

Healthy Eat-out Recommendation System

Shashank Shekhar Rishabh Krishna

ABSTRACT

The project is motivated by Food and Nutrition

People like to eat out, and trying out new places is often by recommendations by people we know. Also, there are websites like Yelp for recommendation

The issue : Personal experience often does not align with the ratings and recommendations from people we know.

The reason : Tastes of individuals differ.

Also, people eat out about 5 times a week, at minimum, and they would prefer to watch what they are eating – nutrition wise.

The issue : Sitting in a restaurant it is very difficult to know about nutritional content of the food items and dishes

The reason : No such system exists which can list the nutritional content and their calorific value at a single place.

We propose a recommender system that uses collaborative filtering to provide personalized recommendation, and also keeps track of one's daily nutritional and calorific intake. The recommender suggests places and dishes to try, based on one's taste and one's daily nutritional goal.

OBJECTIVES

Whatever we eat, becomes a part of us, and to keep a check on its nutritional content and health value; at the same time making a recommendation that the user might like, is what interests us. A uniform labeling system providing an easily understandable visual representation of food selection attributes and describing its nutritional contents, capable of influencing consumer purchasing preference (food product selection) does not exist. It will sell as a product for the users, and the analytical results can also be used by businesses to improve their understanding over their respective food products and dishes.

The system will allow users to rate the dishes on menus through our mobile and web applications. The application will amalgamate and analyze the Crowd-Sourced Consumer Data, understand the demographics and consumption patterns of food items for users, and businesses for a better understanding of consumer preferences.

Not everyone is a data miner; few are trained as food specialists, and even less have training in sensory science. So, the consumers and business-runners need data which is readily understandable, with graphic as well as numeric output, usable with viable near term and long term application, and which integrates the effects of various consumer consumption patterns (food pairing effects for combos and offers, desire-perception effects, time of consumption, preparation styles and so on).

In the real world, no one consumes food products 'blind', without knowledge of what they are eating or drinking, its price, its labeling, its alternatives and most importantly its **nutritional content**. Also, given a fact that nutrition is important and of great concern in the 'real world', no one consumes food products with a perfectly clean palate, void of all other tastes, smells, and references. The product is not trying to create another lab test which could not cater to the real world.

The motivation is a usable system that suggests real time crowd sourced data for various users to find their appropriate tastes from million options available. The system grows strong as the crowd sourced data increases.

METHODS

Algorithm Used:

k-NN clustering algorithm is used to find similar groups, and Pearson's correlation score is used to find similar people(in taste).

