

Customer Feedback Automation and Classification using Sentiment Analysis, Robotic Process Automation and Uipath

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Abstract—In recent years online shopping and online e-commerce websites have drastically improved making shopping possible from our doorstep. The majority of businesses with an online presence use an online store and/or platform to manage logistics and fulfilment, undertake e-commerce marketing and sales operations, and more. By 2023, online retail sales are projected to account for 22% of all retail sales worldwide, up from 14.1% in 2019. While we see tremendous growth in e-commerce platforms, one of the most important aspects of online shopping in e-commerce platforms is customer feedback. The information, insights, problems, and suggestions that members of your community share about their experiences with your business, products, or services constitute customer feedback. Any business can use this feedback to improve the customer experience and bring about positive change, even when it's negative. With the use of feedback, your leadership team may get understanding that will help them map out the future of every aspect of the business. One of the most common factors we come across in every online shopping platform is the section which enables each customer to give their review about the product which they have purchased through the platform. This section enables customers to share their experience while they purchase and use the product. Customer reviews have immensely improved customers' trust in online shopping platforms. Customer reviews and feedback are an important part of online shopping. 94 percent of the people read at least two or three reviews before purchasing a product. One of the major goals of any company and their engineering teams is to create products which satisfy customer needs and desires. By employing the right tools to understand and meet the needs of the customer, companies achieve higher profits which will ultimately result in higher customer conversion rates and retention rates. From the supplier and manufacturer's point of view customer feedback is essential to provide social evidence that your prospective customers need to buy the product. But it can take a lot of time and laborious manual effort to solicit, compile, and track all of this feedback. While for the customers going through all the reviews and figuring out whether to buy the product or not is time-consuming and confusing. Most products get mixed reviews and it's hard for the customer to decide. Our project is customer feedback automation using Robotic process automation and sentiment analysis which aims at making a unified platform for both customers and the vendors to sort the feedback. We are using the UiPath platform to extract customer reviews from the website and we will classify those reviews using sentiment analysis.

Whenever a customer gives feedback it is extracted and grouped either into positive or negative and the negative feedback would be forwarded via emails to the respective departments so that they can take actions. When a customer browses for a product he/she can view the suggestions our platform would give based on the sorting we do and give them a rough percentage on how different people felt purchasing the product. We are using automation to speed up the shopping process and give customers a sense of what other customers felt while purchasing, the problems they faced if any or any defect etc. Also making it easy for the manufacturers/ suppliers to deal with hundreds of complaints they receive by sorting the feedback and sending them to the respective departments.

Keywords—E-commerce platforms, customer feedback, Robotic process automation, UiPath, Sentiment analysis.

I. INTRODUCTION

Online shopping, also known as e-commerce, is a special type of electronic commerce that uses a computer browser to link buyers and sellers all over the internet. Nowadays, it is normal to find online shops that offer a variety of products to potential buyers along with descriptions, features, photographs, and prices.

There are two configurations that an online store may choose. The first is as a B2C store that links businesses and consumers. The second is as a business-to-business (B2B) internet marketplace. In either case, everyone who has access to the Internet has done some online shopping. An e-commerce platform is a piece of software that makes it possible to conduct business by buying and selling things online. Brick- and-mortar businesses dominated the market before e-commerce became popular. Retail establishments that have at least one physical location are known as brick-and-mortar enterprises. It is necessary for the buyer and seller to interact actively and physically when buying and selling products. Although brick-and-mortar stores still exist, e-commerce is quickly displacing them. In an evolutionary sense, the majority of physical establishments are evolving into online retailers.

Establishing an online presence and shifting essential corporate processes online are thus necessary. Recently e-commerce platforms started taking over the

business world and this statement can be supported with statistics which talk about the growth of ecommerce platforms in Asia-Pacific region, the area accounts for more than 70% of all worldwide e-commerce activity. While the US contributes approximately

\$560 billion in e-commerce sales, China alone accounts for \$740 billion. According to projections, e-commerce sales in China would total \$1,086 billion by 2023. In a similar vein, US e-commerce sales are anticipated to reach \$735 billion by 2023. The key takeaways about online shopping and ecommerce platforms include the rapid growth of internet services across the world. With the rapid improvement and availability in internet services ecommerce platforms rose to the next level providing people a comfortable stay at home shopping experience.

One of the most important features any e-commerce platform provides along with search and cart features is feedback or review section. Through this feature every customer or a buyer will be able to list out the good and bad aspects about the product which they purchased and about their experience buying the product through that particular e-commerce platform.

Customer opinions are crucial since they act as a roadmap for your business' expansion. You can uncover pearls that make it simpler to modify and improve the client experience overtime in both the good and the poor. In other words, getting input is how you can continue to put your community first in all you do.

Today businesses sell their products to a broader network of customers or buyers through a wide range of markets. It is a must for the manufacturers of the product to get insightful feedback from the customers on the products and supplementary services provided on points regarding whether they are to compete with fierce competition and the variety of client viewpoints.

