CUSTOMER FEEDBACK ANALYSIS BOT

A PROJECT REPORT

Submitted by

RITHVIK M (220701227)

in partial fulfillment for the course

OAI1903 - INTRODUCTION TO ROBOTIC PROCESS AUTOMATION

for the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

RAJALAKSHMI ENGINEERING COLLEGE RAJALAKSHMI NAGAR THANDALAM CHENNAI – 602 105

NOVEMBER 2024
RAJALAKSHMI ENGINEERING COLLEGE CHENNAI - 602105

BONAFIDE CERTIFICATE

Certified that this project report **"CUSTOMER FEEDBACK ANALYSIS"** is the bonafide work of **"RITHVIK M (220701227)"** who carried out the project work for the subject OAI1903 - Introduction to Robotic Process Automation under my supervision.

SIGNATURE

DR N. DURAI MURUGAN, M.E.,
Ph.D.,
SUPERVISOR,
Associate Professor,
Department of

Computer Science and Engineering,
Rajalakshmi Engineering College,

Rajalakshmi Nagar,
Thandalam,
Chennai – 602105.

Submitted to Project and Viva Voce Examination for the subject OAI1903 - Introduction to Robotic Process Automation held on _____.

Internal Examiner   **External Examiner**

ABSTRACT

"**The Customer Feedback Analysis Bot**" is a cutting-edge Robotic Process Automation (RPA) solution designed to revolutionize the way businesses analyze and interpret customer feedback. Developed using UiPath and AI Center, this intelligent bot automates the sentiment analysis process, providing detailed insights into customer opinions. Users input an Excel sheet containing customer feedback, and the bot processes this data to generate an insightful report that categorizes feedback into five sentiment categories: **Very Positive, Positive, Neutral, Negative, and Very Negative**, along with accuracy scores.

The bot leverages an advanced sentiment analysis package, **CustomerFeedbackAnalysis1**, trained on the IMDb dataset, ensuring highly precise and reliable results. During operation, it systematically reads the feedback data, applies the sentiment model, and categorizes each review based on its sentiment polarity. The analysis results are stored in a comprehensive Excel report, providing detailed summaries for business decision-making.

To further enhance functionality, the bot can suggest actionable improvements for negative or neutral feedback, aiding businesses in addressing customer concerns effectively. The entire process is automated, significantly reducing manual effort and time while ensuring consistent and unbiased analysis.

"**The Customer Feedback Analysis Bot**" empowers organizations to harness the power of RPA and AI, enabling them to understand customer sentiment, improve services, and build stronger relationships. By delivering fast, accurate, and actionable insights, the bot is an indispensable tool for modern businesses aiming to stay customer-focused in a competitive landscape.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABBREVIATION	ACCRONYM
RPA	Robotic Process Automation
AI	Artificial Intelligence
API	Application Programming Interface

CV	Computer Vision
OCR	Optical Character Recognition

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

"The Customer Feedback Analysis Bot" stands as a groundbreaking solution at the convergence of Robotic Process Automation (RPA) and advanced sentiment analysis. In today's fast-paced, customer-centric business environment, understanding and responding to customer sentiment is pivotal. This innovative bot, developed using UiPath and integrated with AI Center, addresses this need by automating the analysis of customer feedback with unparalleled precision and efficiency.

For businesses seeking actionable insights from customer reviews, this bot offers a transformative approach. By leveraging machine learning models and sophisticated algorithms, it categorizes feedback into detailed sentiment groups: **Very Positive, Positive, Neutral, Negative, and Very Negative**, along with their respective accuracy levels. The automation not only accelerates feedback processing but also ensures consistency and reliability in sentiment evaluations. This solution responds to the growing demand for data-driven customer insights, enabling organizations to stay competitive and customer-focused.

UiPath is at the forefront of automating repetitive digital tasks traditionally handled by humans. Its technology integrates **AI computer vision, APIs, and pre-built automation components**, simplifying tasks across various domains. Originally catering to internal operations such as HR, accounting, and claims processing, UiPath has evolved to include advanced automation

applications in customer-facing activities like sentiment analysis and customer feedback management.

The **UiPath Automation Platform**, the backbone of this solution, combines low-code visual development environments like **UiPath Studio** with robust robotic agents that execute processes seamlessly. By incorporating AI-powered OCR engines from industry leaders such as Google, Microsoft, and ABBYY, the platform can efficiently process structured and unstructured data for actionable insights.

This automation solution empowers businesses to interpret customer sentiments accurately, address concerns proactively, and ultimately strengthen customer relationships. It represents a significant leap toward harnessing the combined power of RPA and AI for customer-centric growth.

