

## Introduction

In many companies, the search and retrieval of information matching certain criteria is a key part of the business process. If we take, for example, those companies that work with many different services or products, the task of searching through product or service queries can be a key part of their data analysis or customer care processes. Typically employees will have to query internal knowledge bases or consult with external sources of information to gather sufficient knowledge to solve domain specific tasks.

At present, a typical keyword-based search will not retrieve the wealth or depth of information typically required. While reference to an internet search engine might assist with such a task, such assistance is ad-hoc, sometimes unreliable, and certainly time-consuming.

SmartSearch, using semantic reasoning, improves the ability of an employee to extract all the relevant information relating to a particular search term, by allowing the search to include all related values, e.g. a search for “car” would return not just documents with the word “car” included but documents that refer to car related terms, e.g. any make, component or type of car, e.g. Ford, windscreen, hatchback, etc.

The system we have developed involves a process of information retrieval from websites and APIs to first create a knowledge base of searchable data. Using this knowledge base and available online ontologies, SmartSearch performs a search of all relevant values and returns the results to the screen.

The system has been designed using a combination of Python, Java (for connection to a semantic reasoner), JQuery javascript, Bootstrap, CSS and HTML.

Fig. 1 shows a general overview of the system. Based on this figure, and assuming we were interested in finding all products containing citrus fruits, SmartSearch would search within the available ontology and extracts the subclasses of citrus fruits from the ontology. Performing a search on the subclasses returns things like mandarins, oranges and lemons.

**The SmartSearch interface (configured for food products) is shown in Figure 2.** A user can input the search term, and the system returns a table showing all the relevant items that search term relates to. In the example shown, a user can search not only for ingredients but also for food nutrients.

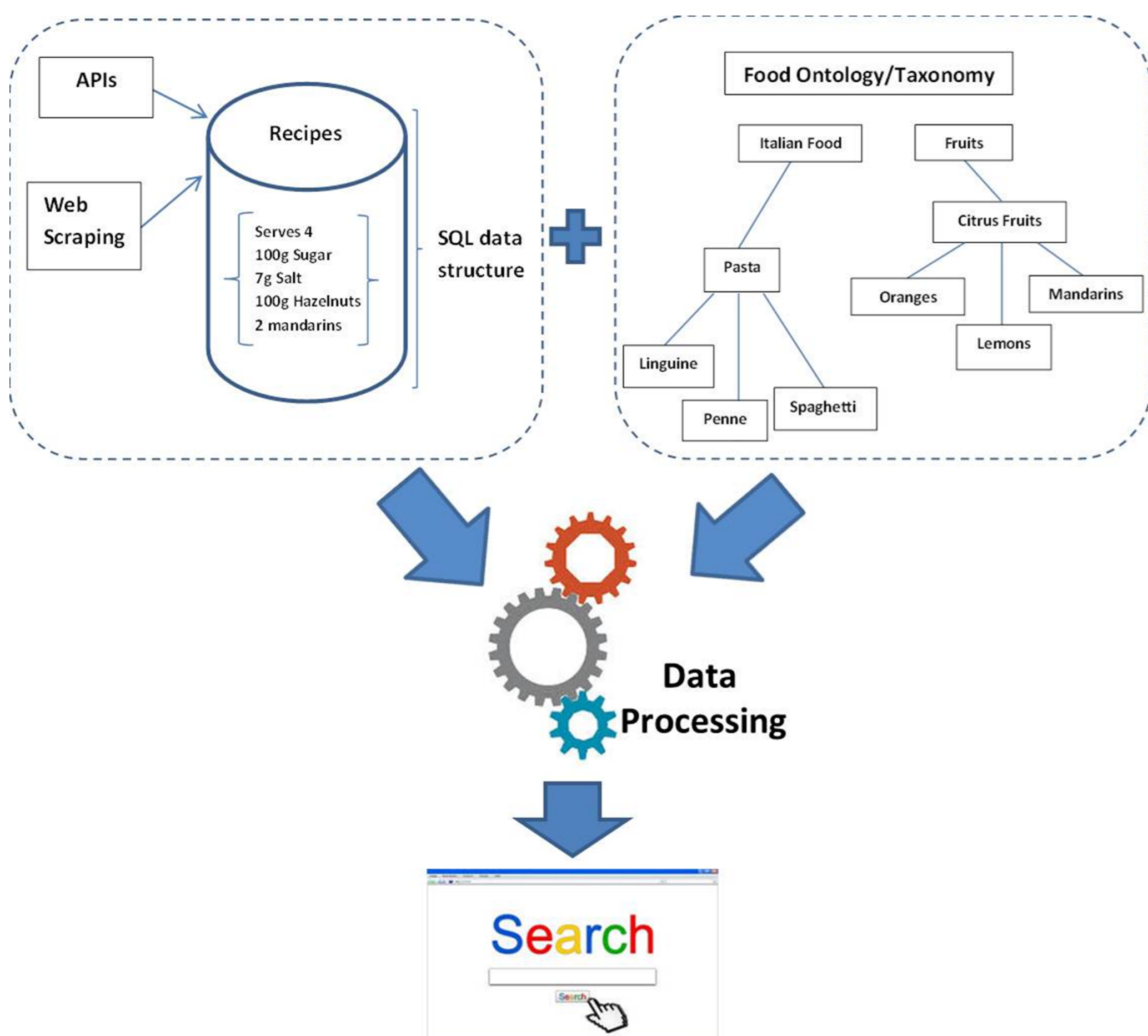


Figure 1. The components of the SmartSearch system

## Technology Solution

The SmartSearch system has been developed as a search engine contained within a web-based interface. A user can input the word they wish searched for in a Google-like front-end.

