AI-Powered User Feedback Evaluation System

Human Computer Interaction (CSE 4451)
Section : B

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Abstract

The rapid growth of online-based businesses has increased the importance of understanding customer feedback for improved service delivery. Our project, titled AI-powered User Feedback Evaluation System, aims to develop a system that automatically collects and evaluates customer comments from social media platforms such as Facebook and YouTube. Given the bilingual nature of comments in Bangladesh, the system first detects the language of the feedback and then uses neural machine translation (NMT) to convert non-English comments into English. Subsequently, the translated comments undergo sentiment analysis to assess the overall customer satisfaction. The system presents the results through graphical representations and statistical summaries, offering businesses valuable insights into user sentiment. Additionally, a survey was conducted among individuals who operate online-based systems to gather their perspectives on the challenges and opportunities of such a solution. This report outlines the functional and non-functional requirements, system design, and user interaction flow, ensuring the proposed system is efficient, user-friendly, and adaptable to real-world business needs.

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Chapter 1

Introduction

1.1 Project Overview

Our project, AI-powered User Feedback Evaluation System, aims to streamline the collection and analysis of customer feedback from various online platforms such as Facebook and YouTube. The system is designed to automatically identify the language of the comments, distinguish between Bangla and English, and translate any non-English comments into English. Once the comments are translated, the system performs sentiment analysis[1][2][3] to determine whether the feedback is positive, negative, or neutral. By automating these processes, the system helps businesses gain a deeper understanding of customer opinions and preferences. This provides a comprehensive view of how customers perceive their products and services, enabling businesses to make informed decisions and improve customer satisfaction. Ultimately, the system offers a clear and organized way to analyze diverse customer feedback, even in multilingual contexts, allowing companies to respond to customer needs more effectively.

1.2 Problem Statement

Online-based businesses today often face significant challenges when it comes to understanding the diverse feedback provided by their customers. This is particularly true for companies operating in multilingual environments, where customer feedback may be expressed in multiple languages such as English and Bangla. Interpreting these comments manually is time-consuming and prone to errors, making it difficult for businesses to keep up with customer sentiment in real-time. Furthermore, the lack of automated systems to analyze such feedback in a structured and reliable manner leads to delays in addressing customer concerns and hampers effective decision-making. As a result, businesses miss out on opportunities to enhance customer engagement and satisfaction. Our project addresses these issues by offering a system that automates the language detection, translation, and sentiment analysis processes, providing businesses with quick and reliable insights into customer feedback.

1.3   Motivation

With the growing popularity of social media platforms like Facebook and YouTube in Bangladesh, the amount of customer feedback in both English and Bangla has increased significantly. However, most businesses lack the tools to process and analyze this feedback efficiently. They often rely on manual methods, which are not only time-consuming but also unable to handle large volumes of data. This project is motivated by the need to bridge this gap and offer a solution that simplifies the evaluation of bilingual feedback. By automating the processes of language detection, translation, and sentiment analysis, our system empowers businesses to focus on what really matters—understanding their customers. This approach saves time and resources while providing actionable insights that can help businesses improve their products and services based on customer feedback.

Chapter 2

Literature Reviews

AI-powered chatbots are increasingly being used in healthcare, especially for managing chronic diseases, as they enhance patient communication, address the rising prevalence of chronic conditions, and meet the demand for supportive healthcare technologies. However, there is a lack of comprehensive reviews assessing their impact [4]. A study aimed to evaluate user satisfaction, intervention efficacy, and the AI architectures of chatbot systems for chronic diseases by reviewing 784 articles, narrowing down to eight studies focused on health education, behavior change theory, stress management, cognitive behavioral therapy, and self-care behaviors. Results showed promising user acceptance of these chatbots, although technical documentation is often insufficient, limiting their efficacy. Future research must prioritize patient safety and detailed technical descriptions. [5] The fusion of AI and databases (AI×DB) is set to revolutionize data systems, reducing the burden on end-users with features like in-database AI-powered analytics and self-driving system performance improvements. NeurDB, an AI-powered autonomous data system, is presented as an example of this trend, with its design choices and key components aiming to fully integrate AI into all major system aspects. NeurDB's development underscores AI's potential to transform data management across industries. [6] In education, AI tools are reshaping the learning process through AI-enhanced teaching, grading automation, and predictive analytics. A study explored the role of large language models (LLMs) in educational assessment, such as test planning, item generation, and scoring, involving STEM teachers using an AI-powered scaffolding system for scientific writing. A systematic review of AI in higher education identified both the benefits and ethical challenges of AI integration, emphasizing the need for transparent algorithms, personalized assessments, and human judgment to ensure ethical AI use. [7] AI in mobile learning apps shows potential, but usability challenges such as functionality issues, performance lags, bias, and ineffective features persist. A study analyzing user reviews of AI-powered language learning and educational support apps found that while users generally reported positive experiences, these challenges impact satisfaction and learning outcomes. Developers must improve AI technology and adapt learning methodologies to address these concerns and meet diverse user needs. [8] AI-powered context-aware systems, which offer personalized and timely services