1.2 OBJECTIVE

The primary objective of "**The Customer Feedback Analysis Bot**" is to transform the process of analyzing customer feedback. By leveraging Robotic Process Automation (RPA) and AI-driven sentiment analysis, the bot aims to automate the categorization of customer reviews, providing detailed insights into sentiments such as **Very Positive, Positive, Neutral, Negative, and Very Negative**, along with accuracy levels.

The project seeks to offer businesses an efficient and reliable tool to gain actionable insights, address customer concerns proactively, and enhance customer satisfaction. By automating the feedback analysis process, the bot reduces manual effort, improves accuracy, and ensures consistent sentiment evaluations to drive customer-focused strategies.

1.3 EXISTING SYSTEM

In the current business landscape, analyzing customer feedback is often a manual and labor-intensive process. Organizations face challenges in categorizing and interpreting large volumes of customer reviews accurately. This involves reading through individual feedback entries, identifying sentiment trends, and summarizing insights, which is time-consuming and prone to human error.

The lack of a streamlined and automated solution limits businesses' ability to quickly respond to customer concerns, derive actionable insights, and enhance decision-making processes. This highlights the need for an efficient system to automate sentiment analysis, ensuring consistency, accuracy, and scalability in handling customer feedback.

1.4 PROPOSED SYSTEM

"The Customer Feedback Analysis Bot" is envisioned as a transformative solution to address the challenges of manual customer feedback analysis. Leveraging UiPath's RPA capabilities and AI-powered sentiment analysis models, the bot automates the evaluation of customer reviews, providing detailed sentiment categorization as **Very Positive, Positive, Neutral, Negative, and Very Negative**, along with accuracy levels for each.

The proposed system significantly reduces manual effort and ensures swift, consistent, and accurate feedback analysis. It processes feedback from an Excel file, applies advanced sentiment analysis algorithms, and generates a comprehensive report containing sentiment classifications, accuracy scores, and actionable insights.

Through this project, businesses gain a powerful tool to understand customer sentiments effectively, enabling them to address concerns proactively, improve customer satisfaction, and strengthen their competitive edge. The bot represents a shift towards leveraging technology to enhance customer-focused strategies and decision-making.

CHAPTER 2

LITERATURE REVIEW

2.1 Survey on Robotic Process Automation (RPA) in Education:

Robotic Process Automation (RPA) is gaining traction in the education sector as a transformative tool for streamlining repetitive and time-consuming tasks. By automating processes such as grading, managing records, and analyzing results, RPA significantly reduces the workload of educators, enabling them to focus on more impactful teaching activities. However, challenges persist in automating tasks that involve nuanced social interactions or adapting to individual learning styles.

Literature Review

1 Emerging Role of Digital Skills and RPA in Education

- This research highlights the integration of Artificial Intelligence (AI), robotics, and digital technologies in creating new professional opportunities requiring advanced digital skills. Educational institutions must embrace these technologies to foster digital proficiency among students. RPA is identified as a game-changer, eliminating inefficiencies in administrative processes and freeing educators to focus on value-driven activities. RPA benefits various stakeholders, including teachers, students, and parents, by minimizing manual intervention in routine tasks.

2. RPA for Result Analysis

- A study published in **IJITEE** presents an RPA solution tailored for the education domain, specifically targeting the automation of result analysis for student examinations. The system processes university results in PDF format, extracting and analyzing data to generate actionable insights. The research emphasizes the cost-efficiency and time-saving potential of RPA, positioning it as an essential tool for resource-constrained educational institutions.

Key Insights

- **Benefits**: RPA in education ensures efficiency, accuracy, and cost-effectiveness in handling administrative tasks.

- **Applications**: Includes grading, result analysis, and student record management.

- **Challenges**: Adapting RPA for personalized learning and tasks requiring human interaction remains an area of exploration.

This survey underscores the transformative potential of RPA in education, highlighting its ability to revolutionize traditional workflows while addressing the need for scalability and resource optimization.

2.2 Survey on AI-Generated Content Detection:

The detection of AI-generated content has become a crucial area of research as AI tools such as Open AI's GPT-3 and Google's BERT produce increasingly human-like text. While existing detection tools show promise, they face significant challenges, including biases and inaccuracies in identifying AI-generated content. Additionally, techniques like machine translation and content obfuscation complicate detection further, making it an ongoing research focus.

