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Customer Support Emails by RPA Methodology

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Abstract: ***In today's internet era electronic mail (Email) is a widely used communication channel commonly used to control customer inquiries such as complaints, feedbacks, reviews, and suggestions. With an increase in the number of customers, there is a significant increase in the emails being received daily, which needs to be segregated, to ensure that a proper reply is sent to all the senders in an organization and to prevent overwhelming and messy email accumulation. And the problem with the traditional method is that a manual workforce team cannot sit and segregate every email as the humongous number of emails get generated daily. apart from that it is quite a tiresome job and cannot be done by a single employee or a team of employees. So, the businesses industry and other industries can simply automate the email processing task of segregating common emails into specified folders as per the organization's requirements, by Introducing a Robotic Process Automation (RPA) system which can generate and send customer support email. The work facilitates the process which is done by a robot without human intervention by using UiPath studio.S***

Keywords: Robotic Process Automation, E-mail Segregation, Automatic reply by bot.

I. INTRODUCTION

More than half the global population uses email application. The email communication services have become aninexorable part of human lives. In the year 2019, the number of email users reached the 3.9 billion marks. In 2020 it is expected that the number of email users to rise to 4 billion. The predicted user growth rate for the next four years is 3 percent, which is around 100 million users more each year. So, in 2023 the number of email users worldwide should be approximately 4.3 billion. An RPA is an automatic reply system that enables company to communicate in real time using simply accessible interfaces. It is a kind of online application distinguished by its simplicity and accessibility to company who want to maintain a good Relationship with client, and shortage of time. It is an automatic generate and send Email application which will automatically send Email, on basis of query provided.

Communication is a mean for people to exchange messages. It has started since the beginning of human creation. Distant communication began as early as 1800 century with the introduction of television, telegraph and then telephony. Interestingly enough, telephone communication stands out as the fastest growing technology, from fixed line to mobile wireless, from voice call to data transfer. The emergence of computer network and telecommunication technologies bears the same objective that is to allow people to communicate. All this while, much efforts has been drawn towards consolidating the device into one and therefore indiscriminate the services. An automatic reply is a system that enables company to communicate in real time using simply accessible interfaces. It is a kind of online application distinguished by its simplicity and accessibility to company who want to maintain a good relationship with client, and shortage of time. It is an automatic generate and send email application which will automatically send email, on basis of query provided. When we enable workflow using software (or robots), it is called Robotic Process Automation. robots represent a company that mimics human actions. Process refers to the sequence of steps that lead to productive work. Automation is when a robot finish working without human intervention. When robots perform these types of repetitive, high-volume tasks, people are free to focus on the things they do best and enjoy more: innovation, collaboration, creativity and customer communication. Businesses area also gaining momentum: high productivity, efficiency, and resilience. Among global managers, 63% say RPA is a major factor in digital transformation. The research in literature has mentioned a few definitions of RPA. Robotic Process Automation bots have a set of digital skills similar to humans—and then others. Think of RPA bots as a digital workforce that can work with any system or application. For example, bots can copy-paste, rip web data, perform statistics, open and move files, analyse emails, login programs, connect to APIs and extract random data. And because bots can adapt to any visual connection or workflow, there is no need to change business plans, applications or existing processes to automate them. RPA bots are easy to set up, use, and share. If you know how to record a video on your phone, you will be able to stop RPA bots. It makes sense like tapping records, playing, and pausing buttons and using drag and drop to move files to work. RPA bot scan be customized, integrated, customized, and shared to run business processes across the organization.

UiPath is the leading Robotics process automation vendor as it provides complete software platform to help companies or organization efficiently to automate any process.

Electronic mail can be just called as e-mail. Since 1993 it is getting used for communicating purpose between the receiver and sender [1]. Generally, there are three parts the message envelope, the message header, and the message body.[2] & the most commonly used email services are Gmail, outlook, Hotmail, Yahoo! etc. [3] according to the customer email survey which was conducted by adobe's consumers found that on a average office workers check their mail 2.5 hours per day, and when comes to work related email, on a average human beings checks the mails 3 hours a day where this is a huge amount of time spent on repetitive communication purpose.[4] Emails are the leading communication technique nearly used by business professionals. As per survey [5] nearly 90% of consumers check their mails during office hours & 9% check their emails constantly. Also 85% people check mails before starting their work. And 25% people check mails after waking up.