by understanding user context, also face challenges, particularly due to the "black box" nature of AI. A study proposed human-AI collaboration as a way to overcome uncertainty and improve these systems. A theoretical framework was developed, dividing AI-powered context-aware services into three phases: context acquisition, interpretation, and application, with future research needed to enhance human-AI collaboration. [9] Another study on AI-enabled mobile apps similarly highlighted critical usability issues affecting user satisfaction and effectiveness, emphasizing the need for improvements in AI technology to address bias, performance issues, and feature functionality. The findings suggest that, with further advancements, AI-powered mobile learning apps can offer more engaging and personalized learning experiences, enhancing user outcomes across the education sector. These studies collectively demonstrate the expanding influence of AI across sectors, offering immense promise but also underscoring the need to address technical, ethical, and usability challenges to fully unlock AI's potential.

Chapter 3

Methodology

3.1   Survey and User Feedback

3.1.1   Survey Objective

The primary objective of the survey was to gather insights from individuals managing online-based businesses regarding their current practices for evaluating user feedback. The survey also aimed to identify the key features and concerns that these businesses consider important when adopting an AI-powered feedback evaluation system.

3.1.2   Survey Method

The survey was conducted using Google Forms, targeting business owners and managers in Bangladesh who operate online platforms. It consisted of 11 questions (see Table 3.1) covering topics such as familiarity with feedback evaluation systems, current methods of sentiment analysis, preferred features, and potential concerns. A total of 15 responses were collected, and follow-up surveys will be conducted after the UI design phase to refine system requirements based on further feedback.

3.1.3   Survey Results and Analysis

The majority of respondents are familiar with the concept of user feedback evaluation systems and currently use manual methods or basic tools to analyze comments. Privacy, data security, and accuracy were highlighted as major concerns, while real-time feedback analysis and integration with existing platforms were considered the most valuable features. Respondents also expressed interest in detailed reports and dashboards for real-time monitoring.

3.1.4   Insights and Implications for System Design

The survey results emphasize the need for a system that prioritizes accuracy, data security, and real-time analysis. Based on the feedback, the system should integrate seamlessly with

ID	Question	Purpose
Q1	What is the name of your company?	To identify the respondent's business.
Q2	Are you familiar with the concept of "User Feedback Evaluation System"?	To gauge the respondents' awareness and familiarity with feedback systems.
Q3	How do you currently analyze customer comments and sentiment on your online platforms?	To understand existing methods used for sentiment analysis.
Q4	Which features would you consider most valuable in a customer feedback analysis system?	To identify the features most desired by businesses.
Q5	Would you prefer a system that integrates directly with your existing online platforms (e.g., YouTube, Facebook, Instagram) to gather and analyze feedback, or would you prefer to upload data manually?	To determine the preferred data collection method.
Q6	What concerns, if any, do you have about using AI for sentiment analysis of customer feedback?	To highlight potential adoption barriers for an AI-based system.
Q7	What improvements or additional features would make you more likely to adopt a customer feedback analysis system for your business?	To gather suggestions for system enhancement.
Q8	How would you prefer to receive insights and reports from a customer feedback analysis system?	To find the most suitable format for presenting insights.
Q9	What potential challenges do you foresee in adopting a customer feedback analysis system for your business?	To identify challenges that might prevent system adoption.
Q10	How likely are you to invest in a customer feedback analysis system within the next 12 months?	To measure business interest in investing in such a system.
Q11	Please share any comments about the "User Feedback Evaluation System" idea.	To collect any additional comments or feedback from respondents.

Table 3.1: Survey Questions and Purpose

multiple social platforms and provide advanced visualization features. Privacy concerns should be addressed through robust data protection measures. Incorporating these insights will ensure that the system meets the expectations and requirements of the target users.