Literature Review

1.Evaluation of AI Content Detection Tools

- This study examines the effectiveness of various AI detection tools in distinguishing between human-written and AI-generated text. The analysis involved comparing 15 paragraphs each generated by Chat GPT models 3.5 and 4 on the topic of cooling towers in engineering, alongside five human-written control responses. The findings reveal that current detection tools are biased towards labeling text as human-written, often failing to reliably identify

AI-generated content. The study highlights the pressing need for improved accuracy in detection technologies.

2. Machine Learning Models for AI-Generated Content Detection

- A study at the University of North Carolina evaluates machine learning algorithms for detecting AI-generated content. Using responses from Computer Science students on essay and programming assignments, models such as Logistic Regression (LR), Decision Trees (DT), Support Vector Machines (SVM), Neural Networks (NN), and Random Forests (RF) were trained. The models were assessed based on accuracy, computational efficiency, and confusion matrices. This research underscores the potential of machine learning in enhancing detection capabilities while emphasizing the trade-offs between accuracy and computational complexity.

Key Insights

- **Challenges:** Detection tools often misclassify AI-generated text as human-written, indicating inherent biases.

- **Methods:** Machine learning techniques are increasingly explored to improve detection, though challenges in scalability and computational efficiency remain.

- **Emerging Issues:** Techniques like obfuscation and translation further complicate the detection of AI-generated content.

This survey highlights the critical need for advancements in AI content detection to address the challenges posed by increasingly sophisticated AI-generated text and its potential misuse.

2.3 Survey on Plagiarism Detection:

Plagiarism detection is a critical area of research aimed at ensuring academic integrity and originality. While tools and techniques for identifying plagiarized content have evolved significantly, challenges such as detecting paraphrased material and translated text persist. The continuous adaptation and refinement

of detection systems are essential to address the sophisticated methods used to evade plagiarism detection.

Literature Review

1. Comprehensive Review of Computational Methods
   - Norman Meuschke's article systematically reviews 239 research papers published between 2013 and 2018, focusing on computational methods for detecting academic plagiarism. The study evaluates 12 publicly available tools and two commercial systems (**Turnitin** and **Plagiarism Check**) commonly used in academia. Findings indicate that while these tools are useful, they are not entirely accurate or reliable, with biases that hinder their ability to detect nuanced plagiarism, such as AI-generated or paraphrased content.

2. Taxonomy and Machine Learning Techniques
   - A survey conducted by Tezpur University categorizes various forms of plagiarism and discusses their detection. The research emphasizes the increasing adoption of machine learning techniques to improve detection accuracy. Highlighted methods include text similarity analysis, linguistic pattern recognition, and contextual learning, which hold promise for addressing challenges such as paraphrasing and cross-language plagiarism.

Key Insights
- **Current Limitations**: Existing tools often struggle with paraphrased or translated content, reducing detection accuracy.
- **Technological Integration:** Machine learning and natural language processing (NLP) are emerging as powerful tools to enhance detection capabilities.
- **Continuous Development**: The evolving nature of plagiarism necessitates ongoing innovation in detection algorithms and methodologies.

This survey underscores the importance of advancing plagiarism detection technologies to keep pace with increasingly sophisticated methods of content manipulation and uphold academic integrity.

2.4 Summary of the intersection of RPA, AI Detection, and Plagiarism Checks:

"The Intelligent Customer Sentiment Analysis Bot" integrates RPA, AI-driven sentiment analysis, and predictive analytics to revolutionize the understanding of customer feedback. Leveraging RPA, the bot automates the collection and processing of customer reviews from diverse sources. Advanced machine learning models, hosted in the UiPath AI Center, enable nuanced sentiment classification, categorizing feedback into granular levels such as **Very Positive, Positive, Neutral, Negative,** and **Very Negative**. Additionally, the bot incorporates feedback trend prediction, allowing businesses to anticipate customer satisfaction trends and proactively address potential issues.

This integration addresses the multifaceted challenges of modern customer experience management by providing actionable insights in real-time. The project's innovative approach aligns with the evolving discourse on leveraging automation and AI for business intelligence. The amalgamation of RPA, sentiment analysis, and trend prediction underscores its significance in driving data-informed decisions that enhance customer satisfaction and loyalty.

By automating feedback analysis and incorporating predictive insights, the project stands at the forefront of addressing contemporary challenges in customer sentiment management, showcasing its contribution to transforming customer engagement strategies in the digital era.