Let us consider the situation of a business owner it is quite tedious task to handle the job applications through email. therefore automation in this service will be essential by that work population will become free from using mailboxes, hereby we propose the approach of building an email bot which manages the task related to business and it uses the time efficiently and by this can avoid of wasting the time through inbox , addition, deletion etc. further , these problems fall under the category of finding similar substructures problem which is an NP-complete problem [5] in nature and needs an efficient algorithm to solve the exponential order problem.

The emergency of artificial intelligence in the former era has completely transformed the process of business handling related to the use of machines instead of human being hence by using robotic process automation RPA [6] This transformation supports organizations but also increases profit by reducing waste. Likewise, new customer registration requires several checks and information. Whereas the whole process can be changes into a series of tasks where robot system can be trained according to the tasks and can be repeated over the relevant systems.[7] so now this process can be manged by robots 24*7 without any error. This technology is different from other sectors. And the robotic process can be treated as operation-intensive and as employees are no need to take initiative are subjective to a rule which is already established standards.

II. LITERATURE SURVEY

Presently advanced technologies transformed the business process into automated systems using the software robots which are based completely on predefined algorithms by using AI. It can also be referred to as a digital worker and broadly termed as "robotic process automation". It includes specific tool or software.

Several techniques have been developed for automating email system and enabling it with smart features. But email spam, also known as junk email is one of the most tedious issues. Unfortunately, many times valid emails are received in the spam [8]. The huge number of incoming emails is another problem, users gone a waste a lot of time and energy in the efforts of identifying valid and useful emails to process it and to avoid this problem, emails need to be categorized and labeled based on the inside information, so that users can identify the useful emails even before opening them and it could lead to some hazardous situations for a business owner that can lead to more time consumption.

The amount of work performed to just identify the sender is also not feasible. Thus, there is a requirement of a technique to perform this task with full accuracy and the least effort.

The hypothesis of the study is that the Case Based Reasoning (CBR) approach can be employed to solve the problem of email overload and this can be analyzed by investigating the email data sets. It shows that it mapped the forthcoming queries by using analogous prior queries and reprocessing the responses [9]. Email management requires significant efforts from both senders and recipients which enabled the automation of email processing. The hybrid techniques are required to study what automation is required by users [10].

This study helps us to understand the novel and end-toend systems for generation of short email responses automatically it can be specified by a bot [11]. Moreover, it also gives an idea on RPA which is a software-based solution completely. For instance, imitating human activities in a sequential way that leads to meaningful action, without any kind of human intervention is called as Robotic Process Automation [15].

It can also provide important data on email classification along with utilizing natural language processing and data mining activities, spam detection, etc. [12]. Furthermore, the social behaviors of the users are used to determine a novel email classification method for enterprises.

Automatic classification of PDF text is a substantial problem in the E-Mail system. [13] have addressed the classification of PDF text to extract the information from publications or reports using Information Extraction (IE) systems. And one of the most important things is authors designed a technique called as text classification technique that automatically classifies PDF text into title, abstract, main content, semi-structured, and metadata categories. Automatic classification of email messages into different folders/directories is an open and challenging problem, particularly for the machine learning algorithms.

[14] using supervised learning algorithms for organizing emails into different folders automatically will be a efficient technique and it helps lot.

They discussed the problems due to the different semantics applied by the users. The meaning of the different folders varies from person to person which is an obstacle for learning methods. Further, as the number of emails being received is increasing, efficient automatic foldering is getting essential [15]. Brutlag and Meek [16] were the first person to analyze email classification as the problem of text classification.

An extensive study was carried out in [20] on the email foldering problem using the Enron Corpus [17] dataset Dredze et al. [18] proposed the idea of intelligent email by applying AI to email. They considered the user-oriented approach and applied the concepts of machine learning and NLP (natural language processing) to propose intelligent email and defined it as an intelligent system for supporting email interfaces.

Dalli et al. [19] designed an Adaptive Information Management (AIM) service to be used in a voice based Virtual Personal Assistant (VPA). The aim of the system consists of three components: an email summarizer, email categorizer, calendar scheduling, and an adaptive prioritization service. The proposed approach uses similar functionalities as discussed above to integrate into one software robot using RPA.

The frequency of emails per day even in a mid-size organization is large enough and needs a storage of huge size. The recent technological developments can manage big data [20] so that the massive email traffic can be handled efficiently. Segregation of emails can be done into different groups and the responses can be sent by the RPA based solution while the critical ones not assigned in any group can be controlled by the particular personnel. Increased workload on users demands more efficient works for responding the query.