3.2   System Design
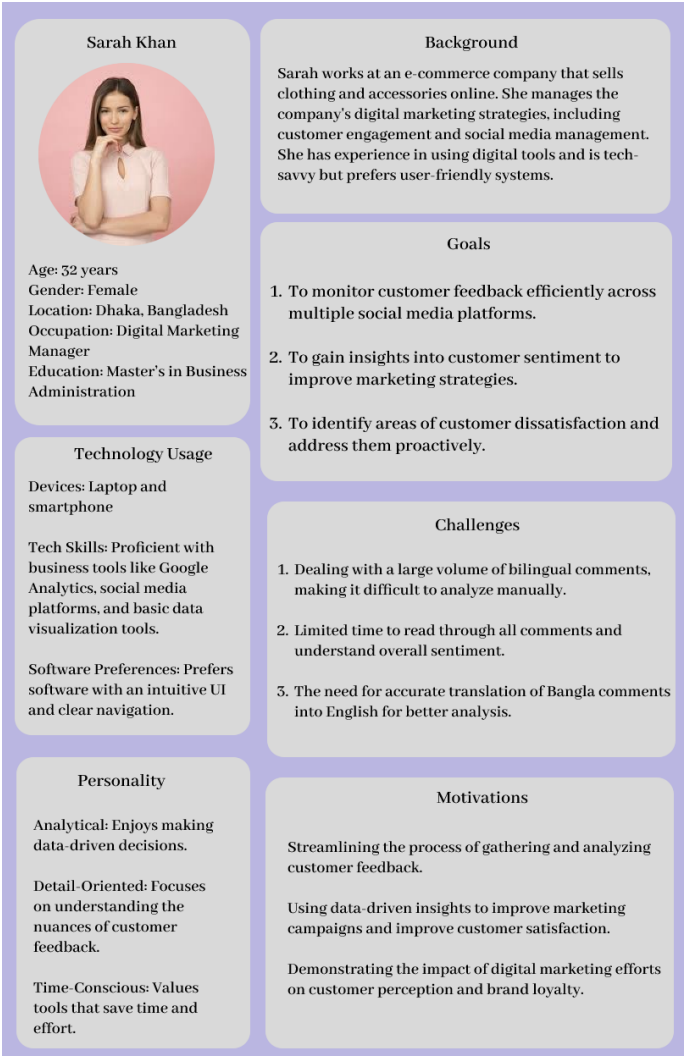
3.2.1   User Personas

Figure 3.1: User Persona

This user persona (3.1) depicts Sarah Khan, a digital marketing manager working in an e-commerce company. Although the persona is fictional, it summarizes the challenges, goals, motivations, and technology usage of a typical user who would benefit from our system. Understanding the user persona allows us to tailor the system's functionality and user interface to meet their specific needs.

3.2.2   Input/Output Descriptions

Our System ingests unstructured textual data from social media platforms like Facebook and YouTube via APIs or web scraping methods (Figure 3.2). This multilingual user-generated content undergoes preprocessing pipelines that include language identification,

leveraging models to detect Bangla, English, or other languages. Non-English feedback is passed through a NMT engine for real-time translation into English, enabling seamless sentiment analysis. Preprocessing also involves text normalization tasks, such as tokenization, stopword removal, and noise filtering, ensuring clean input for downstream NLP tasks. Users can configure custom parameters, such as time intervals for analysis or specific categories, providing flexibility and tailored outputs. The system outputs high-level
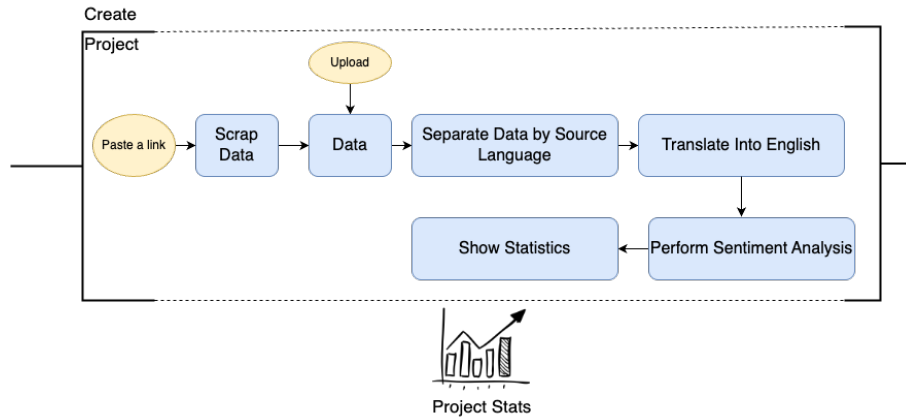