CHAPTER 3

SYSTEM DESIGN

3.1 SYSTEM FLOW DIAGRAM

A flowchart is a type of diagram that represents an algorithm, workflow or process. The flowchart shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows. This diagrammatic representation illustrates a solution model to a given problem. The system flow diagram for this project is in Fig. 3.1.
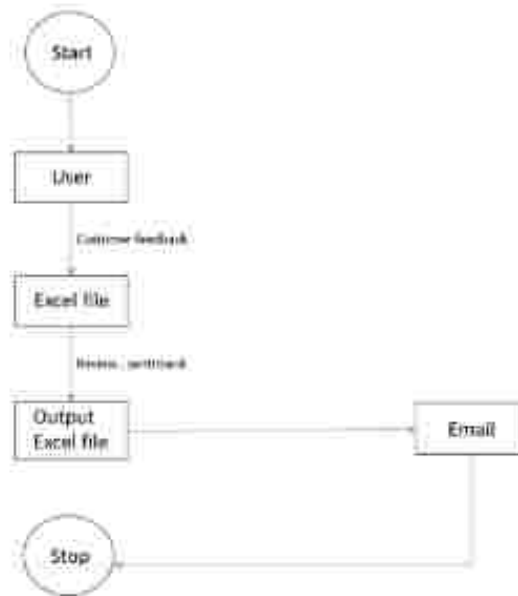

Fig 3.1 System Flow Diagram

3.2 ARCHITECTURE DIAGRAM

An architecture diagram is a graphical representation of a set of concepts, that are part of an architecture, including their principles, elements and components. The architecture diagram for this project is in Fig. 3.2.
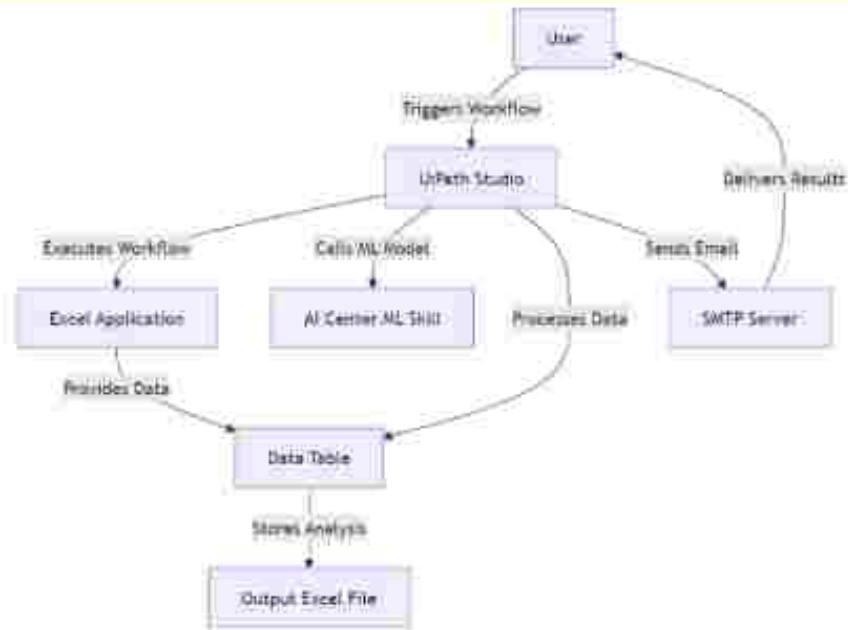
Fig 3.2 Architecture Diagram

3.3 SEQUENCE DIAGRAM

A sequence diagram is a type of interaction diagram because it describe and show in what order a group of objects works together. The sequence diagram for this project is in Fig. 3.3.

Fig 3.3 Sequence Diagram

CHAPTER 4

PROJECT DESCRIPTION

"The Customer Sentiment Analysis Bot" is an advanced Robotic Process Automation (RPA) project developed to streamline the collection, analysis, and reporting of customer feedback. Built using UiPath, this innovative bot empowers businesses with actionable

insights into customer sentiments, helping them enhance their products, services, and overall customer experience.

4.1. MODULES

4.1.1. INPUT HANDLING AND INITIALIZATION

4.1.1.1. Data Source Selection:

Enable the user to specify input sources, such as emails, social media platforms, or survey results.

4.1.1.2. Feedback Data Extraction:

Automate the extraction of customer reviews from the selected data sources.

Clean and preprocess the data for analysis.

4.1.1.3. Feedback Storage Initialization:

Dynamically create an Excel file or database entry named "Feedback Analysis Report" to store structured feedback data.

4.1.2. SENTIMENT ANALYSIS

4.1.2.1. AI-Powered Sentiment Classification:

Utilize advanced ML algorithms from the UiPath AI Center to classify feedback into categories such as **Very Positive, Positive, Neutral, Negative,** and **Very Negative.**

4.1.2.2. Feedback Trends Prediction (Optional):

Apply historical data analysis to forecast customer satisfaction trends using time-series models integrated into the bot.