There are other aspects also which need to be recognized like tagging and prioritizing of incoming emails, moving these emails to other locations, its labeling and, sending emails at scheduled time or in a particular context, also to the right recipient. RPA is an evolving technique that uses software and algorithmic programmed systems which act as humans for the support of proficient business processes. It leads to a decrease in the cost of human resource-related spending by 20–50 percent and transaction processing costs by 30–60 percent.

Data scraping allows you to extract the structure data from any browser or application and document to a website, csv file or to a excel sheet. Email automation is the most popular requirements for many companies across the globe. Using UiPath we can automate this process also.

“Businesses and organizations like RPA because it helps them to improve productivity across a wide range of populations–users, customers, employees, sales and marketing people, business people, accountants, legal and finance analysts etc.” Still, the light bulbs usually turn on quicker with accessible examples of how technology can be used in the enterprise. So, let’s return to data-intensive processes as a good starting point. Sudhakar reminds us of how many different actions can attend data: data receiving, data processing, data collection, data correction, data creation and so forth. Reference librarians have begun investigating ways of integrating email into the reference process. An early example is a November-December 1988 ARL Spec Kit that received 79 responses to a survey concerning the use of email in research libraries Weise (1984) points out that some of the benefits of email services include the ability to access the library from remote sites, at any time of the day or night, and the ability to produce a printed record of the reference request, thus allowing for record-keeping.

One big difference that email has made is making the internal operations of the library invisible to the patron; they are unaware of which department handles each request. RPA bots are easy to set up, use, and share. If you know how to record a video on your phone, you will be able to stop RPA bots. It makes sense like tapping records, playing, and pausing buttons and using drag and drop to move files to work. RPA bot scan be customized, integrated, customized, and shared to run business processes across the organization It’s a necessary process with plenty of “opportunities” for inefficiencies, errors, and other issues. And let’s face it: It’s boring. It’s the kind of process that RPA exists to improve. The ability to automate [with RPA] allows workers to switch their focus to more thoughtful and meaningful work while also eliminating data-entry errors that can damage processing times, compliance, and the overall customer experience.

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The Proposed bot is designed using UiPath would have the following functionalities and features

- A Bot can be connected to any email account for receiving the messages.
- A Bot replies to the sender by identifying the subject line
- By using the bot, we can Save the user's time by not opening the mails from advertising agencies/companies.
- Bot increase the user's convenience by classifying the mails into various categories.
- Download the attachments if any automatically without human intervention.
- Save the downloaded attachments into new folder.
- Replied mail will be moved to the separate folder

III. SYSTEM DESCRIPTION

The proposed customer support e-mails by RPA is a robot that has a stand-alone capability for effective email communications and a strengthened functionality to intelligently categories the incoming email-based on the recommendation list. The user can send the mails to the company by specified company subject after receiving the mails by a company that mails are assigned to a bot and it replies accordingly.

Further, this approach reduces the time and energy required to create a reply for an email from scratch and also saves the trouble to go through the whole inbox to find similar emails that would fall under the category as specified by the user. The categorization scheme is user-defined and can have n number of categories.

For example, for an online shopping application, the organization might receive an email regarding specification details of their product, or complaints, or from the shareholder, or their business relations. All these mails can be segregated into different folders such as customer complaints, business deals, inquiries, finance, etc.

A. Email Segregation Framework

The framework is shown in Fig. 1 consists of three main sections Native email application server, Email processor engine, and an analyzing module. Each of the three sections work in an integrated manner to effectively segregate the incoming email into specified categories and provides a fixed reply to each of the importantemails when Prescribed subject is matched.

1) *A native Email Application:* It consists of a public-inbox where the inbound emails from outside the environment are received. This public- inbox receives emails that are meant to be sent to a new folder.
2) *Email Processor Engine:* The email processor engine consists of Email Logger, Ingestion Layer, web scraping, Data Enrichment Module, RPA Algorithm, Segregated Mail Router each of these modules work in an integrated manner to achieve the intended task of email segregation.

B. Working

Fig. 1 shows the Process flow diagram for intelligent email segregation and routing System, the features are drawn out based on the software being used which is UiPath studio.