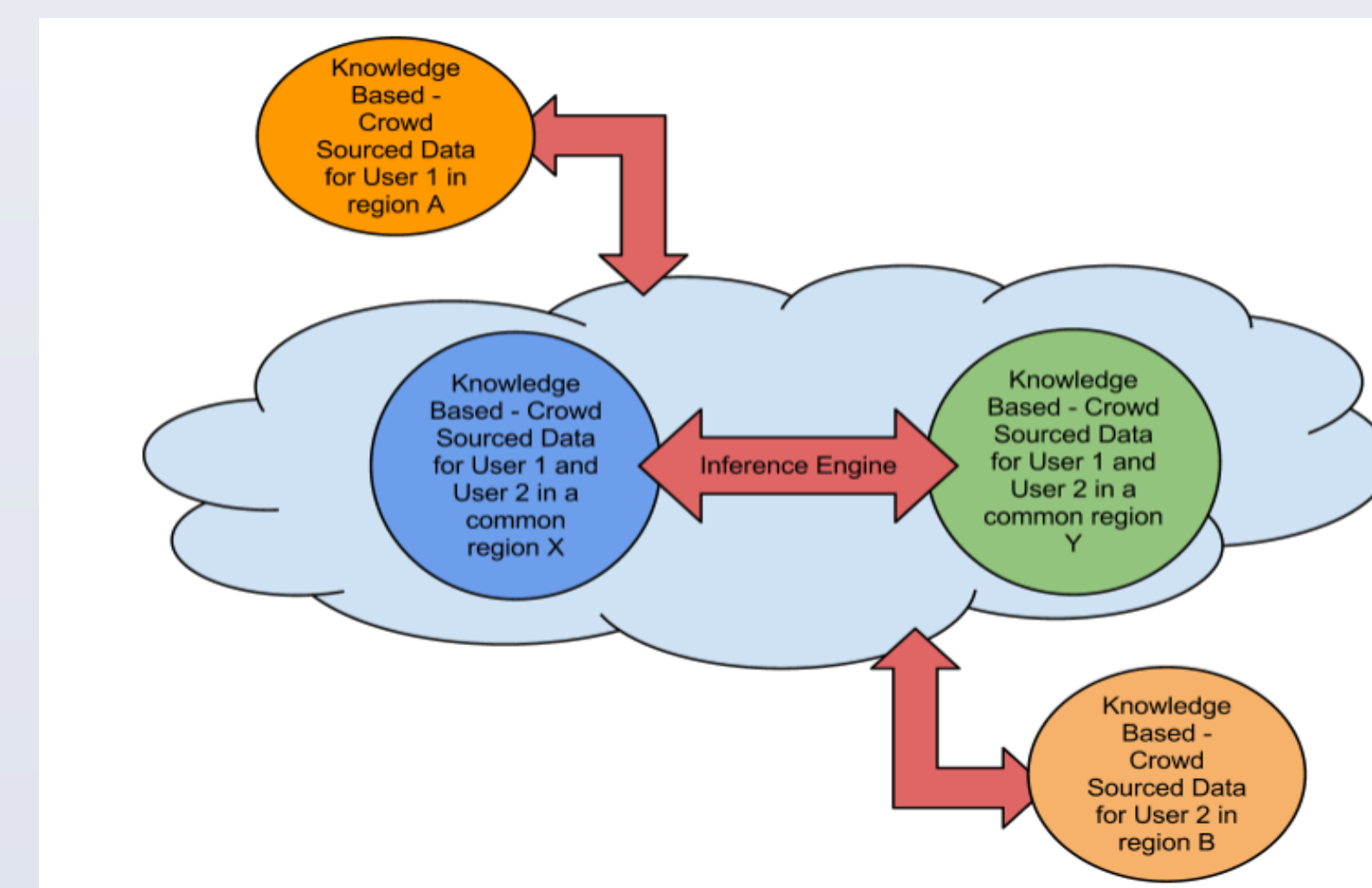
$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}}$$

Pearson's correlation is favored as it keeps grade inflation in check. Sample result: This segregates vegetarians from non-vegetarians.

