Cairo University

Faculty of Graduate Studies for Statistical Research

Professional Studies 2020/2021

Software Engineering

Title

A Queuing system approach for remotely reservation using machine learning in banks and large institutions

Submitted by

Ahmed Abdel Moneam Mahmoud

Supervised by

Dr Ahmed Gad Allah

Introduction

All the time people are facing the problem of large waiting list in order to In order to make certain government documents or withdraw a sum of money and this operations take a lot of time duel to the a mount of people in this institution

Machine learning (ML) is a type of artificial intelligence (AI) that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values. This method can be used

Problem Definition

The biggest problem that people face in dealing with large institutions is the large waiting time and the waste of many hours that could have been used for something else, the consequences of the influx of customers may result in problems like overcrowding and also busy people always cannot go to companies, such as banks, government institutions because of the long wait list

Literature Review

Prediction of waiting time for entities in independent and merged queues using Markov chain and machine learning techniques in 2010, Mehrdad Dadgar, University of Saskatchewan

Abstract:

Using mathematical and statistical methods and machine learning to calculate an estimated waiting time

Results:

So far, five machine learning algorithms are implemented to predict the wait time of each individual customer. To compare the performance of these algorithms, a loss function metric is required.

The average gap between the dimensionality reduction method and simulation results is about 7%

Method:

Use statistics and machine learning to reach an estimated time

Conclusion:

In this research, two queueing structures were investigated: 1) independent queues; 2) a single merged queue line.

This research developed a model for an independent queue structure with multiple priorities

Banking Queue Waiting Time Prediction based on Predicted Service Time using Support Vector Regression Dipta Gomes; Rashidul Hasan Nabil; Kamruddin Nur 02 April 2020

Abstract:

In this paper we applied several machine learning algorithms and among them we chose Support Vector Regression (SVR) in a real-life Banking queue dataset that contains real-life queues of multiple Banks where we predicted waiting time for everyone in the queue

Result:

There is also a scope to study more and find a better solution to queuing problems that provides a more accurate result above 86% unlike Support Vector Regression

Conclusion

Here a fundamental model for queue waiting time prediction depended on predicted service time from training dataset has been established. Different machine learning algorithms have been implemented using different machine learning approaches

Proposed approach

Queuing system approach using machine learning to remotely reservation before going to the institutions and to predict the time that you can spend on the waiting list and the number of people that will visit the institutions in specific date to inform you wither you can come this day or not and didn’t waste your time

The two biggest challenges are the lack of algorithms used in this area and the prediction who will be queued and not come to the bank

Research Objective

The research methodology will be based on Data Collection ,Developing the Prediction Model

Methods:

1-Algorithms are more accurate than previous algorithms because the input increased

a - The algorithm for calculating the time taken for the customer by his previous transaction with the institution

b- Organization conditions such as number of employees and employee waiting time for each customer for each branch

2-Using algorithms to predict who will go to the bank and who will cancel the appointment

a- The circumstances of the customer: through his phone and from personal data such as the type of his phone that expresses his financial condition and his experience in pre-booking with the bank, his age, gender and his region that expresses is he far from the bank or close to it

b- And other circumstances, such as any day of the week or month and the weather

Research Plan:

- Research for machine learning methods
- Data Collection
- Choosing processes
- Enhancing processes
- Evaluating processes
- Compare the results of my research with previous results
- Send the research to scientific journal.

References

Prediction of waiting time for entities in independent and merged queues using Markov chain and machine learning techniques

https://ieeexplore.ieee.org/document/9051490

Waiting time prediction system

https://patents.google.com/patent/US6137425A/en

A Machine Learning Approach to Waiting Time Prediction in Queueing Scenarios

https://ieeexplore.ieee.org/abstract/document/9027796

http://www.mathnet.ru/php/archive.phtml?wshow=paper&jrnid=ppi&paperid=298&option_lang=eng