CSC-40038 COLLABORATIVE APPLICATION DEVELOPMENT

**GROUP 4 Team Report**

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## **1. ABSTRACT**

This project seeks to provide a data driven model of event registration prediction using real time information about booking. The solution will allow determining final registration results, using existing patterns and current booking data through machine learning approaches and dynamic visual analytics. The implementation is also personalized to fulfil the objective of the client of enhancing the accuracy of planning, early intervention, and allocation of resources of scheduled meetings.

## **2. INTRODUCTION**

The aim of the event registration forecasting system is that the system needs to build an intelligent application that can be able to predict the final attendance levels using the current and historical registration data. The precise projection can help clients anticipate in advance, organize logistics, and enhance engagement techniques to attendees. The created system can import raw CSV data of bookings, preprocess them and use machine learning to model the expected trends based on the data. The document provides the description of every step of the lifecycle of the system: the requirements, implementation/evaluation.

## 

## **3. CLIENT INTERACTIONS AND REQUIREMENTS GATHERING**

The development of the forecasting application was not a linear path. Client interaction and requirements were significant in shaping our project. Our team's understanding has adapted over the course of the meetings, from the first client briefing to the application of our chosen approach. This process is illustrated in *Figure…*

A diagram of a project

Description automatically generated

**Figure 1-** This flowchart outlines the projects requirements gathering process. It shows the development from the initial plan (Path A) through to a revised plan (Path B). The figure highlights how the feedback from the client meetings served as a key turning point for the project.

### 3.1 Arrangement and Purpose of Client Interactions

Our team's interaction with the client were organised around three scheduled meetings. These meetings had several key purposes, the most important of which was to discuss the evolving needs of our project. The arrangement, purpose, and key outcomes of these meetings are summarised in **Table 1**.

**Table 1**- Summary of Client Interactions

|  |  |  |  |
| --- | --- | --- | --- |
| Meeting and Arrangement Method | Purpose of Meeting | Key activities and agenda | Key Outcomes |
| Meeting 1 (19/06/25)  In person meeting,  Arranged via email. | * To understand the client’s problem and their requirements. | * Team introductions took place. * Team asked exploratory questions to understand our clients’ goals. | * Initial project goals established. * SCRUM roles were assigned for the week. * Team made initial assumption that a web app would be the best option. |
| Meeting 2 (26/06/25)  In person meeting,  Follow-up arranged in meeting 1 . | * To finalise project plan. * Present initial data analysis. * Clarify data anomalies. * Confirm teams understanding of the problem. | * Presented our approach (Comparative curve matching) and justification. * Discussed data anomalies and contradictory columns. * Asked for clarification on key predictive variables and output format. | * Scope Defined: Focus is solely on registrants. * Curve Matching approach validated. * Final Output for client confirmed: Prediction to be a single number and a range. * With documentation, the team is allowed to pre-process data as needed. |
| Meeting 3 (10/07/25)  Online catch-up with Gerard | * To give an update on developments of the project and get feedback on the new approach and initial technical demonstrations. | * Presented initial data categorisation and cleaning process. * Showed visualisations to the client. * Discussed the purpose of the predictive analysis. | * Received guidance to prioritise results over methodology in meetings and presentations * Client validated the inclusion of UK holidays and the COVID-19 pandemic as key analytical variables. * Client expressed satisfaction with the team's progress and the refined project direction. |

As shown in Table 1, the purpose of our client meetings has grown, leading to better discussions and outcomes. Initially, our goal was simply to understand the problem; now, our meetings involve detailed discussions about data analysis and our proposed approach. This engagement with the client was fundamental in finalising our project plan, for validation and to confirm we were heading in the right direction.

### 3.2 Requirements Gathering: Methods and Techniques

Our team adopted a flexible, phased approach, allowing our methods to evolve in line with ongoing feedback. This was essential for managing the client’s expectations and key to improving our success.

The initial technique used was an interview with the client to understand the business problem and their priorities. This method offered greater flexibility and required less time from the client than alternatives like questionnaires. The answers from this allowed the team to validate the requirements and capture unexpected insights. Before Meeting 2 we decided to analyse the client's data, which allowed us to lead the subsequent discussions with data-driven insights. This technique proved highly effective, transforming our second client meeting into a collaborative analysis session. This was crucial for defining the project's true scope and identifying that the data analysis should focus on registrants, not all attendees(3.3?). Our team made the decision to prioritise data analysis over prototyping. While prototyping gathers subjective user feedback, our project required an objective understanding of registrant patterns and trends first, which could only be achieved by analysing the client's data directly.

### 3.3 Outcomes of Client Interactions and Requirements Gathering

### 3.4 Re-evaluation of Initial Project Assumptions

## **4. SOFTWARE DESIGN AND USER INTERACTIONS**

### 4.1 Design Methodology

The iterative design strategy has been implemented, using the agile concepts and user feedback loops. This facilitated gradual progression of fundamental functions and modification regarding user testing.

### 4.2 Design Considerations for User-Facing Application Elements

The simplicity has been in mind when developing the user interface. Fast deployment was made via a command-line program, and optional plotting functions provide ways to give graphics. Its results contain R2 scores, MAE, and a final count that will be predicted.

### 4.3 Justification of Core Design Choices

Machine Learning Methods: Regression models including Gradient boost and XGBoost have been implemented because of the excellent results on tabular data and time-dependent data sets. Models learned on characteristics like number of days, registrations up till date and percentage time elapsed.

Exploratory Visualisations: Early data visualisation - peak times of registration could be seen and the necessity of time forecasting was also revealed. Cut plots of cumulative distributions and final prediction overlays assist a user in measuring accuracy and process and progress.

## **5. SOFTWARE AND INTERFACE IMPLEMENTATION**

### 5.1 The Development Process

The CSV files were first cleaned to delete metadata rows. A process of preprocessing was constructed to normalise headers and to convert Created Date into a format of datetime. The snapshots of registration were then calculated daily and feature-engineered to train the model.

### 5.2 Implementation-Stage Modifications and Rationale

In the middle of development, inconsistencies with the header rows were found out. There was an update in the implementation that dynamically identifies valid header rows and bypass non-data entries. This enhanced compatibility with files feed by clients.

### 5.3 Implementation Technologies and Resources

The implementation was made using Python, and the following libraries were included as pandas (data work), scikit-learn (modeling), matplotlib (visualisation), and XGBoost. An easy solution to compose the system is in Anaconda/Spyder and should be modified quite easily.

### 5.4 Considerations for Portability and Maintainability

To divide loading, preprocessing, training, and forecasting, the code was modularised. All key parameterisations (e.g. CSV folder path) were parameterised. New improvements and expansion of data sources can be achieved with the help of this design.

## **6. EVALUATION AND TESTING OF FINISHED PRODUCT**

### 6.1 Justification of Evaluation Methods

### 6.2 Testing Results and Subsequent Refinements

(Result Visualisations)

(Predictive Analysis)

### 6.3 Final Assessment Against Client Requirements

### 6.4 Exceeding Client Expectations

## **FUTURE SCOPE**

Long-term enhancements will be to use it as a web application to enable real-time functionality and support of live registration services (such as Eventbrite API) and multi-event capability. There are advanced ensemble models, as well as early-alert characteristics of unsatisfactory registration trends, envisioned.

## **CONCLUSION**

## **REFERENCES**

**HARVARD**

## **APPENDICES**

Appendix A: User Documentation (PDF)

Appendix B: Technical Documentation

**Ensure the first sentence of each section directly answers the original question in the brief.**