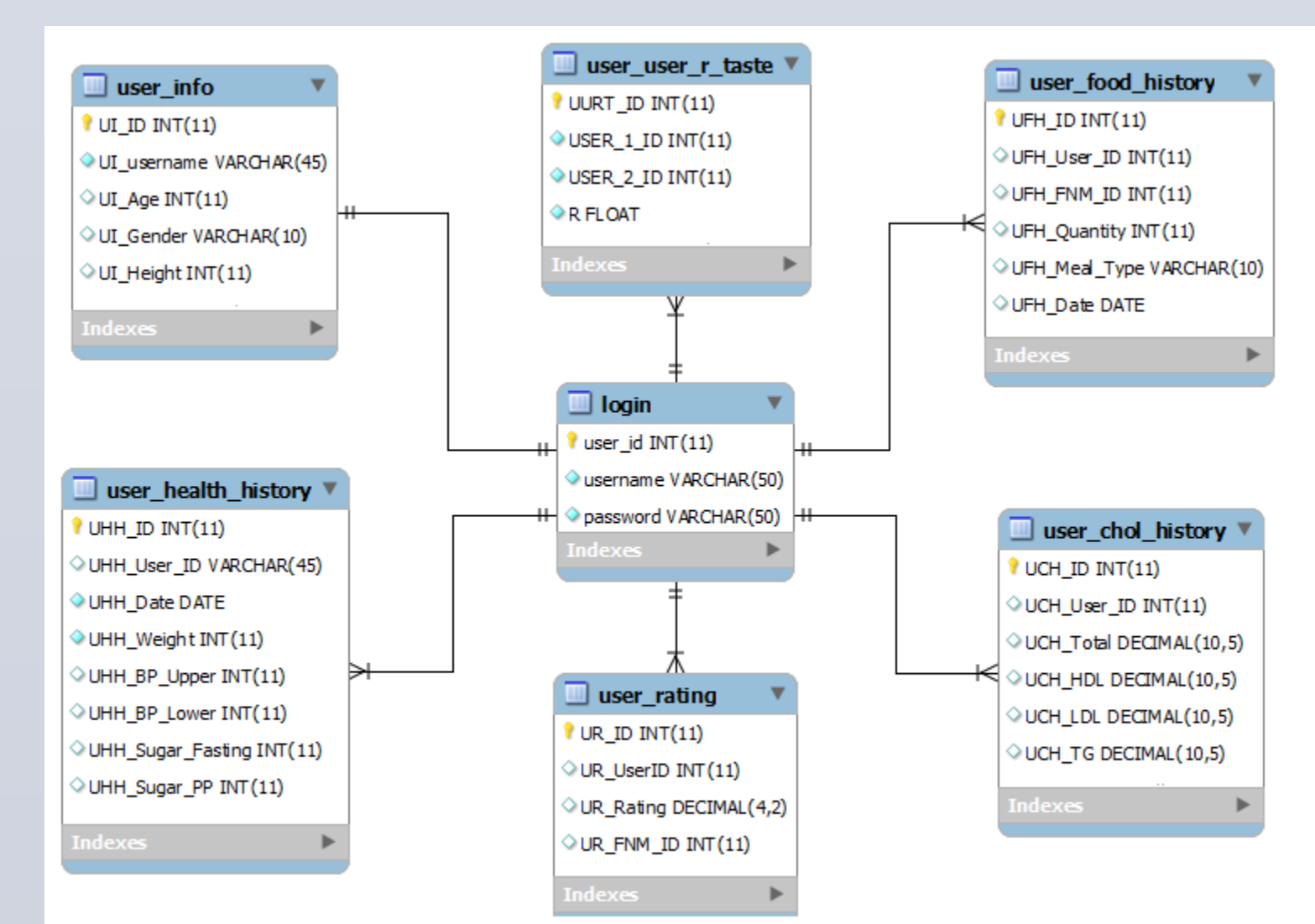
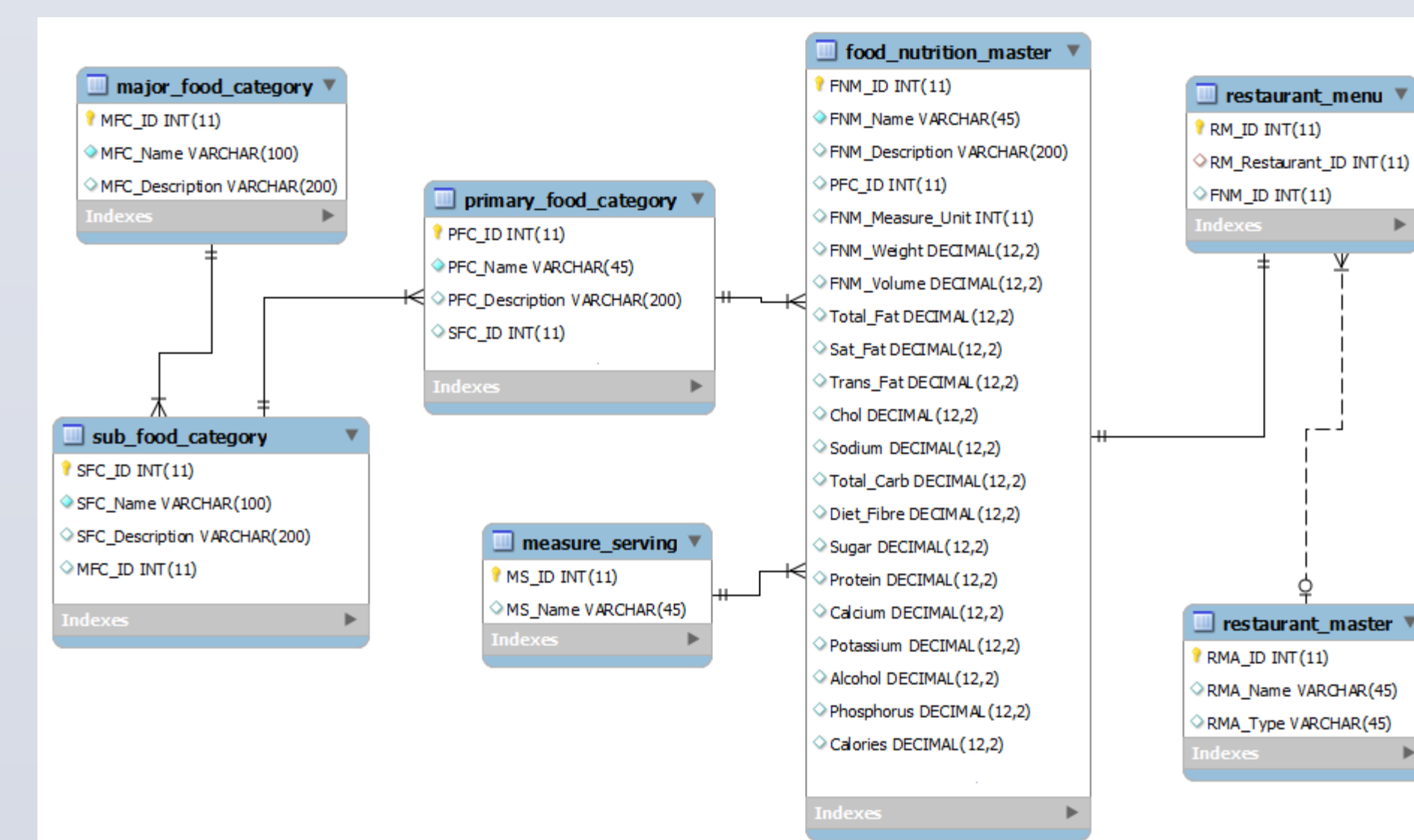
Users Compared	A-B	B-C	A-C
Pearson score	-0.195452457651	0.692543361064	-0.215614386272

