An investigation into the school canteen evaluation and reform

Course: EIE3280

Assignment: Research Proposal

Name: Lyu Minen 120090828,

Chen Lingpeng 120090049,

Zheng Chengle 120090279,

Xu Zijie 120090895

Class No.: L01

香港中文大學(深圳)
The Chinese University of Hong Kong, Shenzhen

An investigation into the school canteen evaluation and reform

Abstract

Establishing a sound cafeteria evaluation system is an important part of school construction. Establishing a reasonable cafeteria stall ranking mechanism will help us identify popular cafeteria stalls, and the school can find the right direction in cafeteria reform to improve student satisfaction. However, for The Chinese University of Hong Kong, Shenzhen, the current cafeteria evaluation and reform system is not effective enough. Therefore, in this project, we will establish a new evaluation model for the CUHK Shenzhen campus cafeteria, and rank the quality and satisfaction of all cafeteria stalls based on our model. The implementation of the new model is mainly based on the Bayesian ranking, modified page ranking and Borda count.

Introduction

Meals are an essential part of a student's campus life, and having a well-evaluated canteen system is a vital aspect of school infrastructure. The Chinese University of Hong Kong, Shenzhen (CUHKSZ) has undergone several canteen reform programs, but despite these efforts, students' satisfaction with the cafeteria remains low. Complaints about the canteen are frequent, and many students prefer to eat off-campus meal. As students of CUHKSZ, we recognize the importance of providing an effective evaluation system to guide future canteen reform programs.

To address this issue, we propose a new evaluation system that collects and analyzes students' evaluations of each stall in the cafeteria. We will then apply the collected data to a new evaluation model that combines Bayesian ranking, modified page ranking and Borda count to create a more reasonable canteen improvement strategy. Our goal is to enhance the overall student experience by involving them in the process of evaluating and reforming the canteen.

In this project, we will discuss the details of our proposed evaluation system and how it can be used to create a more student-centric canteen. We believe that this new evaluation model will provide a comprehensive understanding of the students' needs and expectations for the cafeteria, leading to more effective canteen reform programs.

Research Questions

This study aims to develop a ranking model to reflect the students' favor for each stall, which can contribute to the school canteen evaluation and reform strategy. Therefore, the following questions are asked:

1. What aspects are needed to evaluate a cafeteria stall?
2. How to use data from these aspects to rank all stalls reasonably and comprehensively?

Methodology

Participants:

The questionnaire will be completed by undergraduate students from The Chinese University of Hong Kong, Shenzhen (CUHKSZ). In the survey, participants rate each stall (on a scale of 0 to 5), including the stalls that were closed. Participants will also have the option not to rate to indicate they have not eaten in a specific stall.

Data Collection:

An online survey will be conducted from March 13 to March 20, 2023, using a questionnaire created on the Wenjuanxing app and shared on WeChat. The results will be automatically collected by the app. In addition, data from previous years' student evaluations and complaints, as well as cafeteria revenue and any significant food safety incidents, will be obtained from the Administrative Services Office (ASO) and the Rights and Equity Department of the Student Union (SU). These data sources will provide additional insights into the performance and safety of the cafeteria stalls.

Model pipeline:

Our model consists of six modules (shown in the following graph):

1. Bayesian Ranking: As the number of people who have rated each stall may vary (since participants can have the option not to rate if they have not eaten in a specific stall), we will use the Bayesian Ranking strategy to determine their ratings. All the rating values will be stored in a vector. This approach considers the number of reviewers in order to give out a more accurate evaluation of stalls' performance.

2. NLP model: For the complaints provided by ASO and SU, we would analyze the content by training an NLP model. A complaint with too much emotion will be ignored or assigned a low score. On the contrary, an objective complaint will be counted with a higher score. All points will be summed up as a vector.

3. Combination: Based on the two vectors conducted by the two operations above, we will weigh the scores to generate an overall rating for stalls. Then, we can obtain the first rank list – rank 1.

4. Modified Page Ranking: As some stalls may sell similar cuisine and compete with one another, we will build a graph based on both the similarity between the types of stalls sold and the geographic distance between them and then apply the Page Ranking algorithm to determine the importance of each stall. Stalls that are more similar and closer in proximity will have a stronger competition relationship and thus have a higher chance of being replaced. In contrast, stalls that are less similar and farther apart will have a lower chance of being replaced. This approach ensures that the ranking of the stalls takes into account both their similarity in food type and the impact of their geographic location. The importance ranking from high to low forms the second rank list – rank 2.