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Working

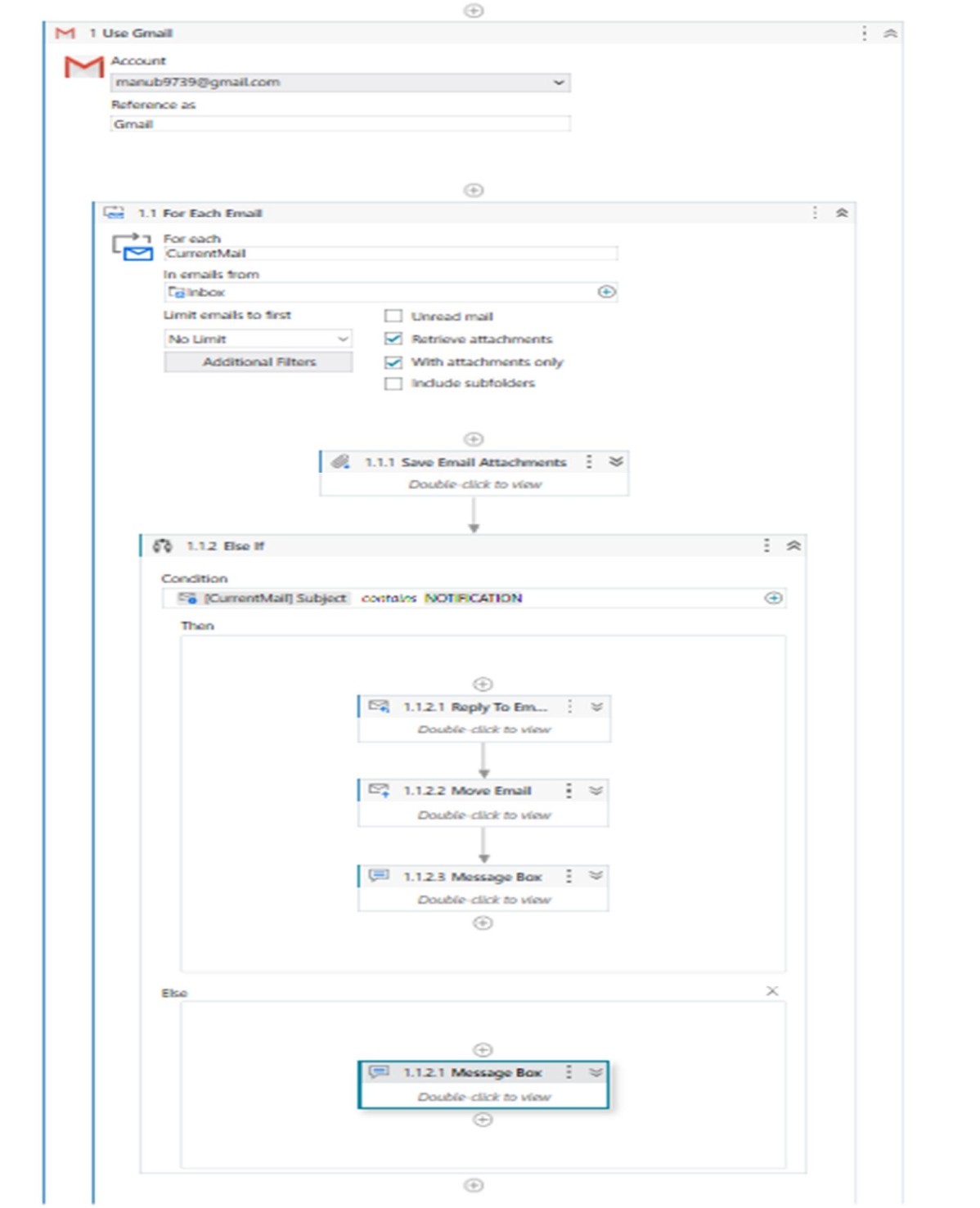

Fig 1. Process flow diagram

Fig. 1 shows the Process flow diagram for intelligent email segregation and routing System, the features are drawn out based on the software being used which is UiPath studio.

1) Connecting e-mail to bot

UiPath provides an activity window where here e-mail account is connected to receive a certain email from sender and used to process it. then it will proceed to the next activity in the sequence.

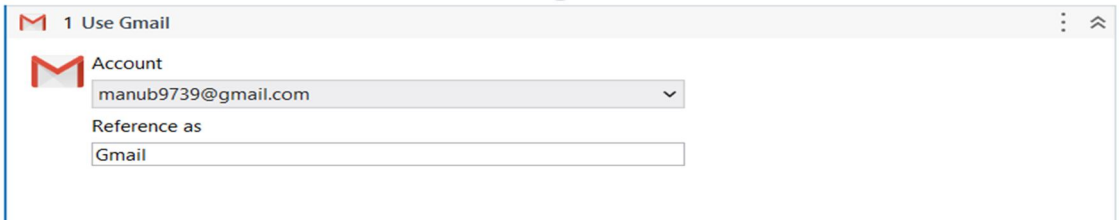

Fig.1 Connect e-mail account to bot

2) For Each Mail

Where as email is connected to bot when the mails come to inbox, The bot retrieve the attachments into new folder. and the limit of storing the attachments can be set according to the receiver preferences and additional filters can be added.

