepper']	Juicy grilled chicken skewers. The chicken is marinated in a soy sauce mixture.	Thread chicken onto skewers. Marinate in a mixture of soy sauce, mirin, and brown sugar. Grill over medium heat until cooked through.	Yakitori has its roots in Japanese cuisine.	Japanese		
20	Matcha Green Tea Ice Cream	1020	60	4	5	['heavy cream', 'whole milk', 'sugar', 'matcha powder', 'vanilla extract', 'salt']	Creamy and flavorful green tea ice cream. It features heavy cream, whole milk, and matcha powder.	Whisk matcha powder with a small amount of water. Heat cream and milk with sugar and vanilla. Pour into a mold and freeze.	Matcha has been a part of Japanese tea ceremony for centuries.	Japanese		
21	Paella	1021	50	6	12	['short-grain rice', 'chicken', 'chorizo', 'sausage', 'peas', 'beans', 'salt', 'pepper']	A Spanish one-pan dish. It features short-grain rice, chicken, chorizo, and sausage.	Sauté chicken, chorizo, and sausage in a large pan. Add rice, peas, and beans. Cook over medium heat until the rice is absorbed.	Originating in Valencia, Spain, paella is a traditional dish.	Spanish		
22	Pad Thai	1022	30	5	9	['rice noodles', 'shrimp', 'tofu', 'bean sprouts', 'eggs', 'peanuts', 'lime juice', 'salt', 'pepper']	A popular Thai stir-fried noodle dish. It features rice noodles, shrimp, and tofu.	Soak rice noodles in hot water. Stir-fry shrimp and tofu. Add noodles, bean sprouts, and eggs. Toss with a sauce of lime juice, soy sauce, and peanuts.	Pad Thai is a relatively modern Thai dish.	Thai		
23	Beef Stroganoff	1023	40	5	8	['beef sirloin', 'onion', 'mushrooms', 'beef broth', 'sour cream', 'salt', 'pepper']	A Russian dish featuring beef and mushrooms. It is served over egg noodles.	Sauté beef, onions, and mushrooms in a pan. Add beef broth and simmer. Stir in sour cream and season with salt and pepper.	Beef Stroganoff has Russian origins.	Russian		
24	Chicken Tikka Masala	1024	50	5	9	['chicken thighs', 'yogurt', 'tomato sauce', 'curry powder', 'garam masala', 'salt', 'pepper']	A British-influenced Indian dish. It features chicken thighs, yogurt, and tomato sauce.	Marinate chicken in yogurt. Cook in a pan with tomato sauce and spices. Simmer until the chicken is tender.	Chicken Tikka Masala is a popular dish in Indian cuisine.	British/Indian		
25	Goulash	1025	120	4	8	['beef stew meat', 'onions', 'bell peppers', 'tomatoes', 'paprika', 'salt', 'pepper']	A Hungarian stew with beef and vegetables. It is served with a dollop of sour cream.	Sauté beef, onions, and bell peppers. Add tomatoes and paprika. Simmer until the beef is tender.	Goulash is a traditional Hungarian dish.	Hungarian		
26	Ceviche	1026	20	3	7	['white fish', 'lime juice', 'red onion', 'tomatoes', 'cilantro', 'salt', 'pepper']	A Latin American dish of raw fish. It features white fish, lime juice, and red onion.	Dice fish and marinate in lime juice. Add other ingredients and serve with cilantro.	Ceviche has ancient origins in Latin America.	Latin American		
27	Moussaka	1027	90	5	10	['eggplant', 'ground lamb or beef', 'onions', 'tomatoes', 'bechamel sauce', 'salt', 'pepper']	A layered baked casserole. It features eggplant, ground lamb or beef, and a bechamel sauce.	Sauté onions, garlic, and meat. Add tomatoes and simmer. Layer eggplant and meat in a dish. Top with bechamel sauce and bake.	Moussaka has Middle Eastern roots.	Mediterranean		
28	Kimchi Fried Rice	1028	25	4	8	['cooked rice', 'kimchi', 'bacon', 'soy sauce', 'sesame oil', 'green onions', 'pickled ginger']	A Korean dish featuring rice and kimchi. It is topped with a fried egg.	Sauté bacon and vegetables. Add rice and kimchi. Cook until the rice is heated through. Top with a fried egg.	Kimchi is a traditional Korean side dish.	Korean		
29	Greek Salad	1029	15	3	7	['cucumbers', 'tomatoes', 'feta cheese', 'kale', 'olive oil', 'lemon juice', 'salt', 'pepper']	A refreshing salad featuring cucumbers, tomatoes, and feta cheese.	Chop cucumbers, tomatoes, and feta cheese. Toss with olive oil, lemon juice, and salt.	Greek salad, also known as salata, is a staple in Greek cuisine.	Greek		
30	Tuna Poke Bowl	1030	20	4	8	['sushi rice', 'fresh tuna', 'avocado', 'cucumber', 'sesame oil', 'soy sauce']	A bowl of sushi rice topped with fresh tuna, avocado, and cucumber.	Prepare sushi rice and poke bowl. Top with fresh tuna, avocado, and cucumber. Drizzle with soy sauce and sesame oil.	Poke bowls have Hawaiian origins.	Hawaiian		