Interpreting scores : ~1-Similar, 0-No relation, ~-1 Inverse relation

Recommendation Engine Architecture:

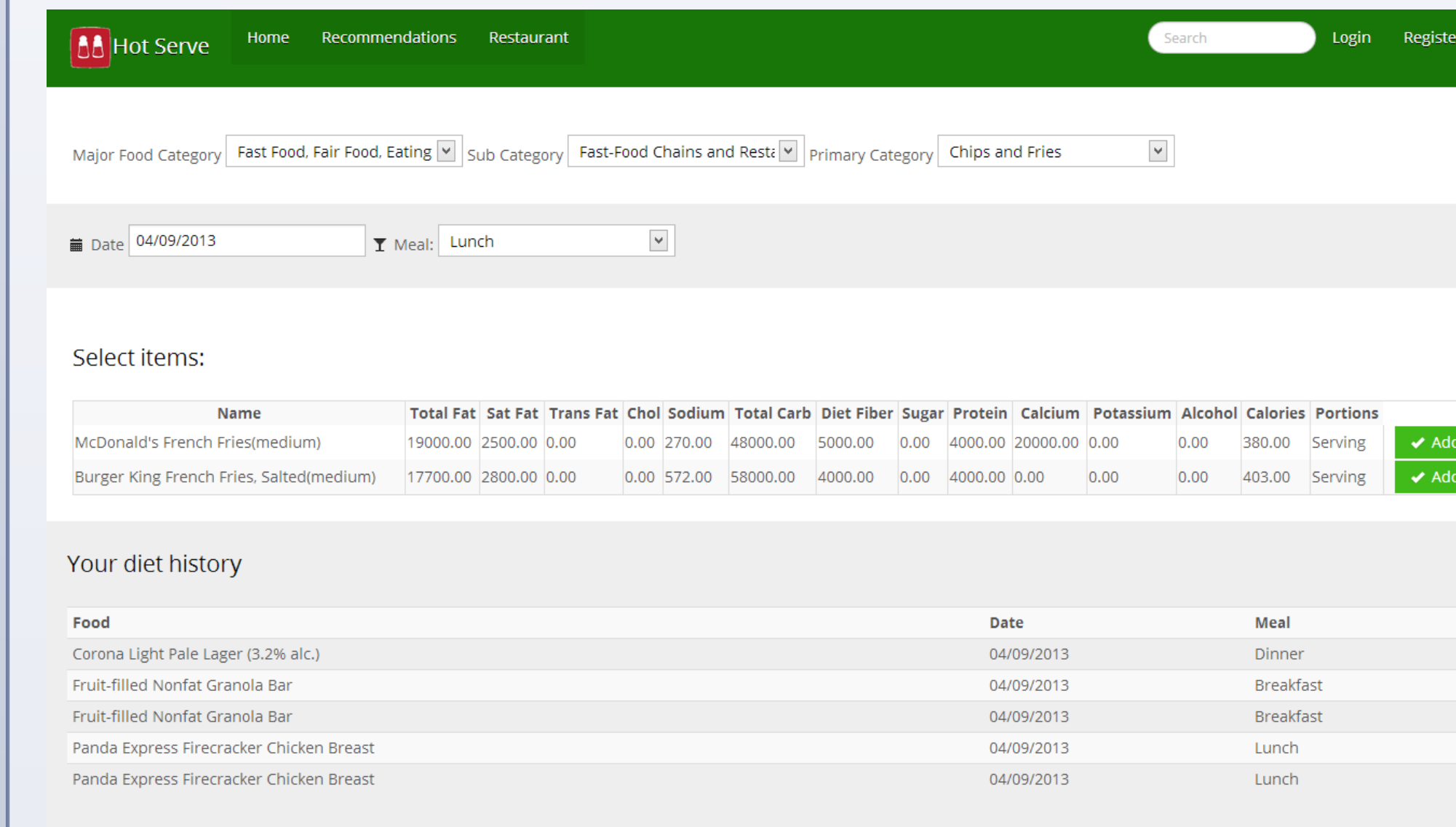


Database Design:

