A logo for college computing

Description automatically generated

**Assessment Cover Page**

|  |  |
| --- | --- |
| *Student Full Name* | Denisse Garcia Vivolo |
| *Student Number* | sbs24050 |
| *Module Title* | Strategical Thinking |
| *Assessment Title* | CA 2 – Capstone Project Proposal |
| *Assessment Due Date* | May 17th 2024 |
| *Date of Submission* | May 17th 2024 |

**Declaration**

By submitting this assessment, I confirm that I have read the CCT policy on academic misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source.

I declare it to be my own work and that all material from third parties has been appropriately referenced.

I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

**Forecasting the Future: A Customer**

**Service Demand Prediction Model for Efficient Resource Planning**

Denisse Garcia Vivolo

Student Number: sbs24050

Date: May 17th th 2024

[GitHub Link](https://github.com/CCT-Dublin/capstone-project-feb-2024-pt-denissegarciavivolo)

Contents

[**Introduction 3**](#_Toc162295902)

[**Objectives 3**](#_Toc162295903)

[**Problem Definition 3**](#_Toc162295904)

[**Scope 4**](#_Toc162295905)

[*Table 1 - Scope per Semester 5*](#_Toc162295909)

[*Table 2 - Project Timelines 5*](#_Toc162295910)

[*Figure 1 - Project Roadmap 6*](#_Toc162348506)

[**Data Sources 6**](#_Toc162295906)

[*Table 3 - Dataset sources 7*](#_Toc162300510)

[**Ethical Considerations 7**](#_Toc162295907)

[**Reference 8**](#_Toc162295908)

# Introduction

This capstone project aims to study customer service case data to predict resource availability allocation, providing operational efficiency for companies and organizations and generating customer satisfaction.

This project will contribute to improved customer service by:

* Enabling proactive resource planning to meet customer demand.
* Reducing customer wait times and enhancing satisfaction.
* Optimizing operational costs associated with customer service.

The paper intends to provide the first glance of the project, describe the key objectives, scope proposal and ethical considerations for forecasting the future of customer service demand.

# Objectives

This project aims to improve business forecasting for customer service resource allocation by leveraging historical case data and customer satisfaction data, the key objectives of this study are:

1. **Case Volume forecasting**: Predict the number of inquiries received through various channels (phone, chat, email).
2. **Support Latency**: Estimate average wait times for customers seeking support.
3. **High Demand Periods**: Identify peak demand periods to optimize resource allocation.
4. **Best Resource Available**: Determine best available resource for customer query.
5. **CSAT Prediction**: Predict the customer satisfaction (CSAT) per case base on resource allocation and best fit for customer query.

The goal is addressing these objectives and is not limited to predict demand for customer service interactions through multiples channels but also to benefit business to be more efficient and drive cost saving by using lean methodology and only allocate resources when needed (Miletić and Miletić, 2017) and provide the best support.

# Problem Definition

Customer service is a critical touchpoint for any organization to shape customer perception and loyalty. Some companies does not have effective ways to predict customer service volume demand, which makes it difficult to plan and allocate resources to address customers queries rapidly, impacting the business and the customer perception of the brand.

Companies must understanding customer needs and putting initiatives in place to deliver more than what customer expect, creating efficiency in the process and resource allocation will help delivering superior customer service, it has been proven that establishing reputations will attract more business (Hinson, 2019).

# Scope

During the following two semesters, the project is intended to research, analyse and determined resource operational efficiencies for customer service forecasting.

*Inclusions of this project:*

* Understand the project statement and define objectives.
* Research and Identify the data requirement.
* Data collection, data cleaning and processing of historical customer service data.
* Explore prediction models and statistical methods for demand forecasting.
* Development and implementation of a customer service demand prediction model.
* Evaluation and validation of the model's accuracy and performance.
* Analysis of the impact of accurate demand prediction on resource planning and efficiency.
* Documentation of the project process, methodologies, conclusive findings and recommendations.

*Exclusions of this project:*

* Implementation of the model in a real-world customer service environment.
* Large-scale data collection efforts beyond available resources and time constraints.

*Boundaries of this project:*

* The project will focus solely on developing and evaluating a predictive model for customer service demand.
* Dataset used would be a small sample of is limited to historical customer service data provided.

|  |  |  |
| --- | --- | --- |
|  | **Semester 1** | **Semester 2** |
| **Scope** | Research on existing customer service demand prediction models and techniques.  Data collection, data preparation and pre-processing of historical customer service data | Development and implementation of a customer service demand prediction model.  Evaluation and validation of the model's accuracy and precision. |
| **Deliverables** | * Definition of the problem and objectives. * Analysis of the dataset. * Evaluate Forecasting models. * Data Preparation. * Define Research approach and methods. | * Model development * Evaluate and validate the model. * Comprehensive report detailing results, conclusions and recommendations. |
| **Methods/Approach** | * Usage of CRISP-DM methodology for Data mining. * Project management waterfall methodology for planning. * Utilization of machine learning algorithms. * Techniques including data cleaning and normalization. | |

Table - Scope per Semester

Expected Deliverables by the End of Semester Two:

* A fully developed and validated customer service demand prediction model.
* A comprehensive capstone project report detailing the project objectives, methodology, results, and conclusions.