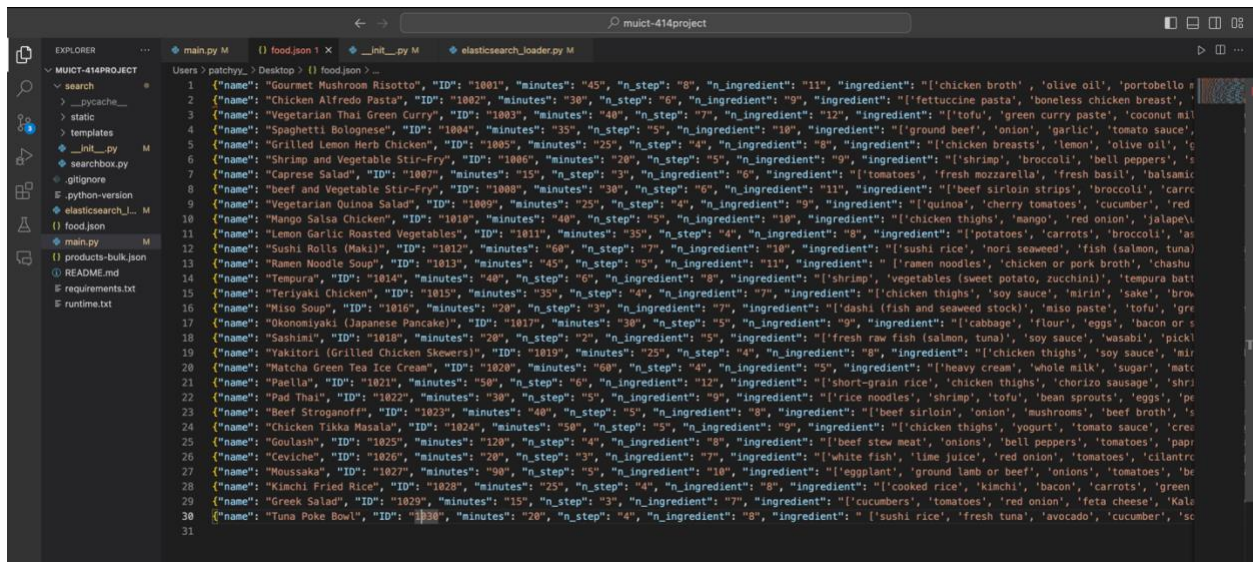
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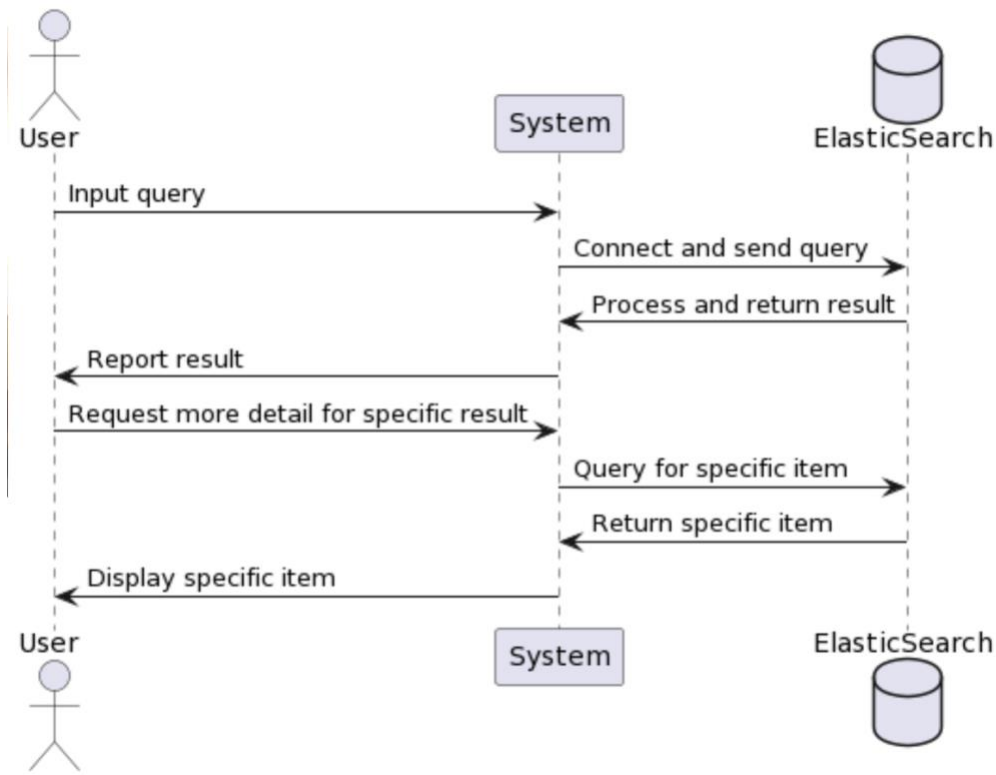
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- (NDJSON) .json format



