Smart Meal Planner

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INTRODUCTION

A recipe recommendation system that takes in user preferences and recommends a week's worth of recipes at a time that are diverse yet similar to the user's liking and also meet the nutritional requirements.

MOTIVATION

Existing recipe websites offer little in terms of personalization. For people with a busy lifestyle, cooking without prior planning is a difficult job. For example, one is constrained by the ingredients they have at the moment. Moreover, given the lack of time, they are likely to stick to recipes they are familiar with. Further, such haphazard activity can lead to not meeting recommended daily nutritional intakes.

INNOVATION

Use of 3SUM to determine valid combination of recipes according to nutritional values and modifying it to allow for a range of values instead of just one. While clustering is typically used to suggest similar items, we flip the use of it to recommend combinations with diverse tastes while still accounting for the user's preference and nutrition constraints.

APPROACH

Yummly™

30000 recipes obtained from Yummly

Cleaned data was stored into a MongoDB database

Precomputation

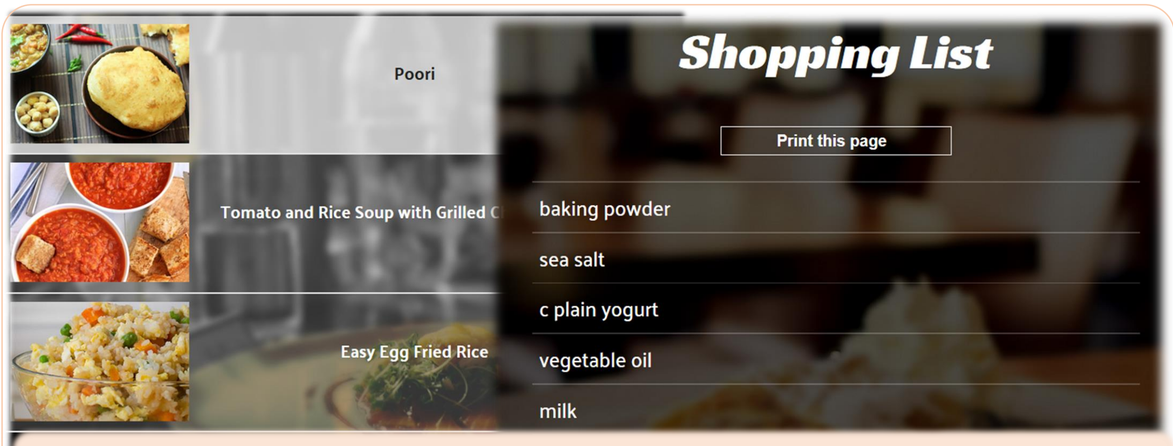
- Convert recipes into Boolean values
  - Use cosine distance to calculate similarities
  - Cluster Recipes into 200 clusters

Recommendation Algorithm

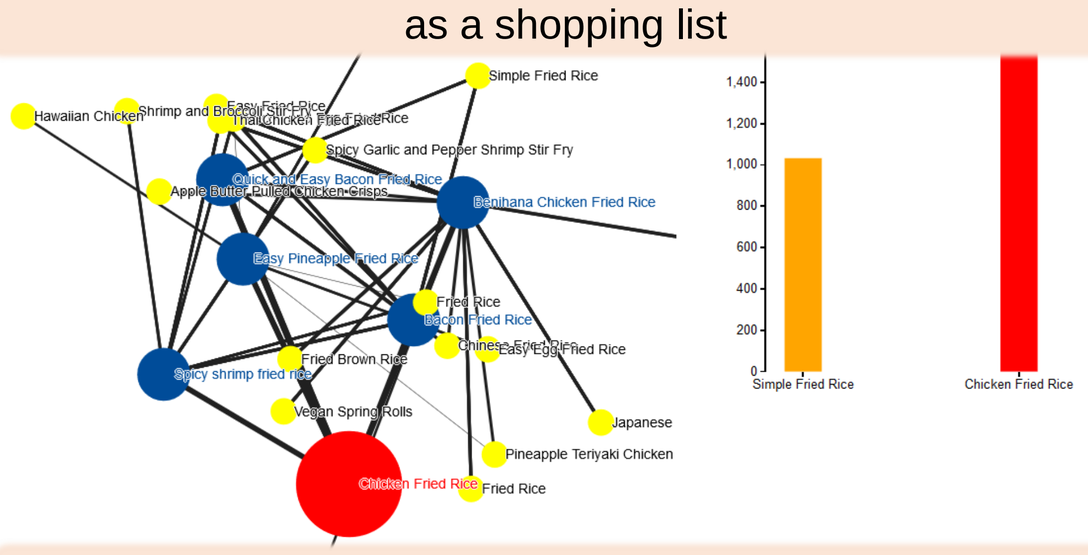
- Score recipes by max similarities to favorites
- Keep top 1000 recipes
- Get nutrition requirements
- Run modified 3SUM for sets of 3 recipes with nutritional constraints
  - Calories
  - Fat
  - Sugar
- Intersect to get valid day combinations
- Sort in decreasing order of the sum of recipe scores
- Greedily pick the top 7 sets that do not overlap clusters

User submits favorite recipes and BMI information to the server (NodeJS + Express + MongoDB)

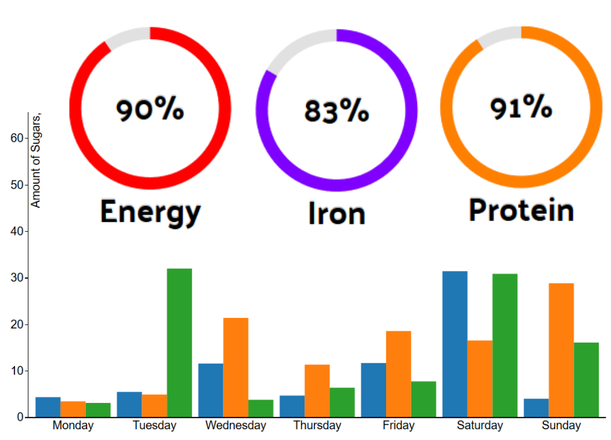
Gets the weekly meal plan, grocery shopping list and interactive nutritional analysis

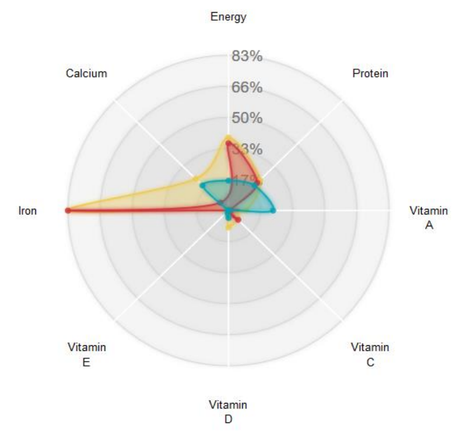


The weekly meal plan with the required ingredients presented as a shopping list



The recommendations can be changed by the user, if desired, by means of a force graph





A comprehensive and interactive nutritional analysis

EVALUATION

We conducted a survey to understand people's cooking styles. Almost universally, participants said they are often pressed for time and spend less than an hour every day on cooking. About 30% of the people go grocery shopping based on need with no pre-set schedule.

We demoed the app to a few participants in a more in-depth interview comparing the app to Yummly's top recipes and found what would detract from following the recommendations (if answered yes).

Nearly all the participants liked the ability to switch the recommended recipes by means of the force graph in our app.