Figure 3.2: From Input to Output

analytical insights through sophisticated sentiment analysis models, categorizing feedback into positive, neutral, or negative sentiment. Advanced data visualization techniques, such as interactive bar charts for sentiment distribution, pie charts for language segmentation, and time-series line graphs for trend analytics, offer actionable intelligence. Furthermore, the system provides real-time statistical aggregation, delivering key performance indicators (KPIs) on customer satisfaction metrics. These insights are accessible through a dynamic dashboard with an intuitive UI, allowing businesses to extract meaningful patterns and optimize their service strategies. Additionally, exportable reports in various formats enable stakeholders to utilize these insights for in-depth review and strategic decision-making.

3.3   Functional Requirements

3.3.1   Language Detection

The system must automatically detect the language of each comment scraped from social media platforms. Since feedback can be in Bangla or English, the language detection module will identify whether the comment is in Bangla, English, or any other language, triggering the translation process if necessary.

3.3.2   Neural Machine Translation (NMT)

For non-English comments, particularly those in Bangla, the system will use a NMT model to accurately translate the text into English. This ensures that all feedback is processed

uniformly for sentiment analysis. The NMT should be capable of handling colloquial phrases and variations in informal speech, common in social media comments.

3.3.3 Sentiment Analysis

Once comments are translated into English, the system will analyze the sentiment of each comment. Using pre-trained models, the sentiment analysis module will classify the feedback into three categories: positive, negative, or neutral. This classification will help businesses assess customer satisfaction and identify areas of improvement.

3.3.4 Data Scraping from Social Platforms

The system will be able to scrape user comments from social media platforms like Facebook and YouTube. This feature will automate the process of gathering feedback by allowing users to input specific post URLs, from which the system extracts relevant data. The scraping process must comply with the platforms' terms of service and privacy regulations.

3.3.5 Graphical Representation of Results

The final output of the system will be presented in the form of visual graphs and statistical summaries. Businesses will be able to view the overall sentiment distribution, frequency of comments, and trends over time. The graphical representation should be intuitive, allowing users to easily interpret the sentiment analysis results and make informed decisions based on customer feedback.

3.4 Non-Functional Requirements

3.4.1 Usability

The system must be user-friendly, providing an intuitive interface that allows users to easily input post URLs, view results, and navigate between features. The design should follow best practices in human-computer interaction, ensuring minimal training is required for business users.

3.4.2 Performance

The system should perform efficiently, handling large volumes of comments within a reasonable time frame. The language detection, translation, and sentiment analysis processes must be optimized for quick response times, ensuring users receive timely insights.

3.4.3 Reliability

The system must consistently deliver accurate language detection, translation, and sentiment analysis results. It should be reliable during data scraping, ensuring no data is lost or corrupted, and be available with minimal downtime to meet business needs.

3.4.4 Security and Privacy

The system must adhere to strict security and privacy standards, ensuring that all collected data is securely stored and processed. User data must be protected in compliance with relevant regulations, such as GDPR, and the system should prevent unauthorized access to sensitive information.

Chapter 4

Proposed System

4.1 System Description

The "AI-powered User Feedback Evaluation System" is designed to automatically scrape[10][11], analyze, and evaluate user feedback from social media platforms like Facebook and YouTube. The system identifies the language of the comments, translates non-English feedback into English using neural machine translation (NMT)[12][13][14], and performs sentiment analysis to gauge user satisfaction. The results are visualized through graphs and statistical summaries, providing businesses with actionable insights into their customer base.

4.2 Goals and Objectives

The primary goal of the system is to assist online-based businesses by streamlining the process of analyzing customer feedback. Key objectives include:

- Automating the collection of feedback from multiple social media platforms.

- Supporting bilingual (Bangla and English) feedback through language detection and translation.

- Conducting sentiment analysis to categorize customer feedback as positive, negative, or neutral.

- Presenting results in an easily interpretable format, including visual statistics and graphs.

4.3 Major Stakeholders

The major stakeholders of the system include:

- **Online Businesses:** Businesses that seek to improve their services by analyzing customer feedback.

- **System Administrators:** Individuals responsible for maintaining the system and ensuring its proper operation.