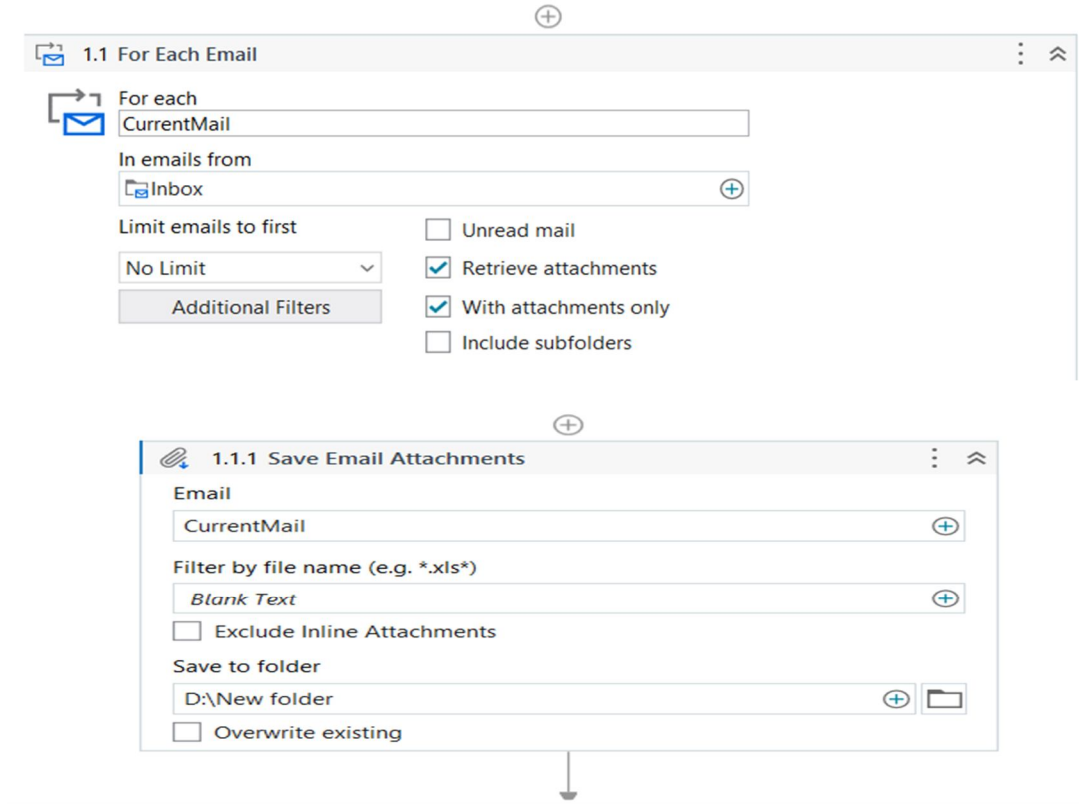

Fig.2. For each e-mail and save Attachments

3) else if

The condition is executed only if the current mail contains the prescribed subject.

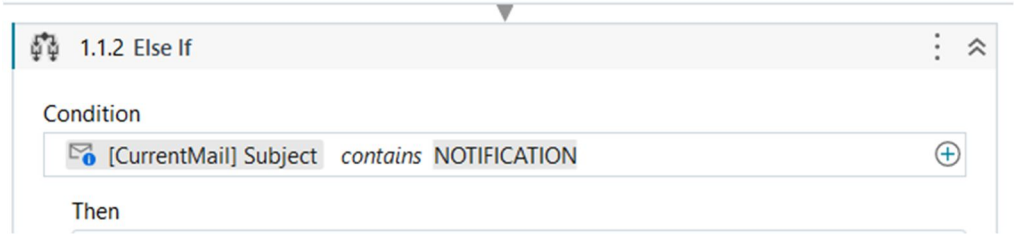

Fig.3.else If

4) Reply to Email

Where bot is connected to a current mail, if bot receives the mail by a sender, when sender subject is matched according to the bot subject, then bot replies to the sender with the text.