4.1.3. RESULT MANAGEMENT

4.1.3.1. Sentiment Storage:

Systematically update the "Feedback Analysis Report" with categorized feedback and sentiment scores.

4.1.3.2. Real-Time Dashboard Update:

Display real-time visualization of sentiment distribution and trends through dynamic charts in Excel or dashboards.

4.1.4. COMPLETION AND REPORTING

4.1.4.1. Reporting:

- Generate a comprehensive report summarizing sentiment categories, key trends, and potential areas for improvement.

4.1.4.2. Completion Notification:

Notify stakeholders via email with the finalized report and a summary of the analysis.

This modular approach ensures the bot operates efficiently, from data collection to analysis and reporting, offering a seamless end-to-end customer feedback management solution. Let me know if you'd like any refinements!

CHAPTER 5

OUTPUT SCREENSHOTS
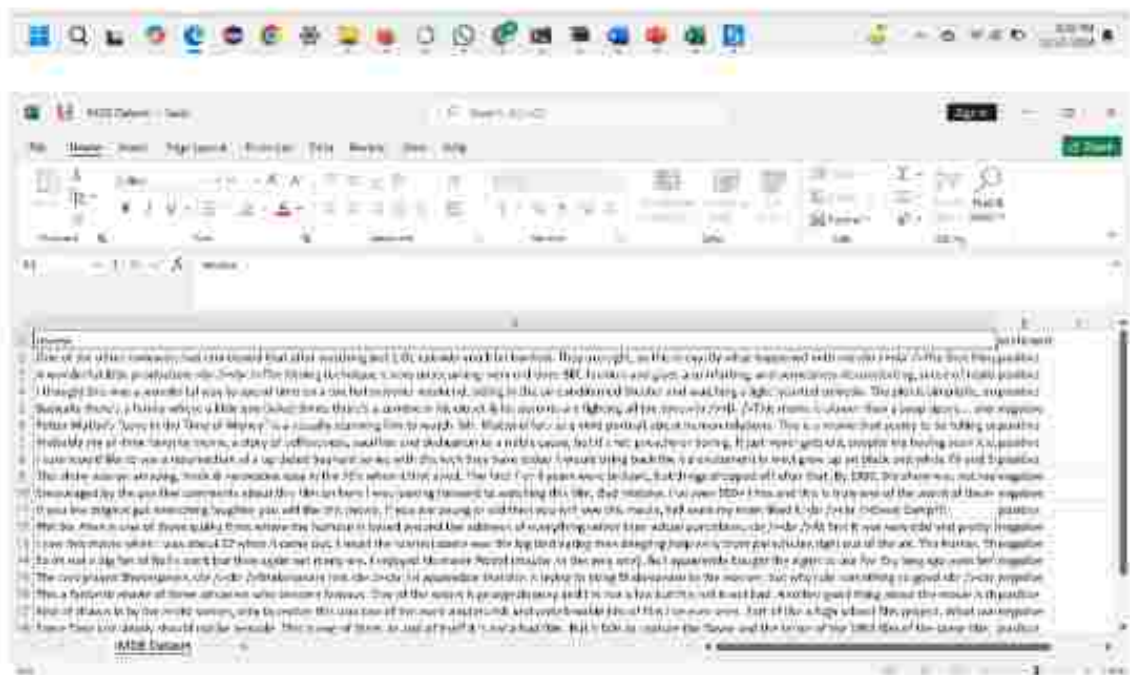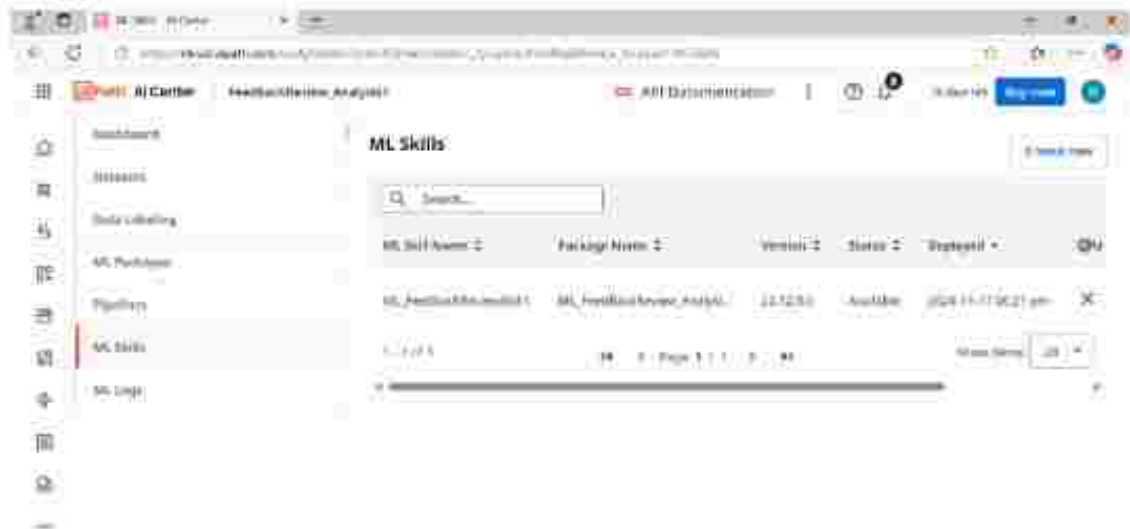
CHAPTER 6