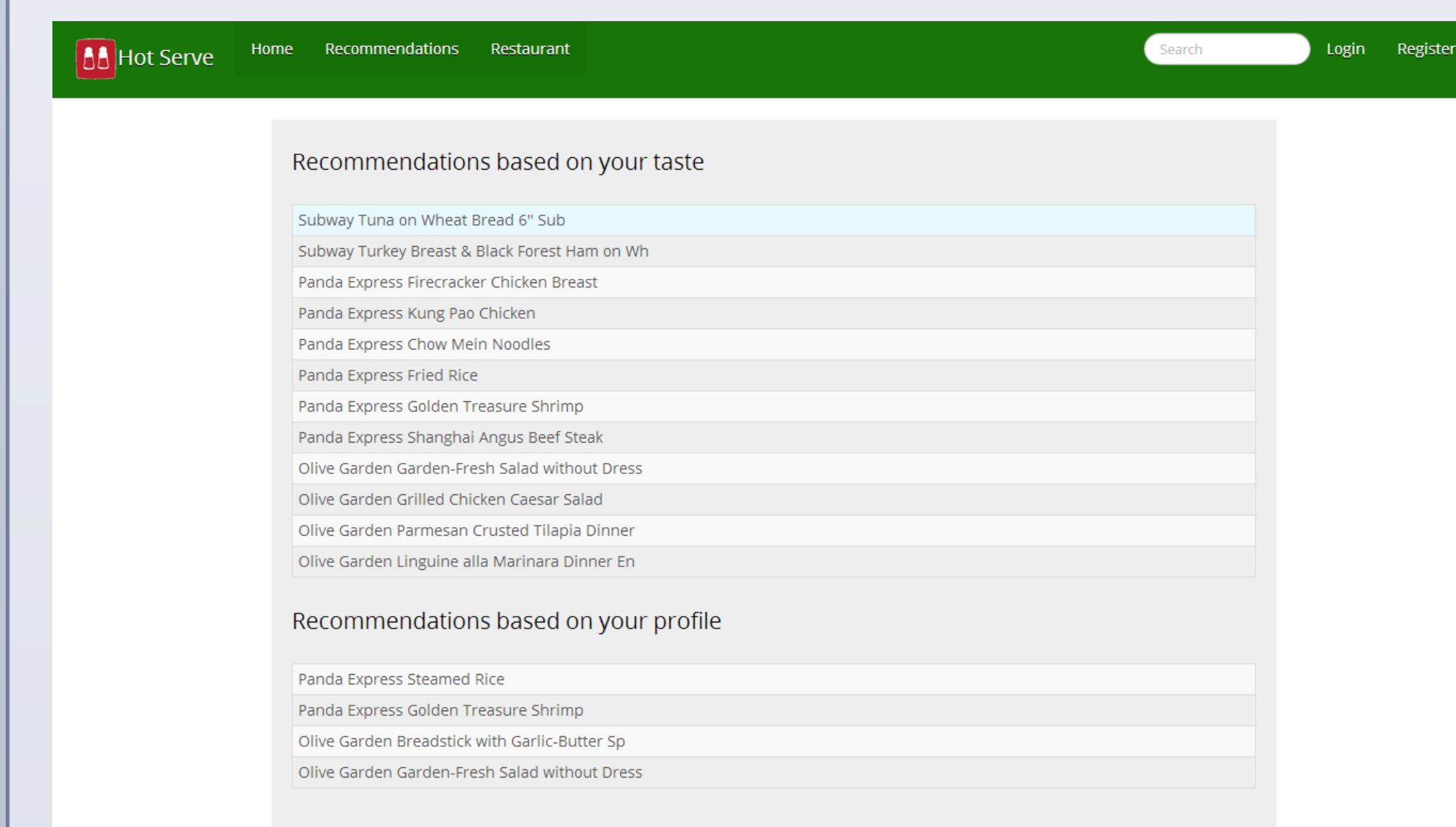


RESULTS