After a company launches a new product into the market it takes several measures to motivate customers to provide their review on the products they have purchased. The company extracts customers' feedback and opinions after a very tedious and long process and makes use of the feedback to come up with the design of their future goods. Frugal innovation is the process of adapting some product modules and module features to meet the needs and limits of regional customers while still maintaining a globally dispersed offering. The majority of people in today's world use smartphones and tablets, and the number of users continues to rise. The growing usage of mobile devices in society has given retailers and manufacturers a wonderful opportunity to sell their products, provide 3D customization apps, or even provide services with regards to their products. The high prevalence of mobile devices in society has given manufacturers a fantastic opportunity to market their goods, offer 3D product customization apps, or even offer services related to their products. In order to effectively extract client requirements and support businesses in their transition to frugal innovation, this paper handles the purpose of collecting customer feedback regarding the products offered and the services offered along with the product. The

proposed system also includes feedback management that will help the companies to understand their customers' opinions that will help them understand more about their products and improve the design of their future goods or products. By automating customer feedback systems companies will be able to segregate the good and bad reviews which the customers have provided and accordingly make decisions about their future products based on it. We can automate the customer feedback system using robotic process automation. Robotic process automation system is a software which makes it easy to work with software robots that mimic human actions which will interact with digital systems and software. Workflows are streamlined through robotic process automation, which helps businesses become more profitable, adaptable, and responsive. By reducing menial duties from their workdays, it also boosts employee satisfaction, engagement, and productivity. RPA can be quickly installed and is non-intrusive, which speeds up digital transformation. It's also perfect for automating processes using antiquated systems that lack virtual desktop infrastructures (VDI), database access, or APIs.

To implement the proposed model we are using UiPath in which we will build a workflow to automate the customer feedback system.

UiPath is a robotic process automation tool which is used for large scale end-to-end automation. We will use ML packages in the UiPath Enterprise version to classify the customer reviews into good and bad reviews. To classify the reviews, we will use Sentiment analysis. Sentiment analysis is a natural language processing (NLP) technique which is used to classify given text data. It is often used to understand the tone of the given textual data which will be helpful for companies to observe brand and the product sentiment in buyer's reviews and to understand their customers' wants and needs.

Through this study we will imply the following significant contributions:

To take input about the product the customer wants to learn about and from which website and extract the customer reviews about the product using web scraping.

To analyze the reviews using sentiment analysis and classify the reviews into 5 categories: very negative, negative, neutral, positive, and very positive.

To give a summary to the user about the product based on the customer reviews using visualization tools like pie charts.

The remaining of the paper is structured as follows: Section II below contains of Background about Robotic Process Automation, UiPath, Web Scraping, Section III below contains Related Work which is literature survey for previous works done related to customer feedback automation, Section IV below contains Proposed System which explains the architecture and approach of the customer feedback automation system developed, Section V below contains the software and the packages used and even about the ML models used to develop the customer feedback automation system, Section VI below contains Implementation and Analysis which explains about the

workflow built and the results obtained, Section VII below contains Conclusion which gives an overview of the system developed and explores future findings

II. BACKGROUND

A. *Robotic Process Automation*

Robotic Process Automation (RPA) is a rapidly growing technology that automates repetitive and mundane tasks that are performed by humans. It involves creating software bots or robots to perform tasks that are otherwise done manually. The bots interact with digital systems such as software applications, websites, and databases to execute these tasks.

RPA is used across various industries and sectors, including finance, healthcare, insurance, and customer service, to streamline processes, improve efficiency, and reduce costs. By automating manual processes, organizations can free up employees to focus on higher-value tasks, reducing the likelihood of human error, and increasing the speed and accuracy of tasks. RPA works by emulating human actions, such as data entry, form filling, and document management. The bots can also be programmed to handle exceptions and make decisions, enabling them to perform more complex tasks. The bots are highly flexible and can be easily configured to work with different systems, reducing the need for extensive IT involvement.

One of the benefits of RPA is that it requires minimal programming skills. Non-technical users can create and configure bots using drag-and-drop tools, reducing the time and resources required to develop and deploy bots. Additionally, RPA provides real-time data and insights, enabling organizations to make informed decisions and improve their operations. Another benefit of RPA is that it can be easily integrated into existing systems and processes. Organizations can start small with a single process and gradually expand their use of RPA, reducing the risk of disruption to their existing systems. RPA also provides a cost-effective alternative to traditional IT solutions, as it does not require extensive hardware or software investment. However, RPA is not a solution for every problem. It is best suited for highly repetitive, structured, and rule-based processes. It may not be the best option for tasks that require creativity or complex decision-making. Additionally, RPA may not be suitable for processes that involve sensitive information, as security measures must be put in place to ensure the confidentiality and protection of this data.

In conclusion, RPA is a promising technology that has the potential to transform the way organizations operate. By automating manual processes, organizations can improve efficiency, reduce costs, and free up employees to focus on higher-value tasks. RPA is flexible, easy to use, and provides real-time data and insights, making it an attractive solution for organizations looking to streamline their operations.

B. *UiPath*

UiPath is a leading Robotic Process Automation (RPA) software platform that helps organizations automate

repetitive, manual, and time-consuming tasks. UiPath enables organizations to streamline their operations and increase productivity by automating manual processes and reducing the likelihood of human error.