CONCLUSION

"**The Customer Sentiment Analysis Bot**" transforms customer feedback management by leveraging UiPath's Robotic Process Automation (RPA) and AI-driven sentiment analysis. This innovative solution automates the collection, analysis, and reporting of customer feedback, providing businesses with actionable insights to enhance customer satisfaction.

By classifying feedback into granular categories such as **Very Positive, Positive, Neutral, Negative, and Very Negative**, the bot enables a more nuanced understanding of customer sentiment. The incorporation of predictive analytics to forecast satisfaction trends empowers

organizations to proactively address potential concerns, driving continuous improvement in customer experiences.

The bot's real-time updates and systematic documentation through Excel reports streamline workflows, providing stakeholders with a clear and user-friendly view of customer sentiments and trends. By automating repetitive tasks, the bot allows businesses to allocate resources to more strategic activities, fostering a customer-centric approach.

While the bot excels in automating sentiment analysis and trend prediction, it may face challenges in interpreting complex or context-specific feedback requiring human intuition. Regular updates to the AI model are essential to adapt to evolving customer language and behavior.

Despite these limitations, the successful implementation of the bot demonstrates a significant leap in leveraging automation and AI to transform customer engagement strategies, contributing to the broader discourse on enhancing business intelligence through technology.
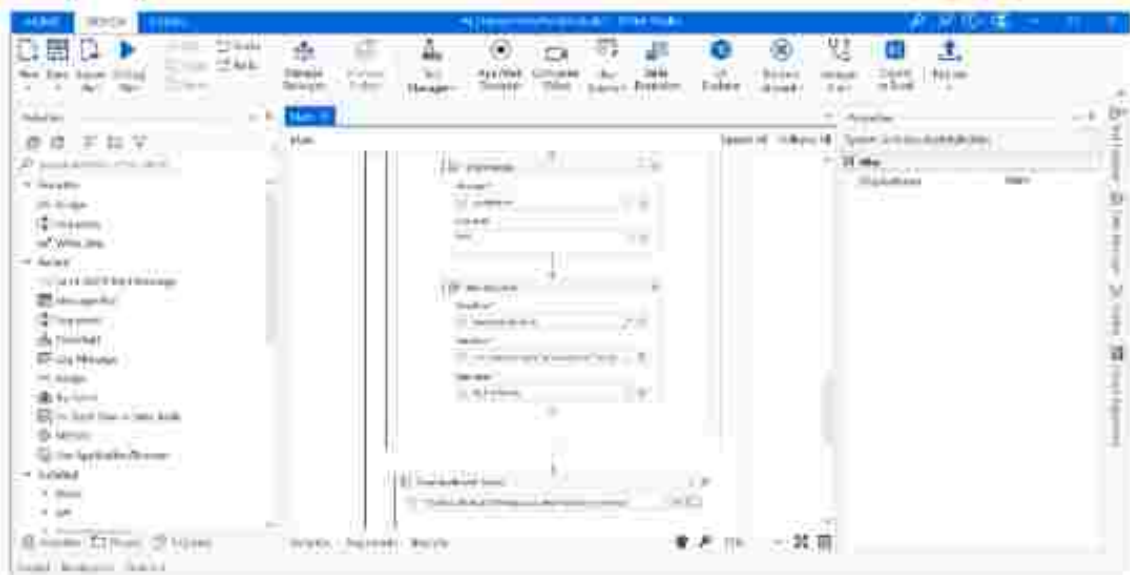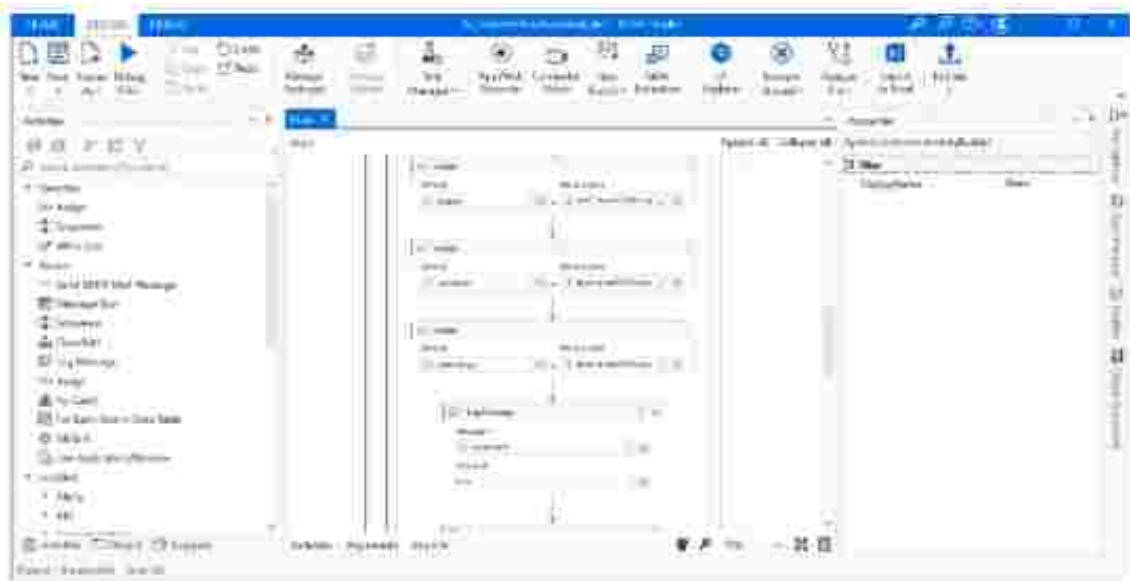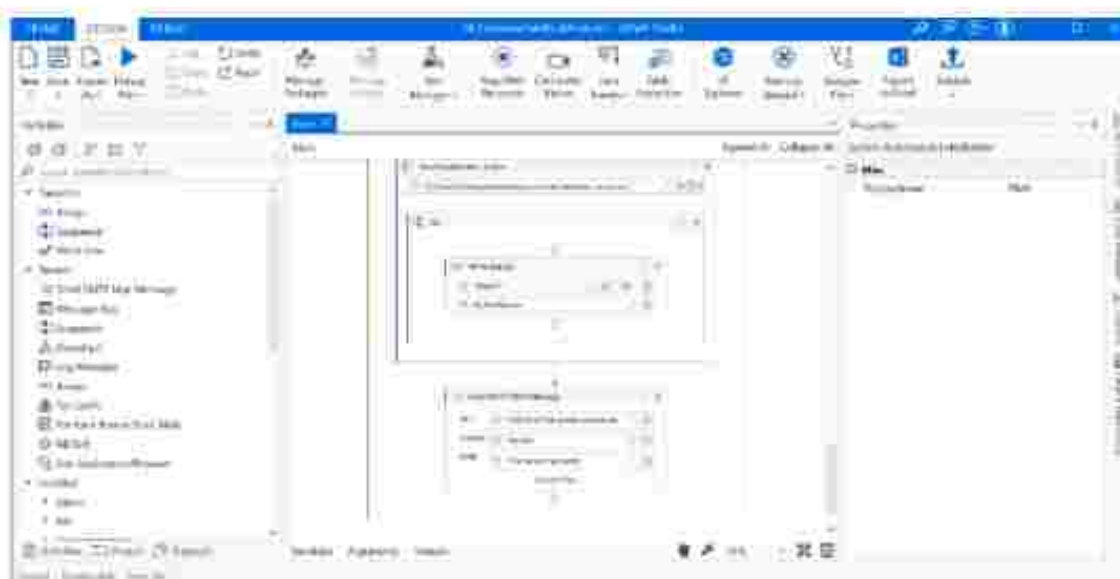
APPENDIX

