MINDFUL CHEF

Business Case Study

1. The challenge

Our client is Mindful Chef, an innovative recipe box delivery company. They deliver recipe boxes which contain everything needed to cook delicious meals, with ethically sourced ingredients. Their customer base is the UK market, and currently 75,000 deliveries are made per month.

The company is developing a recommender system, which can predict recipes that existing customers are likely to want to order. However, as with every recommender system, this suffers from the cold-start problem. The system works accurately for existing customers, but not for new customers. The goal of this project is to design and test onboarding tools for new customers, providing quantitative preference data which could feed into the current recommender system.

It was observed that ~60% of new customers leave after two orders, one of the reasons being that the recommender system cannot suggest the most suitable recipes to the new customer. Our onboarding tool aims to solve this problem and retain new customers.

The biggest challenge was to build a robust end-to-end web app which would be sent to 21,000 customers, given that our team had no expertise initially. The onboarding tool needed to be fast to play and appealing for the user. We also needed to understand the current recommender system, gather compatible data, and accurately interpret recipe clusters obtained from analyzing Mindful Chef's database (~800 detailed recipes).

Currently the company has no onboarding tool, and initial recipes are recommended effectively at random to a new user.

2. Approach

For the first half of the project, after preliminary team discussions on game design, we naturally split into three streams. The first stream concentrated on building the framework of the web app for all the games, and designing Game 1 (baseline). The second stream looked in depth at the inputs for the current recommender system and developed Game 2. The third stream explored machine learning techniques to come up with a novel idea for Game 3.

We decided not to implement 'traditional' solutions to the cold-start problem. Instead, we developed tailored ideas based on analysis of Mindful Chef's recipe database and recommender system.

Initially, none of the team had prior experience in developing a distributed web app. We had to learn from scratch, making rapid adjustments to account for the possibility of high user traffic. Other issues included the slow loading of images (>15 secs), which we solved by using an alternative image server, and image resizing on the fly.

We used TF-IDF to process the most relevant textual data in the recipe table and performed PCA to obtain the most important principal components in describing Mindful Chef's recipes. This was used to select images for Game 2. In addition, we analyzed the recipe table with all its features using LDA topic modelling to process the most meaningful text, and used a clustering algorithm to classify the recipes. Some statistical analysis of these clusters allowed us to interpret meaning behind the clusters. These were used to build Game 3, which used probability weightings by cluster to build fake orders.

3. The results and impact

The goals set out at the start of the project were achieved. We realized three different onboarding games, deployed them into production and tested on 7,000 users each, receiving over 11% responses (>770) for each game over 3 days.

We used two metrics of adventurousness to analyze the performance of Games 2 and 3, compared to Game 1, which represents Mindful Chef's current onboarding system. We quantified the difference between measured adventurousness (based on users playing the deployed game) and actual adventurousness (from the same users' existing order history). The game with the smallest mean difference would be deemed the best.

Our results have shown that Games 2 and 3 perform 6 and 12 times better, respectively, than the baseline model, in predicting the adventurousness of the existing customers. This outcome is significant, since it could lead to a 20% increased retention of customers, corresponding to an increase in revenue by approximately £3 million per year.

Regarding next steps, the performance of the games should be measured by A/B testing on actual new customers. Combined with the existing recommender system, the attrition rates with and without the games can be measured.

We are interested in providing further insights into the games, such as to develop additional metrics for better comparison and implement the epsilon-greedy algorithm to design the questions.

The client was very happy and satisfied with our work, and we hope that the games we have developed will undergo further testing and eventual deployment on the Mindful Chef platform.