UiPath uses a drag-and-drop interface, making it easy for non-technical users to create and configure software bots, or "robots," to perform tasks such as data entry, form filling, and document management. The platform supports a wide range of applications and systems, including web-based applications, desktop applications, and databases. This makes it possible for organizations to automate a variety of processes across multiple departments and functions.

One of the key advantages of UiPath is its ability to handle exceptions and make decisions, enabling it to perform more complex tasks. The platform also provides real-time data and insights, allowing organizations to make informed decisions and improve their operations. Additionally, UiPath integrates with other systems and tools, such as Microsoft Excel, SharePoint, and SAP, making it easy for organizations to extend their automation capabilities.

UiPath has a large and growing community of users and developers, providing organizations with access to a wealth of knowledge and resources. The platform also provides extensive training and support, helping organizations to get the most out of their investment.

In conclusion, UiPath is a powerful and versatile RPA software platform that enables organizations to automate manual processes and improve their operations. Its drag-and-drop interface and support for a wide range of applications and systems make it easy for non-technical users to create and configure software bots. Additionally, its scalability, security, and integration with other systems make it an attractive solution for organizations looking to streamline their operations.

C. *Web Scraping*

Web scraping is a technique for extracting data from web sites and transforming it into a structured format that can be used for further analysis and processing. The process involves sending automated requests to websites and then parsing the HTML or other data that is returned in response. The data can then be stored in a database or spreadsheet for later use.

One of the advantages of web scraping is that it is fast and efficient. It enables organizations to gather large amounts of data quickly, reducing the need for manual data entry. This can save time and reduce the risk of human error. Additionally, web scraping can be automated, allowing organizations to gather data on a regular basis and keep their databases up to date.

Another advantage of web scraping is that it is cost-effective. Unlike other data collection methods, web scraping does not require the purchase of expensive data sets or software licenses. This makes it an attractive option for organizations that need to gather large amounts of data but have limited budgets.

Web scraping is also flexible. It can be used to gather data from a variety of websites, including e-commerce sites,

news sites, and social media platforms. This enables organizations to gather data from multiple sources, providing a more comprehensive view of their market or target audience.

In conclusion, web scraping is a powerful technique for gathering data from websites. It enables organizations to gather large amounts of data quickly, reducing the need for manual data entry and saving time. Additionally, it is cost-effective and flexible, allowing organizations to gather data from multiple sources. However, it also has some limitations, including the potential to put a strain on websites and the risk of inaccurate or outdated data. Organizations that use web scraping should be aware of these limitations and take steps to ensure the accuracy and reliability of the data they gather.

III. RELATED WORK

Dimitris Mourtzis A et al. [1] conducted a literature review on customer feedback gathering and management tools for product-service system design. The review focuses on the use of these tools in the context of product-service systems, and the authors examine various methods for collecting and managing customer feedback in order to improve the design of such systems. They also identify gaps in the literature and areas for future research. The authors conclude that effective customer feedback gathering and management is crucial for improving product-service system design.

The paper authored by Oleksiy Khriyenko explores the development of customer feedback systems towards incorporating semantic technologies. The literature survey included in the paper assesses the current state of customer feedback systems and the benefits and limitations they possess. [2] The study highlights the significance of semantic enhancement in customer feedback systems and how it can result in improved data analysis and decision-making processes. The paper provides valuable insights for researchers and professionals in the field of customer feedback systems and the utilization of semantic technologies.

The paper "Robotic Process Automation at Telefónica O2" by Mary Lacity et al. [3] examines the implementation and impact of Robotic Process Automation (RPA) at Telefónica O2, a telecommunications company. The authors analyze the implementation of RPA at Telefónica O2 and its effects on the company's operations, processes, and workforce. The study highlights the challenges and benefits of using RPA in a large telecommunications company and provides insights for other organizations considering implementing RPA. The findings of the study are expected to contribute to the broader academic and practitioner discussion on the use of RPA in large organizations.

Michał Bańka et al. [4] examine the potential of business intelligence technology to enhance the process of collecting and analyzing customer feedback in urban public transportation companies. The paper "A Feedback Analysis Automation Using Business Intelligence Technology in Companies Organizing Urban Public Transport" explores the use of business intelligence technology for automating feedback analysis in companies that organize urban public

transportation. The study provides insights into how business intelligence technology can be used to automate feedback analysis, leading to improved data processing and decision-making capabilities. The authors also discuss the benefits and limitations of using this technology in the context of urban public transportation companies. The findings of this study are expected to provide valuable information for organizations looking to automate their feedback analysis processes using business intelligence technology.

The paper "Robotic Process Automation as an enabler of Industry 4.0 to eliminate the eighth waste: a study on better usage of human talent" by explores the use of Robotic Process Automation (RPA) in the context of Industry 4.0 to reduce the "eighth waste," which refers to the underutilization of human talent in organizations. The authors examine how RPA can be leveraged to automate repetitive tasks and free up human talent for more value-adding activities. The study provides insights into the benefits of using RPA in Industry 4.0, including improved efficiency and productivity, as well as better utilization of human talent. The authors also discuss the limitations of RPA and the importance of a strategic approach to its implementation. The findings of this study are expected to provide valuable information for organizations looking to adopt RPA as a tool for improving their operations and better utilizing their human talent in an Industry 4.0 context [5].