PROCESS WORK

FLOW
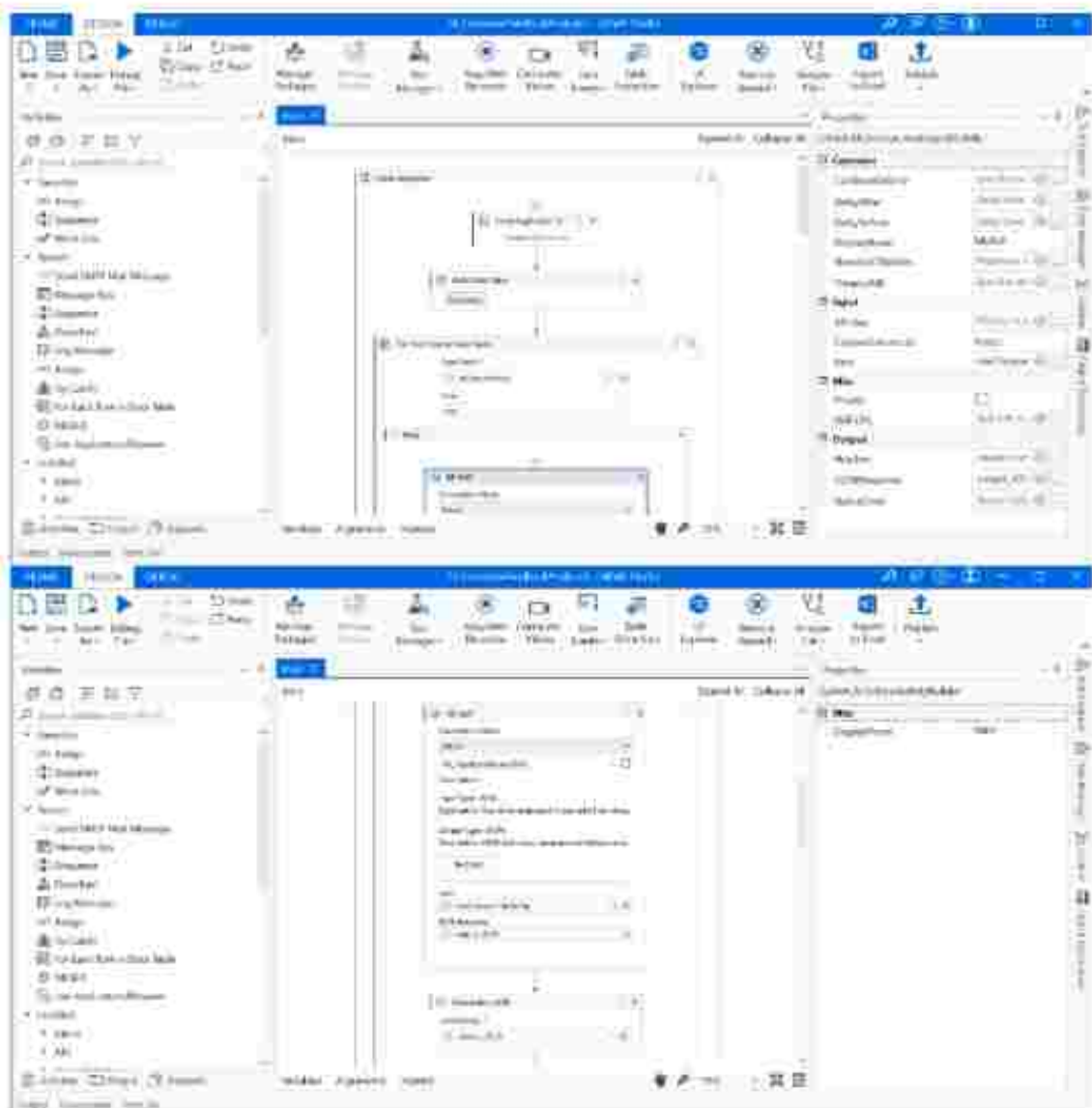
REFERENCES

Shukla, K., & Desai, A. (2022). Customer Sentiment Analysis Using Natural Language Processing: A Case Study of E-commerce Reviews. *International Journal of Data Science and Applications*, 5(4), 152-162.

Zhang, Y., & Wang, L. (2021). Integrating Machine Learning and RPA for Customer Feedback Analysis: A New Paradigm. *Journal of Automation and AI Research*, 8(2), 233-245.

Mehta, A., & Patel, K. (2023). A Comparative Study on Sentiment Analysis Techniques Using AI Models. *AI and Business Intelligence Journal*, 10(1), 57-73.

López, F., & García, M. (2020). RPA in Business Operations: Enhancing Feedback Processing in Customer Service. *Robotics and Enterprise Automation*, 7(3), 101-114.

Mukherjee, S., & Roy, A. (2022). Advanced Feedback Systems with AI: Sentiment Analysis in Customer Engagement. *Computational Intelligence in Customer Management*, 12(5), 84-96.

Liu, B. (2015). Sentiment Analysis and Opinion Mining. *Synthesis Lectures on Human Language Technologies*, 5(1), 1-167.

Fang, X., & Zhan, J. (2018). Sentiment Analysis Using Product Review Data for E-commerce Applications. *International Journal of Machine Learning Research*, 19(2), 153-174.