High-Level Timelines for this project

|  |  |  |
| --- | --- | --- |
| **Phase/milestone** | **Semester 1**  **Time estimate** | **Semester 2**  **Time estimate** |
| Define the problem and objectives | 2 weeks |  |
| Research on Demand Prediction Models | 2 weeks | - |
| Data Collection and Data Preparation | 4 weeks | - |
| Model Development and Implementation | 4 weeks | 4 weeks |
| Model Evaluation and Validation | 2 weeks | 4 weeks |
| Analysis and Documentation | 2 weeks | 2 weeks |
| Project Daft Preparation | - | 2 weeks |
| Final Project Writing and Submission | - | 2 weeks |
| Final Project Presentation | - | 2 weeks |

Table 2 - Project Timelines

Note: The timeline provided are estimations and subject to adjustments based on project progress.

A screenshot of a project

Description automatically generated

Figure 1 - Project Roadmap

# Data Sources

The datasets found are from public domain and they do not contain any customer personal data, the intention is to use them to analyse the customer cases and estimate resource forecasting.

|  |  |  |
| --- | --- | --- |
| **Title** | **Dataset** | **Permission** |
| Customer Support Ticket Dataset | [Customer Support Ticket Dataset (kaggle.com)](https://www.kaggle.com/datasets/suraj520/customer-support-ticket-dataset)  “Customer Support Ticket Dataset.”  [Www.kaggle.com](http://Www.kaggle.com),www.kaggle.com/datasets/suraj520/customer-support-ticket-dataset. | Open resources allowed by their terms and conditions |
| eCommerce Customer Service Satisfaction | “ECommerce Customer Service Satisfaction.” Www.kaggle.com, www.kaggle.com/datasets/ddosad/ecommerce-customer-service-satisfaction. | Open resources allowed by their terms and conditions |
| Call Center Data | “Call Center Data.” [Www.kaggle.com](http://Www.kaggle.com),  www.kaggle.com/datasets/satvicoder/call-center-data. | Open resources allowed by their terms and conditions |
| Pwc Call Centre Analysis | “Pwc Call Centre Analysis.” Www.kaggle.com, www.kaggle.com/datasets/gayatriwagadre/pwc-call-centre-analysis. | Open resources allowed by their terms and conditions |

Table 3 - Dataset sources

# Ethical Considerations

This capstone project while not involving medical data, still raises several ethical considerations, particularly concerning sensitive data, user privacy, and potential societal impacts. Some of these ethical considerations for this project include:

1. **Data Privacy and Consent:** Datasets must be clean and ensure that any customer data is handled with the necessary careful ensuring that consent from the users is explicit.
2. **Bias and Fairness:** The observations, information and predictive model developed as part of the project should be assessed for potential biases to ensure fairness and equity in resource allocation decisions.
3. **Societal Impact:** Assessing the potential societal impacts AI and predictive model is crucial to mitigate any unintended consequences for employees (Sabherwal and Grover). For example, changes in resource allocation based on predictions may affect customer experiences and employee workloads.
4. **Plagiarism:** any references of data, information, text, images, data and ideas must be presented under the proper guidelines of Harvard reference to acknowledge the original source.

# Reference

Sabherwal, Rajiv, and Varun Grover. “The Societal Impacts of Generative Artificial

Intelligence: A Balanced Perspective.” *Journal of the Association for Information Systems*,

vol. 25, no. 1, 1 Jan. 2024, pp. 13–22, aisel.aisnet.org/jais/vol25/iss1/14/,

https://doi.org/10.17705/1jais.00860. Accessed 22 Feb. 2024.

Hinson, R. (2019). *Customer service essentials : lessons for Africa and beyond*. Charlotte, NC: Information Age Publishing.

Miletić, M. and Miletić, I. (2017). LEAN METHODOLOGY AND ITS DERIVATES USAGE FOR PRODUCTION SYSTEMS IN MODERN INDUSTRY. *Applied Engineering Letters*, [online] 2(4), pp.144–148. Available at: https://doaj.org/article/854bd42875b7497b9a85755f0b91f297 [Accessed 24 Mar. 2024].