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System Diagram

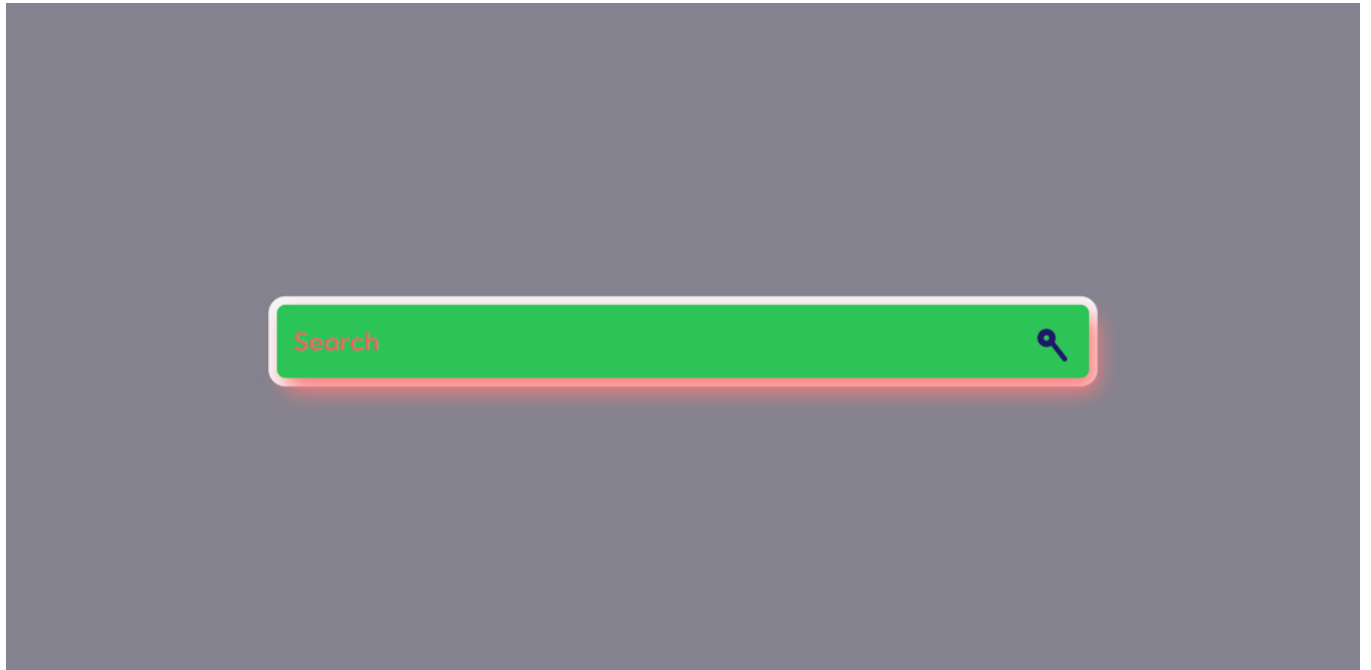


Explanation :

- System receives query from user. System connected and send the query to the elastic search.
- Elastic searches use the user's query as an input, then elastic search will process and return the search result
- System, then will report the result of the elastic server to display out the corresponding result(s).
- If user requested for the detailed result for the specific result, system will query for the specific item and then return to the user.

Snapshots of the System

- Search Page



- One word query (rice)

Search Results for "rice"

Page item order	Title	Descriptions	Region	Details
1	Paella	A Spanish one-pan dish with a rich combination of rice, seafood, and meats.	Spanish	link
2	Kimchi Fried Rice	A Korean dish featuring fried rice with kimchi, vegetables, and a savory sauce, often topped with a fried egg.	Korean	link
3	Matcha Green Tea Ice Cream	Creamy and flavorful green tea ice cream made with matcha powder.	Japanese	link
4	Tuna Poke Bowl	A bowl of sushi rice topped with fresh tuna, avocado, cucumber, and a flavorful soy-sesame dressing.	Hawaiian	link
5	Sushi Rolls (Maki)	Create your own sushi rolls with a variety of fresh ingredients.	Japanese	link

For more information you can click “Link” and it will show you more information

KIMCHI FRIED RICE

Data ID: 1028
Name: Kimchi Fried Rice

Description

A Korean dish featuring fried rice with kimchi, vegetables, and a savory sauce, often topped with a fried egg.