5. Revenue Rating: We rank the overall revenue from high to low directly and obtain the third rank list – rank 3.

6. Modified Borda Count for Ranking Combination: Based on the rank 1, rank 2 and rank 3, we set their corresponding weights w1, w2, and w3. For example, the stall in the first position of rank1 would get w1 * (M - 1) marks. After summing up the Borda Counts of the three ranks, we get an overall weighted Borda Count. This Board Count will give out the final ranking result.

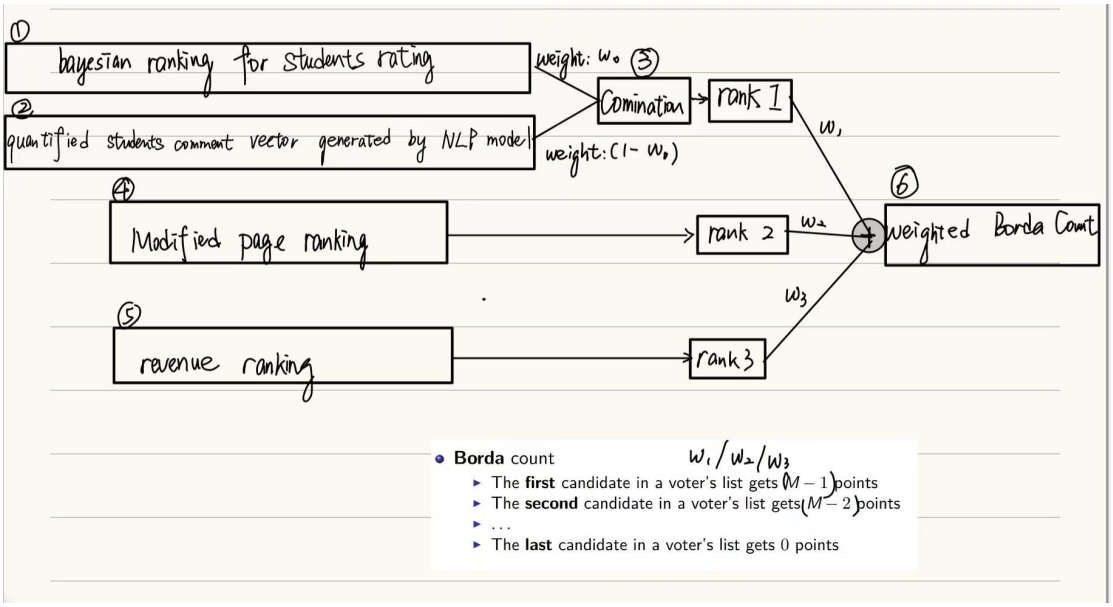

Fig. model pipeline

Evaluation:

As seen above, our ranking model takes into consideration three factors: student opinions (modules 1 and 2), stall information (module 4), and stall revenue (module 5). But how do these factors contribute to the final ranking results? In other words, how do we set the weight parameters (omega0 in module 3 and omega1-3 in module 6) in order to develop a more accurate model? To address this question, we need to develop an evaluation algorithm.

Our evaluation algorithm is based on survey results, namely, the participants' ratings for each stall. From each survey sample, we obtain the participants' favorite and least favorite stalls. For the ranks generated by our model, we assume that our college will remove the final 10% of the stalls in the rank. For example, if we have a total of 30 stalls, we will remove 3 stalls at the end of the rank. We develop a cost function as follows: if a participant's least favorite stall is among these 3 stalls, the cost function will be reduced by 1, but if a participant's favorite stall is among these 3 stalls, the cost function will be increased by 2. Our objective is to minimize the cost function by tuning the weight parameters (omega0-3).

We chose to design our cost function based on the students' survey because our model is student-oriented. Although stall information and revenue can indicate the quality of a stall, student opinion is always our primary concern. After all, our main goal is to improve student satisfaction. We need to ensure that our model does not remove the favorite stalls of some students while retaining the most hated stalls.

References

Chapter 3: How Google rank webpages?

Chapter 5: When can I trust an average rating on Amazon?

Chapter 6: Why does Wikipedia even work?