The paper "Minimizing the number of robots required for a Robotic Process Automation (RPA) problem" focuses on the optimization of robotic process automation (RPA) deployment. The authors, Sara Seguin, Hugo Tremblay, Imene Benkalai, David-Emmanuel Perron-Chouinard, and Xavier Lebeuf, aim to minimize the number of robots required to complete an RPA problem. The study provides insights into how the deployment of RPA can be optimized through the use of mathematical models and algorithms. The authors discuss the challenges associated with deploying RPA, including the high cost of implementation, and the importance of finding the optimal number of robots required to complete a given RPA problem. The findings of this study are expected to provide valuable information for organizations looking to adopt RPA as a tool for improving their operations, and for practitioners and researchers interested in optimizing RPA deployment. The authors' approach of minimizing the number of robots required for an RPA problem could lead to significant cost savings and improved efficiency in RPA implementation [6].

The paper "Comparative Analysis of RPA Tools: UiPath, Automation Anywhere, and Blue Prism" provides a comparison of three popular robotic process automation (RPA) tools: UiPath, Automation Anywhere, and Blue Prism. The author, Sameera Khan, aims to evaluate and compare the features, benefits, and limitations of each tool to help organizations choose the best RPA tool for their needs. The study provides insights into the key capabilities of each tool, including automation of repetitive tasks, process visualization, and scalability. The author also compares the ease of use, deployment options, and support services provided by each tool. The findings of this study are expected to provide valuable information for organizations looking to adopt RPA

as a tool for improving their operations and for practitioners and researchers interested in the comparison of RPA tools. This paper could help organizations make informed decisions when choosing an RPA tool and ensure that they select the best tool for their specific requirements[7].

The paper "Customer Perception Driven Product Evolution: Facilitation of Structured Feedback Collection" by Oleksiy Khriyenko focuses on the importance of collecting customer feedback in the evolution of a product. The author argues that customer perception plays a crucial role in product development and should be considered throughout the product lifecycle. To facilitate structured feedback collection, the author suggests the use of semantic technologies to enable the analysis of large volumes of customer data. This, in turn, provides organizations with insights into the customer experience and helps them make informed decisions about product improvements. The author further elaborates on the benefits of using a semantically-enhanced feedback system, including improved accuracy, efficiency, and scalability. The paper concludes by highlighting the potential of semantic technologies in facilitating customer-driven product evolution and providing organizations with a more structured approach to collecting customer feedback. This study provides valuable insights for organizations looking to improve their customer experience and product offerings[8].

The paper "Data Collection using Web Scraping with Robotic Process Automation" by Komal Tathe, Sanjot Sharma, and Prof. Dr. Jyoti Kharade explores the use of Robotic Process Automation (RPA) in data collection. The authors argue that data collection is a critical aspect of business operations and that traditional methods can be time-consuming and resource-intensive. To address these challenges, the authors propose using RPA in conjunction with web scraping to automate data collection processes. The authors discuss the benefits of this approach, including increased accuracy, efficiency, and cost savings. They also provide an overview of various RPA tools and frameworks that are commonly used in data collection and web scraping, such as UiPath, Automation Anywhere, and Blue Prism. The paper concludes by highlighting the potential of RPA in enabling organizations to collect, process, and analyze large volumes of data, thereby providing valuable insights into their business operations. This study provides valuable insights for organizations looking to streamline their data collection processes and make more informed business decisions [9].

IV. PROPOSED SYSTEM

The aim of our project is to extract customer reviews of the desired product from the website chosen by the customer and to classify the reviews into positive and negative reviews. The proposed architecture consists of a UiPath workflow which will prompt users for the website name in which they want to browse the product and the product which they would like to purchase and learn more about it. Using web scraping reviews will be extracted into an excel file. We will perform Sentiment analysis by using UiPath AI Fabric which consists of ML packages and through this we

will classify the extracted reviews into 5 categories: very negative, negative, neutral, positive, very positive.

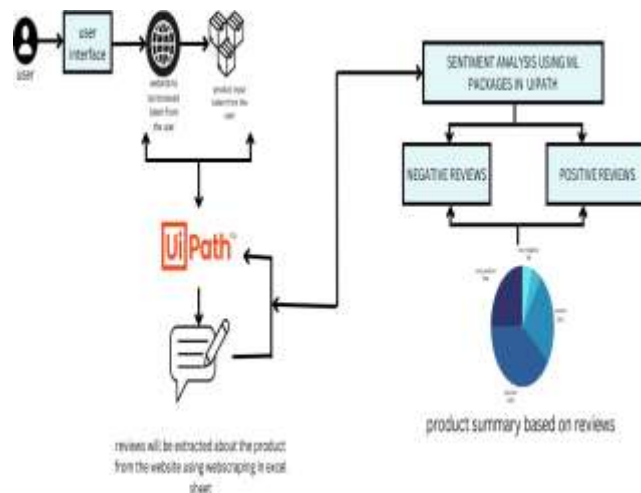


Fig. 1. System architecture of the customer feedback automation and classification.