History

Kimchi is a traditional Korean side dish of fermented vegetables. Kimchi fried rice is a modern creation, combining Korean and global flavors.

Region

Korean

Estimated cooking time (minutes)

25

Number of cooking steps

4

Number of ingredients

8

Ingredients

['cooked rice', 'kimchi', 'bacon', 'carrots', 'green onions', 'soy sauce', 'sesame oil', 'fried eggs']

Steps

['Saut bacon and vegetables in sesame oil', 'Add cooked rice and kimchi', 'Stir in soy sauce', 'Top with green onions and a fried egg']

- Multi-word query (Japanese food)

Search Results for "Japanese food"

Page item order	Title	Descriptions	Region	Details
1	Yakitori (Grilled Chicken Skewers)	Juicy grilled chicken skewers with a sweet and savory glaze.	Japanese	link
2	Yakitori (Grilled Chicken Skewers)	Juicy grilled chicken skewers with a sweet and savory glaze.	Japanese	link
3	Okonomiyaki (Japanese Pancake)	Savory Japanese pancake with a variety of toppings.	Japanese	link
4	Okonomiyaki (Japanese Pancake)	Savory Japanese pancake with a variety of toppings.	Japanese	link
5	Chicken Alfredo Pasta	Creamy Alfredo pasta with tender chicken breast, a perfect comfort dish.	Italian	link

1 2 » Last

New Search

For more information you can click “Link” and it will show you more information

YAKITORI (GRILLED CHICKEN SKEWERS)

Data ID: 1019

Name: Yakitori (Grilled Chicken Skewers)

Description

Juicy grilled chicken skewers with a sweet and savory glaze.

History

Yakitori has its roots in Japanese street food culture and has evolved into a popular izakaya (pub) dish.