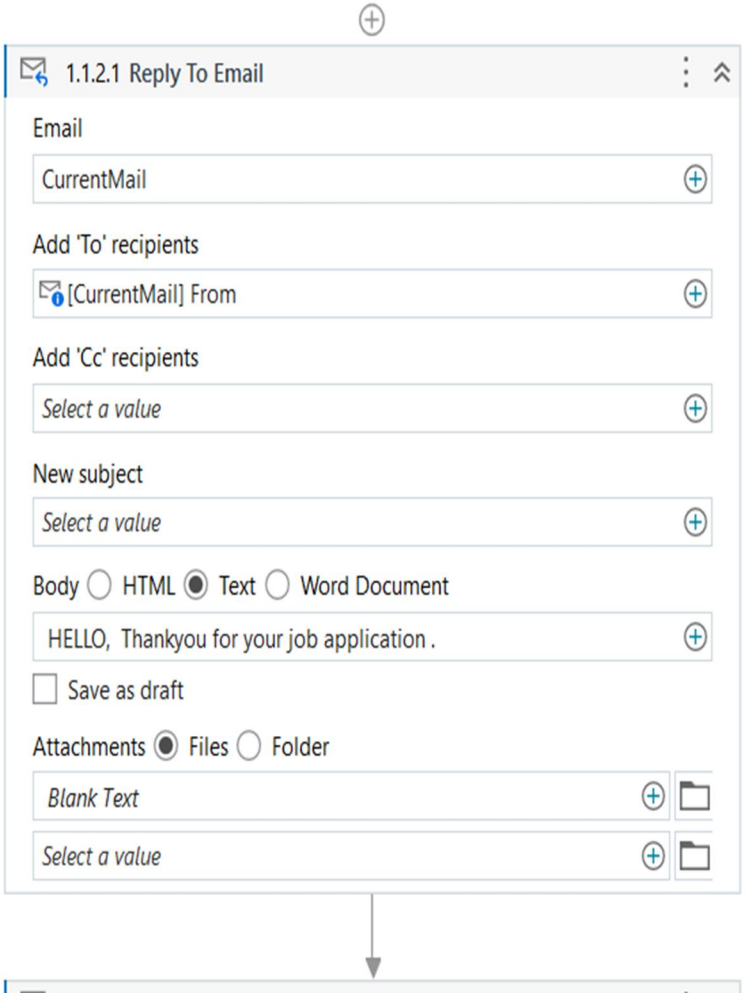

Fig.4. Bot replies to e-mails

5) Move e-mails

Bot moves the replied e-mails into a new folder in e-mail account.

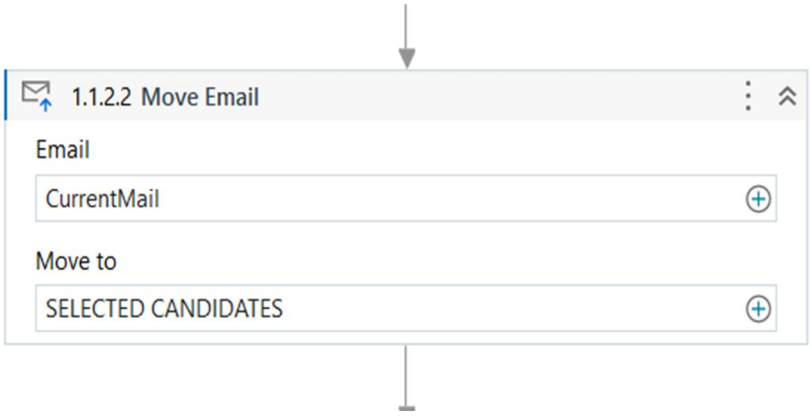

Fig.5.Move email

6) Message Box

When all the operations are successfully completed then bot displays a message called “BOT IS SUCCESSFUL” else the match is not found according to the subject line bot displays a message called as “BOT IS NOT SUCCESSFULL”