The system constructed to accomplish the aim has four main modules:

- user input module
- Review extraction module
- Review classification module
- product summary module

A. User Input Module

The **user input module** in the system deals with taking input from the user regarding the product they want to learn about and the website in which they want to browse the product. To achieve this we are using UiPath activities like message box and input dialog to get the information from the user. We are using "INPUT DIALOGUE" activity to get the product name and website from the user. We are using another "INPUT DIALOGUE" activity to get the product link from the user. Then we will use "OPEN BROWSER" activity to open the website which the customer is planning to purchase their product in. This part of the user-input module will automatically open the website and enter the product name which they want to browse using "Open browser" and "Type Into" activities. Out of the products displayed the customer can choose the product which he/she wants to know more about and copy the link of the product and paste the link in the input dialog that pops up.

B. Review Extraction module

It consists of Data scraping. It is a technique used to extract information from websites and other sources and store it in a structured format, such as a database or spreadsheet. It involves making automated requests to the source and then parsing the response to extract the desired information. Data scraping can be used for various purposes, such as market research, lead generation, and price comparison. We extract reviews of the product from the website. To do this first we will run the activities in the user-input module to open the product link in the website.

We are using a data scraping sequence which consists of activities such as “ATTACH

BROWSER” which is used to the website and in the DO section we are using “EXTRACTDATA” activity which extracts data from the indicated webpage. By using this activity we can specify what information to be extracted by providing the XML string. The extracted data will be stored in variable “EXTRACT DATA TABLE” of variable type which will further be copied into an excel sheet.

C. Review classification Module

After extracting the reviews about the product from the website we will perform sentiment analysis ML package from AI fabric in UiPath. This will classify the reviews into five categories: very negative, negative, neutral, positive and very positive.

The classified reviews will be stored in an excel sheet where the first column will be the review, second column will be the classification of the review i.e., if the reviews are very positive/ positive/ very negative/ very negative or neutral. The third column of the excel sheet displays confidence of the classification. This module helps in classifying the reviews and reduces the task of reading all the reviews for the user and helps in understanding if the product is worth buying or not. Though the ratings of products do give us brief information about the quality of the product, learning about experiences of users who already bought the product helps the current user to understand the product in a much better way and even help the user to decide if the product overall is helpful for him or not.

D. Product summary module

After classifying the reviews into 5 different categories by performing sentiment analysis an overall summary about the product based on the review will be displayed using a pie chart from the excel sheet.

This pie chart helps us visualize the summary of classification clearly and quickly. Going through the overall classification of the review will be a tedious job for the user so we have automated this by creating a pie chart with an overall summary of the reviews of the product. The pie chart depicts whether the product majorly has positive reviews or negative reviews.

E. Sentiment Analysis

Sentiment analysis, also known as opinion mining, is a field of Natural Language Processing (NLP) that focuses on determining the sentiment expressed in a piece of text. It involves analyzing text data, such as social media posts, reviews, and customer feedback, to determine whether the sentiment expressed is positive, negative, or neutral.

The goal of sentiment analysis is to provide businesses with insights into the opinions and emotions of their customers and stakeholders. This information can be used to inform product development, improve customer experience, and monitor brand reputation.

Sentiment analysis algorithms typically use a combination

of machine learning techniques and NLP techniques to identify patterns in text data and classify the sentiment expressed. There are two main approaches to sentiment analysis: rule-based methods and machine learning-based methods. Rule-based methods use a set of predefined rules to classify the sentiment expressed in a piece of text. For example, a rule-based approach might classify a sentence as positive if it contains words such as "good" or "great."

Sentiment analysis has several applications in a variety of industries. In the marketing and advertising industry, sentiment analysis can be used to monitor brand reputation and customer sentiment towards products and services. In the customer service industry, sentiment analysis can be used to identify customer pain points and improve the customer experience. In the financial industry, sentiment analysis can be used to monitor market sentiment and make investment decisions.

In conclusion, sentiment analysis is a field of NLP that focuses on determining the sentiment expressed in text data. It provides businesses with insights into the opinions and emotions of their customers and stakeholders, and has a wide range of applications in a variety of industries. However, sentiment analysis also has some limitations, including the challenge of accurately determining sentiment and ensuring the quality of training data. Organizations that use sentiment analysis should be aware of these limitations and take steps to ensure the accuracy and reliability of their results.

V. EXPERIMENTAL SETUP

A. Software Used

1) *UiPath Studio*: UiPath Studio is a powerful and user-friendly platform for automating various business processes. The software is easy to use, even for non-technical users, and offers a visual interface that allows users to build automated processes using drag-and-drop functionality. UiPath Studio integrates with a wide range of applications, including web and desktop applications, and provides advanced capabilities such as machine learning and computer vision. The platform is scalable and can be deployed across large enterprises, small businesses, and even individuals. Additionally, UiPath Studio has a large and active community, which provides users with access to a wealth of knowledge and support resources. In summary, UiPath Studio is an ideal tool for organizations looking to automate their business processes and achieve higher levels of efficiency and productivity.