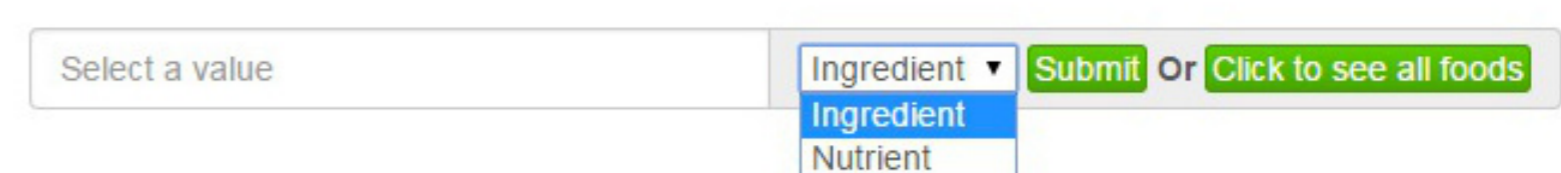
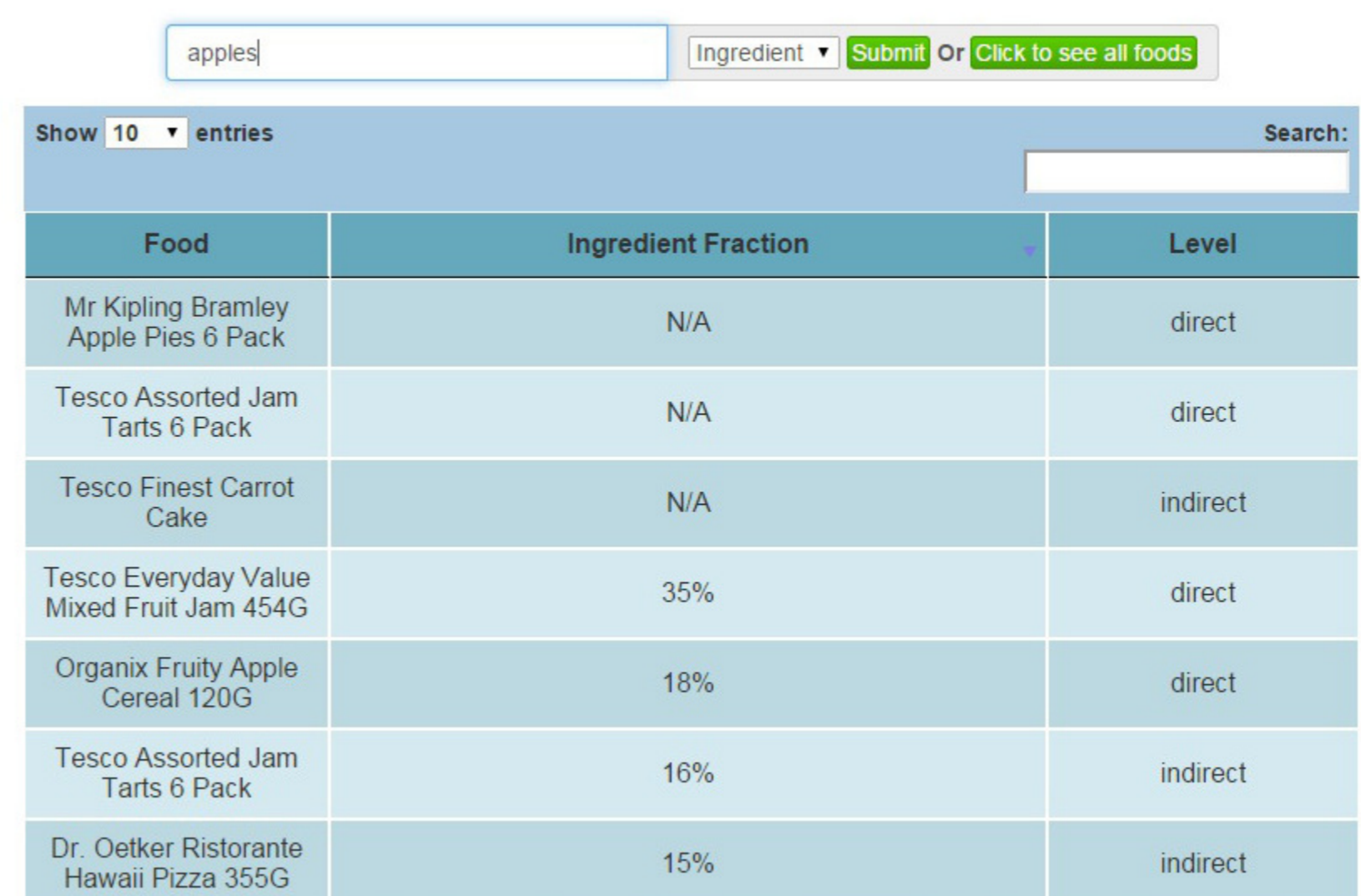


Figure 2a. The SmartSearch searchbox



| Food                                      | Ingredient Fraction | Level    |
|---|---------------------|----------|
| Mr Kipling Bramley Apple Pies 6 Pack      | N/A                 | direct   |
| Tesco Assorted Jam Tarts 6 Pack           | N/A                 | direct   |
| Tesco Finest Carrot Cake                  | N/A                 | indirect |
| Tesco Everyday Value Mixed Fruit Jam 454G | 35%                 | direct   |
| Organix Fruity Apple Cereal 120G          | 18%                 | direct   |
| Tesco Assorted Jam Tarts 6 Pack           | 16%                 | indirect |
| Dr. Oetker Ristorante Hawaii Pizza 355G   | 15%                 | indirect |

Figure 2b. The SmartSearch results in tabular form

## Research Team

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