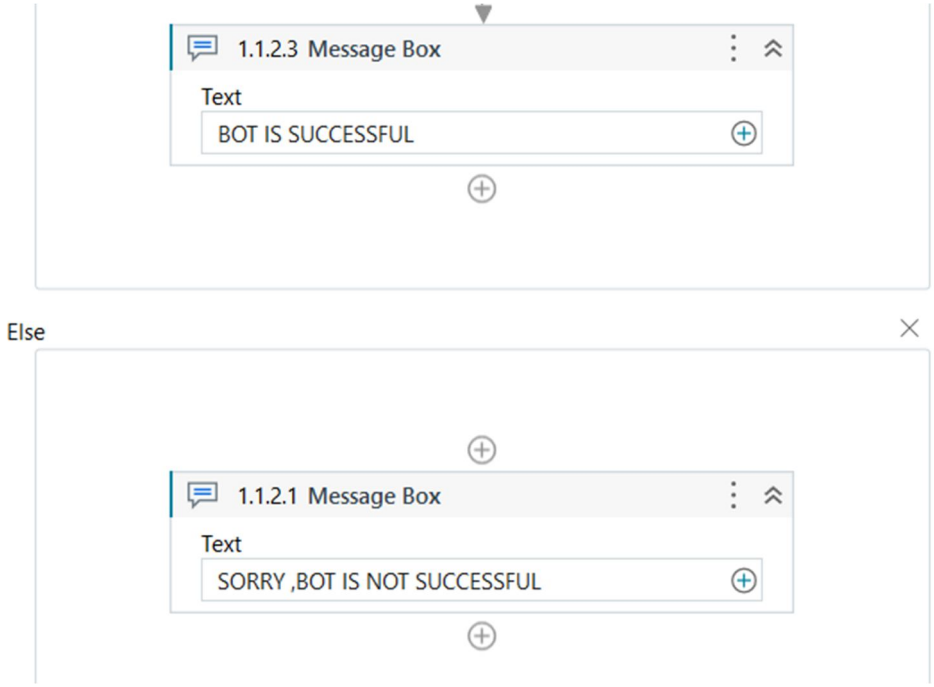

Fig.6.Message Box

IV. RESULTS AND DISCUSSIONS

The proposed system successfully replies the incoming email. The recommendation list can be changed and updated by the user at any time. For this study the incoming mails are classified into two, however, the code can be slightly modified to perform segregation for more than two categories depending on the user's needs.

TABLE 1: - Describes the RPA parameters based on Efficiency, Time consumption and accuracy.

EMAIL AUTOMATION		
PARAMETERS	WITH RPA	WITHOUT RPA
Efficiency	83.20%	78%
Time consumption	5%	23%
Accuracy	87.20%	94.13%

Table 1. Email client automation with and without RPA

V. EVALUATION MEASURES

Some of the parameters based on which the effectiveness of the Email Client Automation Robot is measured are

- Efficiency - It is the ratio of useful work performed by the system.
- Time consumption - It is the time taken by the system to process and throughput.
- Accuracy- It is a state of the system to be precise.

To study the effectiveness of the system a Gmail account was used wherein the incoming email was read andreplied to using two cases

1) *CASE1:* E-mail processing without the implementation of the robot (i.e., manually).
2) *CASE2:* E-mail processing with the implementation of the robot (i.e., automation).

The activities such as opening the email using the user credentials, Checking the received mail, selecting the mail which is equal to the Bot prescribed subject, reading the content of the mail, and replying to the mails individually are done manually in case 1 whereas in case 2 the robot does it for the user without any human intervention.

A. *Efficiency*

It was observed that it is difficult for a user to go through all the new mails entering his inbox, to segregate them, and to identify unwanted emails and reply to all important emails individually. But when it comes to the user who uses the e-mail automation, the e-mails which enter into inbox will get segregated based on the recommendation list into categories specified. This is far efficient compared to the first case 1 without automation and it requires the least user involvement for the work to be done manually.

B. *Time Consumption*

With regards to case 1 it was observed that of the process without the automation, the user must do the work manually which requires much time, where the user needs to go through all the mails that have entered the inbox, read all the emails according to segregate based on importance and send a reply all based on the user's priority. In case 2 it was observed that of the process with automation since the task is automated it takes just a few minutes. Case 2 is comparatively less time consuming compared to the process in the absence of the RPA. The number of incoming mails, the amount of the contents in subject and body, and the size of attachments play a key role in determining time consumed to complete the task in both cases.

C. *Accuracy*

The level of accuracy is measured by how many replies are sent to the proper destination. In case 1 since the task is performed manually done the chances of sending a reply to the wrong destination id is less, the precise value is less and depends on user skills. But in the presence of the automation sending a reply to a wrong destination is the least.

Apart from these, the accuracy varies sometimes in both the conditions based on the number of the mails which bombard into inbox which fall under a different category. A precise reply is sent in case 1 which is rich in information case 2 lacks the richness in its information.

1) *Security:* - Assures all data inside the system are protected by unauthorized access.
2) *Reliability:* - Specifies the probability of the software performing without failure for a specific number of users
3) *Maintainability:* - Indicates the average time, ease, and rapidity with which a system can be restored after a failure
4) *Performance:* - Deals with the measure of the system's response time under different load conditions
5) *Scalability:* - Assesses the highest workloads under which the system will still meet the performance requirements.