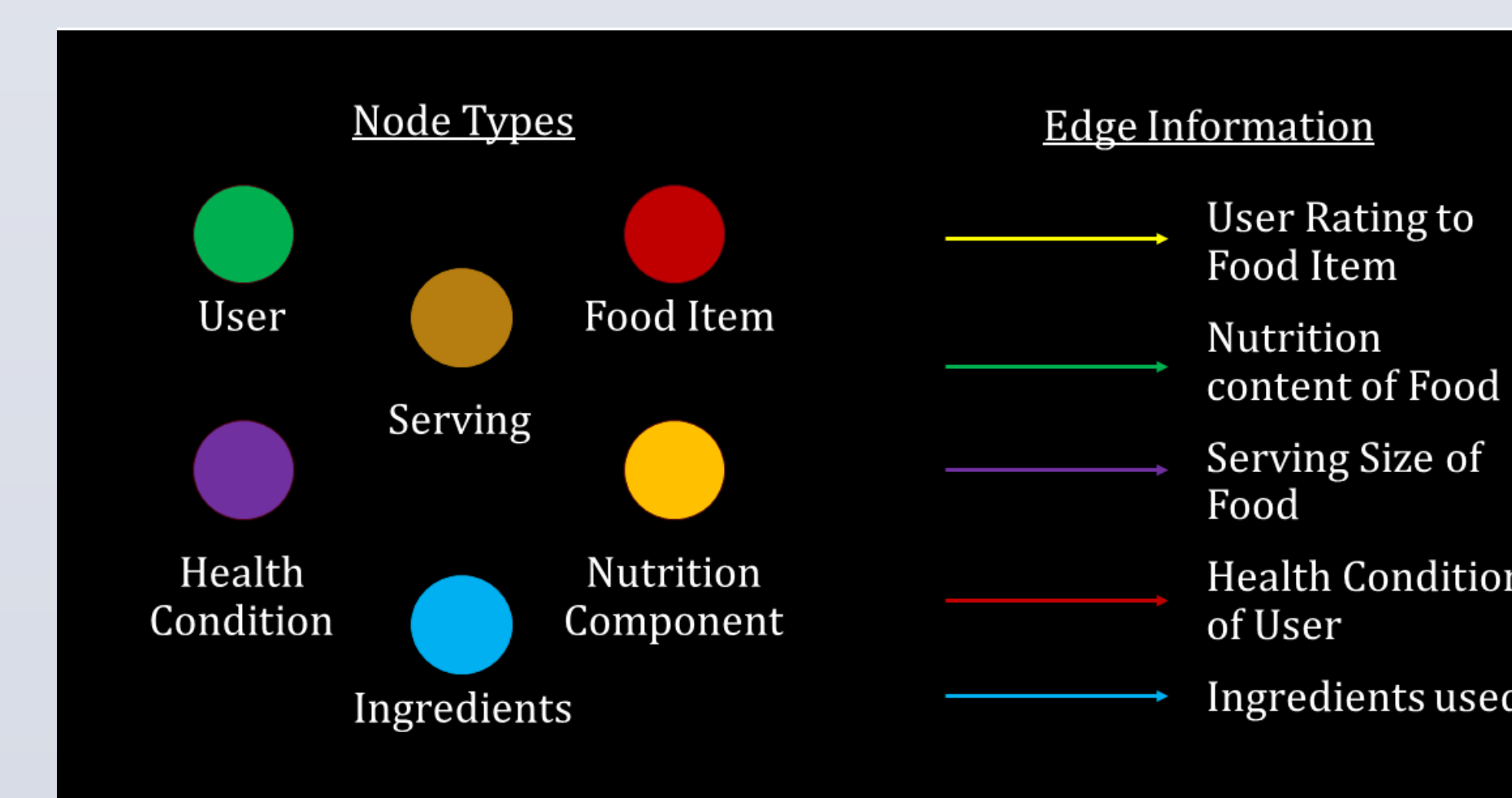
User Selection and History page:



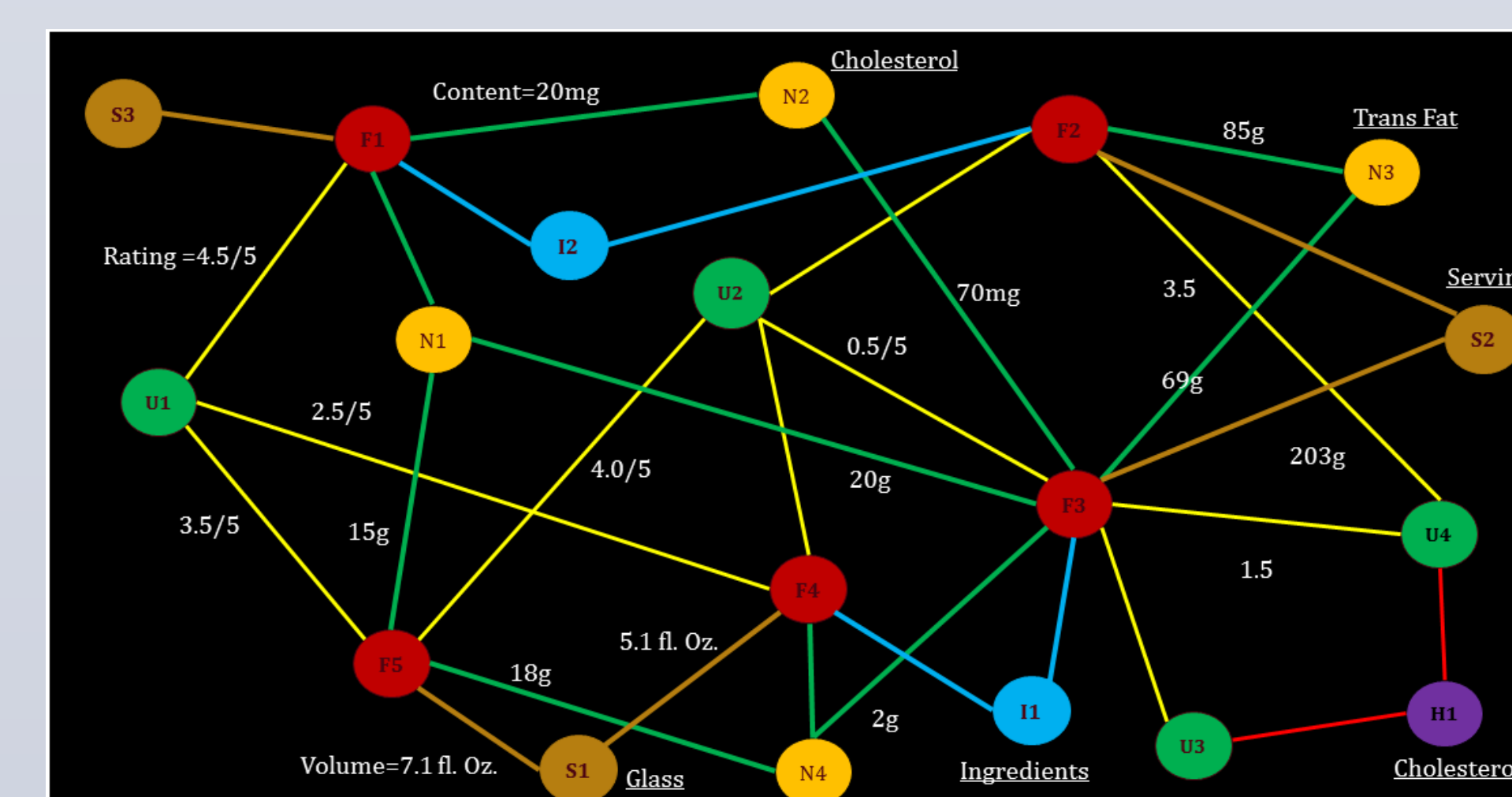
User Recommendation page:



Knowledge Representation - Graph DB - Semantics:



Knowledge Representation - Graph DB - Sample Graph:



FUTURE WORK AND CONCLUSION

The application can be expanded to do a feature based filtering of food items , allowing users to bring variations to their diet yet keep it balanced.

Another aspect of feature based filtering is finding food items and dishes that are more effective in keeping users vital statistics like blood pressure, blood sugar in control.

The application can find use in food and nutrition research acting as a source of large scale crowd-sourced real time study. This benefits both the application users who get better recommendations as more people use it and researchers trying to study impact of various food items on individual health.

We have envisioned a product called Eatable that aims to bring this concept to reality and available to all.

REFERENCES

USDA Nutrition Database : http://www.usda.gov/wps/portal/usda/usdahome?navid=FOOD_NUTRITION&navtype=SU

Source code: <https://github.com/shakehar/ALDWebsite>

Nutritional goals for age-gender groups based on dietary guidelines: <http://www.cnpnp.usda.gov/Publications/DietaryGuidelines/2010/PolicyDoc/Appendices.pdf>

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Dr. Daisy Zhe Wang
Computer and Information Science and Engineering,
University of Florida

Dr. Wendy J. Dahl
Food Science and Human Nutrition,
University of Florida

CONTACTS

Shashank Shekhar
University of Florida
shashankshakehar@gmail.com

Rishabh Krishna
University of Florida
krishna.rishabh@gmail.com