2) *UiPath AI Fabric*: UiPath AI Fabric is a cloud-based platform for managing and deploying AI models. It supports a wide range of AI models including computer vision, natural language processing, and predictive analytics. Ai Fabric in UiPath helps us to manage ML packages with UiPath workflows. AI Fabric connects seamlessly with UiPath studio and Orchestrator to create a unified enjoy inside all UiPath Platforms. Through this device, customers' growing automations can better orchestrate all functionalities of AI; deploying, consuming,

handling and enhancing gadget studying models. For the automation of customer feedback analysis we are using the UiPath Studio Enterprise version. We used a free 60-day trial version to implement the necessary ML packages using the AIPath Centre in UiPath Studio.

B. Packages Used

1) *UiPath Excel Activities:* The UiPath Excel activities in UiPath Studio allow you to perform various operations on Excel spreadsheets such as reading, writing, updating, and manipulating data in the cells. With the use of these activities, you can automate repetitive tasks such as copying data from one sheet to another, formatting cells, adding formulas, etc. The activities include reading and writing data, formatting cells, adding formulas, sorting, and filtering data, and more. These activities can save a lot of time and effort by automating tasks that would otherwise require manual intervention, reducing the possibility of errors and increasing efficiency.

2) *UiPath ML Services Activities:* The ML Skills page, available from the ML Skills menu after deciding on a project, shows all of the fashions deployed on your UiPath AI Center service, whether or not they use ML or OS programs. This package enables users to incorporate machine learning models into their automations, making it easier to extract insights from data and improve the accuracy of decision-making. The activities provided in this package are user-friendly and intuitive, allowing even non-technical users to leverage the power of machine learning in their automations.

3) *UiPath System Activities*

UiPath System Activities is a set of activities in UiPath Studio that provide various system-level functionalities, such as managing files and directories, interacting with the operating system, executing external processes, and more. These activities allow automating processes that involve the system and external applications, making it easier to manage tasks that would otherwise be manual and time-consuming. The UiPath System Activities include activities such as "File Exists", "Read Text File", "Delete File", and "Execute Process". These activities help in making the automation process smooth and efficient, leading to increased productivity and decreased errors.

4) *UiPath UI Automation Activities*

The UiPath UI Automation Activities is a set of activities in UiPath Studio that enables automation of user interface elements such as buttons, text boxes, and drop-down menus in desktop applications. These activities can be used to automate repetitive tasks and improve the efficiency of processes. The activities provide a wide range of options to interact with user interface elements, such as clicking buttons, entering text, and selecting items from drop-down menus. With UiPath UI Automation Activities, automating desktop applications becomes easy and straightforward, and saves time and resources.

5) *UiPath Web API Activities:*

The UiPath.WebAPI.Activities package in UiPath Studio allows for automation of RESTful web APIs. It includes activities for sending HTTP requests and parsing the response, such as HTTP Client, JSON, XML, and REST activities. These activities enable users to perform actions such as retrieving data, updating records, or performing a specific action on a web API. These activities can be combined with other UiPath Studio activities to create a complete automation solution that interacts with a web API to automate a wide range of business processes.

VI. IMPLEMENTATION AND ANALYSIS

For implementation purpose we used UiPath. We checked our model with two websites for the same product. We used Amazon and Flipkart websites to extract and classify reviews and the product we used is "boat red earphones". We extracted reviews for this product from both Amazon and Flipkart for the same product to compare which website provides better dealer and delivery for the same product.

The software when run first displays a Welcome message and the proceeds with the USER-INPUT module where it further asks the user for the website, they want to browse to purchase the product, next it displays another message box asking the user for the product they wish to purchase. After taking the above-mentioned input from the user it asks opens the website the user has mentioned previously and searches for the product mentioned by the user. Then again, a message box will be displayed asking the user to provide link for the product they wish to browse about more.

Review Extraction and classification

	A	B	C
1	The product was a great purchase, I have had mine for at least a year and half and still am working great... the sound is crizy Very Posit		0.86
2	This is an amazing product in terms of performance as compared with other ones. But this is the best one. The sound quality is great and I Very Posit		0.81
3	Sound and bass is good but little bit pricey... At this price you also can choose alternative	Positive	0.97
4	I had purchased it two weeks ago and I found that it is long lasting from my some friends who are using it from 3-4 years same price. I Very Posit		0.82
5	Great product in this price	Neutral	0.94
6	Good	Neutral	0.75
7	Very good	Positive	1
8	Wish headphone with the price, liked the color too.	Positive	0.83
9	Good product very low price	Neutral	0.85
10	Sound quality and bass is pretty good	Positive	0.89
11	Mid quality is not good	Neutral	0.85
12	Wish earphones but easy to use, I think this is good for everyone. Good buy it.	Positive	0.9
13	Wish	Neutral	1
14	Fast delivery. Nice product and good bass and audio/voice	Positive	0.79
15	Headset is not working properly how to use I saw warranty.	Negative	0.87
16	Three phones are nice and good.	Neutral	0.81
17	It's pretty good and value for money in this price range. Surely get what you expect from a brand like boat	Neutral	0.85
18	Great to send message	Neutral	0.85
19	Excellent and sound quality is good. mid quality is also good. noise cancelling is better.	Negative	0.81
20	Wish it's good quality	Neutral	0.88