Region

Japanese

Estimated cooking time (minutes)

25

Number of cooking steps

4

Number of ingredients

8

Ingredients

['chicken thighs', 'soy sauce', 'mirin', 'sake', 'sugar', 'green onions', 'sesame seeds', 'lemon wedges']

Steps

['Thread chicken onto skewers', 'Mix soy sauce, mirin, sake, and sugar for the glaze', 'Grill skewers, basting with the glaze', 'Sprinkle with chopped green onions and sesame seeds, serve with lemon wedges']

- Partial match (“sala” for “salad”)

Search Results for "sala"

Page	Item order	Title	Descriptions	Region	Details
1		Mango Salsa Chicken	Sweet and spicy mango salsa served over grilled chicken thighs.	Mexican	link
2		Mango Salsa Chicken	Sweet and spicy mango salsa served over grilled chicken thighs.	Mexican	link
3		Caprese Salad	A refreshing salad featuring tomatoes, fresh mozzarella, and basil drizzled with balsamic glaze.	Italian	link
4		Greek Salad	A refreshing salad featuring crisp vegetables, feta cheese, olives, and a drizzle of olive oil.	Greek	link
5		Caprese Salad	A refreshing salad featuring tomatoes, fresh mozzarella, and basil drizzled with balsamic glaze.	Italian	link

12»Last

New Search

For more information you can click “Link” and it will show you more information

GREEK SALAD

Data ID: 1029
Name: Greek Salad

Description

A refreshing salad featuring crisp vegetables, feta cheese, olives, and a drizzle of olive oil.

History

Greek salad, also known as Horiatiki, has been a staple in Greek cuisine for centuries, showcasing the region's emphasis on fresh and simple ingredients.

Region

Greek

Estimated cooking time (minutes)

15

Number of cooking steps

3

Number of ingredients

7

Ingredients

['cucumbers', 'tomatoes', 'red onion', 'feta cheese', 'Kalamata olives', 'olive oil', 'oregano']

Steps

['Chop cucumbers, tomatoes, and red onion', 'Combine with olives and feta cheese', 'Drizzle with olive oil, sprinkle with oregano']

Example Search Sessions

1. One Word Query: Demonstrate a search for a term like "rice" and its results.
2. Multiple Word Query: Show a search for a phrase, such as "Japanese food"
3. Partial Match: Illustrate the system's response to a partial query like "sala" for "salad".
4. Ranking: Keyword relevance, Elasticsearch ranks based on relevance to the search query. This is calculated by algorithms like TF-IDF (Term Frequency-Inverse Document Frequency) which consider frequency of query terms.

Limitations

While the system can handle the query and returned the search result, it may be limited in its ability to handle inquiries in languages other than English or non-text information. Furthermore, the specificity of user inquiries may affect the accuracy and relevance of search results.

Technical Challenges and Lessons Learned

The project offered difficulties in understanding the complexities of Elasticsearch, the significance of dataset, and the application logic and interface. These challenges were all significant learning experiences.

1. Integration with Elasticsearch:

- Challenge: Elasticsearch installation and configuration for efficient data indexing and retrieval. Handling connection problems.
- Lesson Learned: Understanding Elasticsearch setup and security factors is critical for robust and effective search capabilities.

2. Error Handling and Debugging:

- Challenge: Putting in place robust error handling methods, particularly for dealing with search requests and Elasticsearch interactions. Troubleshooting Flask routing and Elasticsearch queries. To be more specific, to showing the detailed page for each query result facing an unexpected view and unable to link and show the specific detail of the search result to show.
- Lesson Learned: Learned the importance of thorough error handling and debugging procedures in ensuring system reliability, applying techniques and knowledge for a real world-like scenario functionality.

Future opportunity

A compelling prospect for future enhancement involves the incorporation of advanced machine learning techniques to continually refine the relevance algorithms employed by the Full Text Food Search Engine. Through machine learning, the system has the potential to adapt and improve based on user interactions, preferences, and behaviors, offering increasingly personalized and contextually accurate search results as users engage with the platform. This dynamic adaptation not only ensures a more tailored and user-centric experience but also positions the search engine to stay agile in response to shifting culinary trends and evolving user expectations. In doing so, it solidifies its role as an indispensable tool for individuals seeking precise and personalized food-related information in the ever-evolving landscape of digital content.

Conclusion

This report summarizes the key components of your Full Text Food Search Engine project. More specific information, especially in the 'Data Collection and Statistics' and 'Technical Challenges and Lessons Learned' sections, as well as the real system diagram and interface snapshots.