- **End Users/Customers:** Individuals who provide feedback on social media platforms, indirectly influencing business decisions.
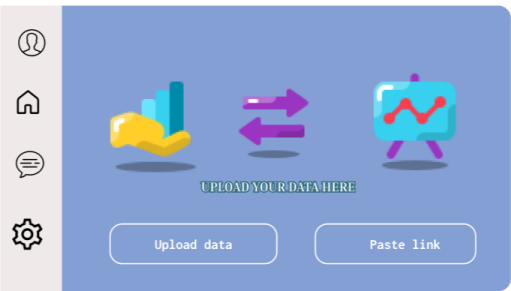
4.4   User Interaction and User Experience
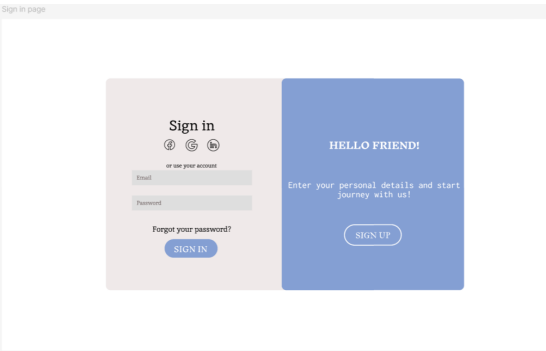
(a) Sign in page
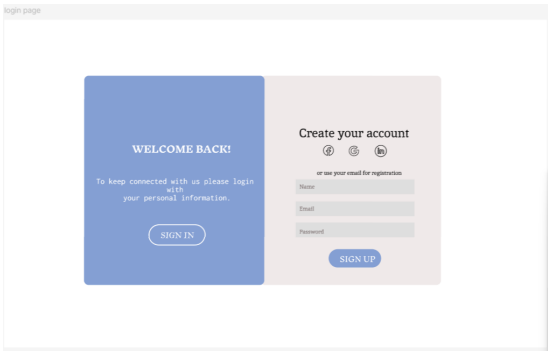
(b) Login page

(c) Upload data page

(d) Statistical Analysis page

Figure 4.1: UI Design of Our System

Chapter 5

System Summary and Discussion

5.1   System Summary

The AI-powered User Feedback Evaluation System automates the process of collecting and analyzing customer feedback from online platforms such as Facebook and YouTube. The system is capable of detecting the language of comments, translating non-English feedback into English, and performing sentiment analysis to classify feedback as positive, negative, or neutral. By leveraging these automated functionalities, the system provides businesses with a structured overview of customer sentiment and allows them to make data-driven decisions to enhance customer satisfaction. The system is designed to handle multilingual feedback efficiently, making it ideal for businesses operating in regions like Bangladesh where both Bangla and English are commonly used. With its user-friendly interface and ability to present feedback results graphically, the system simplifies the interpretation of customer sentiment and helps identify areas for improvement. This ensures that businesses can respond to customer feedback promptly and effectively, fostering a more engaged customer base and improving overall customer experience.

5.2   Limitation & Future Work

While the AI-powered User Feedback Evaluation System offers many benefits, there are some limitations that need to be addressed. One limitation is the reliance on the accuracy of neural machine translation (NMT) models, which may not always provide precise translations, particularly for complex or context-dependent Bangla sentences. This can lead to misinterpretations during sentiment analysis. Additionally, the system currently focuses only on text-based feedback and does not consider other types of feedback such as images, videos, or audio content, which are also common on social media platforms.

   Future work will aim to improve the accuracy of translations by incorporating more advanced language models and training them specifically for Bangla-English translations. We also plan to extend the system's capabilities to include the analysis of non-textual feedback, allowing it to process and interpret multimedia content. Furthermore, expanding

the dataset to include feedback from a wider range of social media platforms will make the system more versatile and comprehensive. By addressing these limitations, the system can provide even more robust and reliable insights to businesses looking to understand their customers better.

5.3   Conclusion

In conclusion, the AI-powered User Feedback Evaluation System offers an innovative solution for online-based businesses to efficiently analyze and interpret customer feedback from social media platforms. By automating the processes of language detection, neural machine translation, and sentiment analysis, the system enables businesses to gain valuable insights into customer sentiment in both Bangla and English. The graphical representation of results further simplifies decision-making, providing a clear understanding of user satisfaction and areas for improvement. With a focus on usability, performance, reliability, and security, the proposed system meets the essential needs of businesses seeking to enhance their customer engagement through data-driven feedback evaluation.

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