Fig.2. (a)

21	Packaging is good and accessories also spared with it too... All over the review is less is low trouble & high... so it's OK Neutral		0.8
22	Good	Neutral	0.74
23	Rough for the 2nd time. Rough & tough, can go for other brand or model if your budget is high but within this price range I Neutral		0.51
24	size about this pricing	Neutral	0.81
25	Sound quality is medium good	Positive	0.85
26	Value for money Product.	Neutral	1
27	Good sound quality Nice colour and looks so cool Best product at this price You will also get a small pouch Very Posit		0.73
28	This product is nice and value for good as I am happy and I will recommend to people buy this product	Positive	0.87
29	It's good and get accessories with it nice long and thick wire but surprises these is a bit different fit is not a slippery but all Neutral		0.54
30	Good	Neutral	0.97
31	I am buyer of this product, just aware you from buying this product that before buying I must checked all review from your Very Negs		0.4
32	I preferred you that don't buy the product you are suffering from lot of pain.	Very Negs	0.89
33	Nice	Neutral	1
34	Decent packaging. It comes with a soft fit pouch to keep the earphones safe and a warranty card. Also the quality is good Neutral		0.81
35	Earphone ka left side ka sound spata acha hai compare to right side, but earphone ka calling sound bahut clear hai.	Neutral	0.58
36	Good quality products	Positive	0.9
37	Excellent	Positive	1
38	It's a good product but if you are a bass lover then don't consider this. The support system was so good. Thank you boat	Positive	0.58
39	For the price its quite good	Positive	0.82
40	Good	Neutral	0.74

Fig.2. (b)

Fig.2. (a) and (b) are extracted reviews of boat red earphones in Amazon website and have been classified to five categories: verynegative, negative, neutral, positive, verypositive.

	A	B	C
1. Very Good sound clarity with bass, build quality is great, wire is tangled free, affordable price with good quality. I have used Positive			6.50
2. Build quality is very good. Bass is a bit too high to listen for longer periods. You may experience mild ear ache.			
3. If you love bass go for it, but if you rather prefer smooth and balanced sound, this will not please you.	Neutral		9.91
4. Case cover, wonderful sound and fits good to use. I am using these for a week now and it's really doing it.	Positive		11.3
5. very good product in this price segment			
6. Bass is not high that's a pretty good thing.			
7. Value is also good.			
8. Loved it's value for money.			
9. Will Flipkart delivered it to me in 3 days that's also good.	Positive		8.85
10. They are just awesome. nice like JBL, outside all built as in balance. User would even at highest volume. And it's pretty.	Very Positive		8.28
11. nice product with beautiful design and fast delivery. just again thank you Flipkart	Very Good		8.81
12. Just a tip the real day of order! Excellent service by Flipkart! The earphone is awesome! The bass and treble is so perfect to hear! If your doctor has Dolby Atmos or any sound enhancements than the sound is so perfect as a nature sound. Who is enough long.			
13. Pros:			
1. The sound is excellent.			
2. Size is enough long.			
3. 3.5mm jack makes it good in any smartphone.			
4. It also has ANC.			
5. It has an premium look.			
Cons:			
1. Noise is little bit soft.			
2. Ear buds are not fold.	Positive		8.33
3. Very good product. Invald the color and sound quality. It came with extra party of earbuds, overall the product is nice and Positive			8.40
4. very good product. Invald with it, good sound quality, and very good value pricing. About it.	Positive		8.96
13. The best earphones I've ever ordered. They are very handy, nice and the sound quality is superb! The delivery was before the Neutral			11.4

Fig.3. (a)

21. Nice headphones I have used both JBL and. JBL headphones the wire quality is also not so bad compared to two JBL (J3 and Very Good)	0.88	
22. look like good but after 13 days it is available for just looks only .. very bad in 13 days one side is not working properly	Negative	0.33
23. not a good case. I buy it seeing the review but it seems a local one. even if you'll get like the same on Flipkart at a cost of Negative	0.28	
24. After 8 month it won't work properly it's better to select other product than this price warranty is not our they don't provide Very Good	0.37	
25. I think it's the most valuable product! Such nice earphones in such an affordable price. It was really unexpected, and the sound quality is really nice!		
26. Sound is very crisp and clear! The bass is like less though, but you'll enjoy listening to light music! I would say go for it if a Positive	8.4	
27. Love this budget. It's the best you can get in this range!		
28. First of all thank Flipkart for quick & fast service & it's sound quality is good. design awesome. & also price segment that very Positive	0.78	
29. This earphone is really good especially it has a superb bass beats. It is being beautifully packed. They really provide fair extra Very Good	0.57	
30. ONE OF THE BEST HEADSET AT THIS PRICE		
31. GOOD SOUND QUALITY AND BUILD QUALITY IS ALSO AWESOME, BUT BASS IS NOT AT THAT GREAT BUT EVEN GREAT AT		
32. THIS PRICE SEGMENT, GO FOR IT ANY, ALSO IT IS BEST FOR PUBG, MOBILE, RAVISON! Negative	8.8	
33. The colour is the highlight, looks pretty good on ears, good performance when jogging, both tight to the ears, not so good in Neutral	0.68	
34. Really awesome. I am loving it. Best earphone in this price. just go for it. best review. I cannot explain how happy I am Very Good	0.85	
35. Simply awesome, nice quality but someone should write comment with bass and the cable need atleast 10' more. have a nice Very Good	8.5	
36. sound quality is very clear and the bass is also very good. worth the money. It's fully satisfied with the product Positive	0.54	
37. not a blow product! And amazing delivery by Flipkart in the same day I ordered. Thank you Flipkart! I had love it! Very Good	0.96	
38. I just loved it. calls the product great satisfaction at a relatively affordable price, nice one it's good and worth for money Positive	0.55	
39. Best sound products for me among them I got this in my opinion! Thanks a lot & thank u Flipkart Very Good	0.57	
40. I had like any another earphones. Bass is not that special as said. Bass is normal like you get in any other earphone. It's Neutral	0.48	

