Department of Computer Science & Engineering

United International University

# CSE6011: Data Mining

## Forecasting SMS Traffic and Balance Availability with Machine Learning

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# Chapter 1

# Introduction

This report presents a comprehensive analysis of SMS traffic and balance availability for a specific set of clients, with a particular focus on predicting potential service interruptions during holidays. By employing advanced machine learning techniques, such as **polynomial regression**, we aim to accurately forecast future SMS traffic and balance levels, enabling clients to optimize their usage and avoid unexpected service disruptions.

By leveraging advanced data analytics, this study provides a comprehensive forecast of SMS traffic and balance levels, enabling organizations to proactively manage their client communication strategies and resource allocation. This predictive model accurately anticipates SMS traffic during peak periods, such as holidays, and offers hourly updates on balance levels for the next two days, ensuring a seamless and uninterrupted service experience for clients.

Ultimately, this research contributes to the field of machine learning applications and provides practical solutions for organizations seeking to effectively manage their SMS balance allocation to clients, particularly during peak demand periods like holidays.

## 1.1 Background

### 1.1.1 The Problem

In today's fast-paced world, SMS communication has become an integral part of our daily lives. For organizations with a large customer base, managing SMS traffic and ensuring

adequate balance availability can be a complex challenge, especially during peak periods such as holidays. Service interruptions due to insufficient balance or overloaded networks can lead to customer dissatisfaction and financial losses.

### 1.1.2 The Solution

To address these challenges, this report presents a comprehensive analysis of SMS traffic and balance prediction & automation for a specific set of clients. By employing advanced machine learning techniques, such as **polynomial regression**, we aim to develop a predictive model that can accurately forecast future SMS traffic and balance levels. This information will empower organizations to make informed decisions regarding their communication strategies and resource allocation, ensuring a seamless and uninterrupted service experience for their clients.

### 1.1.3 The Benefits

- **Improved Service Quality:** Accurate predictions of SMS traffic and balance levels will enable organizations to proactively address potential issues, ensuring a consistent and reliable service experience for their clients.
- **Optimized Resource Allocation:** By understanding future demand, organizations can allocate resources more efficiently, reducing employees hours of struggle during the holidays and minimizing service disruptions.
- **Enhanced Customer Satisfaction:** A reliable and uninterrupted SMS service can significantly improve customer satisfaction and loyalty.
- **Data-Driven Decision Making:** The insights gained from this analysis will provide organizations with a data-driven foundation for making informed decisions about their SMS communication strategies.

This report aims to contribute to the field of machine learning applications and provide practical solutions for organizations seeking to optimize their SMS communication infrastructure and deliver exceptional customer service.

## 1.2 Literature Review

## 1.3 Research Gap

## 1.4 Objectives

Section 1.1: Background

Overview of SMS usage and its significance. Brief history of SMS technology.

Importance of accurate SMS traffic and balance prediction.

Section 1.2: Literature Review

Existing research on SMS traffic prediction. Review of machine learning techniques used for prediction. Analysis of the limitations of previous studies.

Section 1.3: Research Gap

Identification of the specific gap in the existing research. Explanation of the need for a more comprehensive and accurate prediction model.

Section 1.4: Objectives

Clear statement of the research objectives. Outline of the goals to be achieved

# Chapter 2

# Methodology

## 2.1 Corpus Collection

## 2.2 Training Data

## 2.3 Test Data

Section 2.1: Corpus Collection

Description of the data sources used. Explanation of the data collection process. Data preprocessing techniques (cleaning,

normalization, etc.).

Section 2.2: Training Data

Details of the training dataset. Features selected for training. Data splitting for training and validation.

Section 2.3: Test Data

Description of the test dataset. Evaluation metrics to be used.

Section 2.4: Experimental Setup

Overview of the experimental design. Configuration of the machine learning model. Hyperparameter tuning methodology.

# Chapter 3

# Experimental Results and Analysis

Section 3.1: Model Performance

Presentation of the experimental results.

Evaluation of the model's accuracy, precision, recall, and F1-score. Comparison with baseline models or previous studies.

Section 3.2: Analysis of Findings

Discussion of the insights gained from the results. Explanation of the model's strengths and limitations. Identification of any unexpected outcomes.

# Chapter 4

# Conclusion and Future Works

Section 4.1: Summary of Findings

Recapitulation of the key research findings.

Highlights of the contributions made.

Section 4.2: Limitations

Acknowledgment of the study's limitations. Discussion of potential areas for improvement.

Section 4.3: Future Directions

Suggestions for future research. Potential extensions or applications of the work.