VI. CONCLUSIONS AND FUTURESCOPE

The proposed customer support e-mails by RPA is a robot that has a stand-alone capability for effective email communications and a strengthened functionality to intelligently categories the incoming email-based on the recommendation list. The bot can write in his reply which can be sent to each of the clients (customer emailids) personally that fall under the same category. This approach is a background process that would still allow the user to have all control over the task. Further, it reduces the time and energy required to compose from the same task from scratch or scrape through the entire inbox to find similar queries.

Soon the following advancements can be made for an even more effective email client automation robot to ease the use email communication channel. The intelligent email segregation and routing system capabilities can be used to leverage email management functions like summarization, traffic management, business process discovery, etc. The system could also include the categorization of emails base on the subject matter of discussion to optimize the routing and allocation of emails. Artificial intelligence could be integrated to generated reply based on the subject matter.

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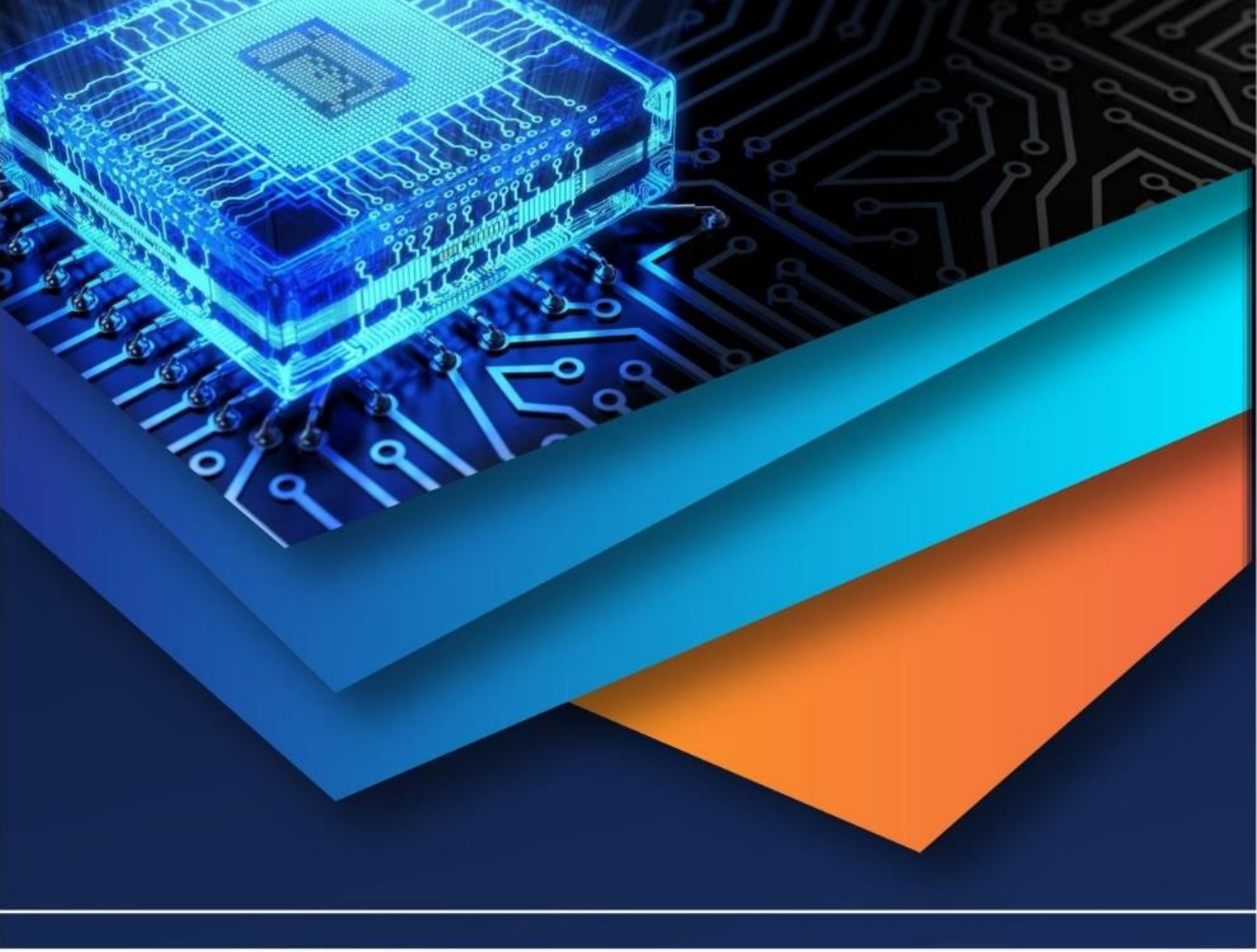

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