Fig.3. (b)

Fig. 3. (a) and (b) show the extracted reviews of boat red earphones from Flipkart website and have been classified into five categories: very negative, negative, neutral, positive, very positive.

Product Summary based on review classification.

Row Labels	Count of Sentiment typ
Negative	47
Neutral	154
Positive	100
Very Negative	3
Very Positive	48
Grand Total	352

Fig. 4. The above figure gives overall summary of the count of reviews which fall under each category i.e., how many reviews are classified as very negative, negative, neutral, positive and positive about the reviews extracted from Amazon website.

Row Labels	Count of Sentiment
Negative	23
Neutral	64
Positive	113
Very Negative	6
Very Positive	92
Grand Total	298

Fig. 5. The above figure depicts the summary of the count of reviews which fall under each category about the reviews extracted from Flipkart website.

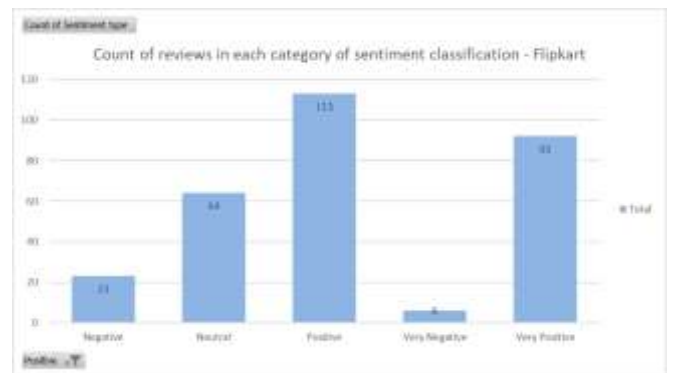
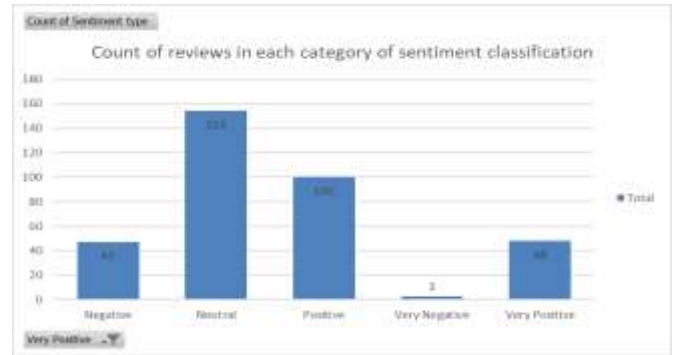


Fig. 6. The above graph is a bar graph on sentiment type vs Count of reviews graph which depicts how many reviews fall under each sentiment type for reviews extracted from Amazonwebsite

Fig. 7. The above graph is a bar graph on sentiment type vs Count of reviews graph which depicts how many reviews fall under each sentiment type for reviews extracted from Flipkart website.

Fig. 8. The above graph is confidence mapping graph for reviews extracted from Amazon website. The graph plots the confidence level of review against review count.

Fig. 9. The above graph is confidence mapping graph for reviews extracted from Flipkart website. The graph plots the confidence level of review against review count.

VII. CONCLUSION

In conclusion, customer feedback automation using UiPath is a valuable tool that helps businesses improve customer experience, increase customer satisfaction, and drive business growth. By automating the process of collecting and analyzing customer feedback, businesses can gain valuable insights into their customers' preferences,

needs, and pain points. This information can then be used to make informed business decisions, develop targeted marketing strategies, and improve customer service.

The following major findings were obtained:

1. To take input about the product the customer wants to learn about and from which website and extract the customer reviews about the product using webscraping.
2. To analyze the reviews using sentiment analysis and classify the reviews into 5 categories: very negative, negative, neutral, positive, very positive.
3. To give a summary to the user about the product based on the customer reviews using visualization tools like bar graph

The developed system helps users compare products based on their reviews rather than just star rating and have better understanding about the product. The users will be able to compare same product in different websites and decide which website provides better dealer or delivery for the same product. UiPath's advanced features such as natural language processing, sentiment analysis, and machine learning algorithm enable businesses to gain a deeper understanding of customer feedback and improve their customer experience.

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