Invoice Processing Using Robotic Process Automation

Agalya P[1], Akshaya B[2], Divviya C[3], Vaishnavi G[4], Sheelavathi A[5]
[1,2,3,4,5] *Information Technology, Saranathan College of Engineering, Trichy, India*

***Abstract*- Robotic Process Automation (RPA) is a software-based solution for rule-based business processes involving routine tasks. Robotic Process Automation is introduced with a motive to reduce human involvement in repetitive financial process like accounting, data management, billing and many more. There may be doubts regarding the capabilities and success rates of RPA for accounts payable activities like invoice processing. Invoices that companies receive from their suppliers arrive in different formats. A company's finance team is responsible for transferring the data from these various formats of invoices into the company database. These challenges make it difficult to handle invoices and this manual process is time consuming and prone to errors. Robotic Process Automation can be applied to generate invoices automatically. RPA software robots can automate the process data input, error detection and error correction and to check and verify the correctness of the invoices. It can also automate some of the decision-making tasks done by the finance team. RPA robots monitor the folder where invoices are stored and extract information using intelligent Optical Character Recognition and natural processing capabilities. After extracting the key information, the robots verify the credentials in the invoices with the company database and then the robots start processing the invoices one by one. A notification in the form of email is sent to the corresponding vendor or supplier in case of exception or a posting notification sent in the form of e-mail to the responsible employee or vendor. Robotic Process Automation for financial processing reports benefits like productivity, speed, costs and error reduction. RPA in business processes helps to reduce customer complaints, manual efforts and increase customer or vendor satisfaction.**

I.INTRODUCTION

In Business Process Management (BPM), invoice processing is one of the important and tedious process. It is a time-consuming work which needs more human involvement. The execution of the process can be automated using Robotic Process Automation. The software bots are developed to automate the task of invoice processing which helps to improve accuracy and efficiency of the invoices. These software bots perform repetitive and rule-based task which reduces the human intervention. These bots use technologies such as cognitive technology, Optical Character Recognition (OCR), Artificial Intelligence (AI), data analytics, natural language processing and machine learning. Robotic Process Automation can effectively perform task such as high-volume process, labour intensive, rule-based and repetitive process. It involves structured data and deterministic outcomes. It extracts the information from the given data sets using optical character recognition and natural language processing capabilities.

Automating the business processes involves technologies such as Robotic Process Automation (RPA), Artificial Intelligence (AI), Optical/Intelligent Character Recognition (OCR/ICR). RPA can efficiently perform tasks such as high-volume process, labour intensive, rule based and repetitive process. Bots also allows employees to focus on higher level work instead of less interested task. Strategic marketing also involves and contributed to the growth of RPA market. Automation is a strategic priority for shared services. Global Business Services (GBS) leaders established relationship between continuous improvement and automation in most shared services transformations.

II. AUTOMATION ANYWHERE AND UIPATH IN RPA

A. Automation Anywhere in RPA

Automation anywhere is one of the RPA vendors who offers user-friendly RPA to automate complex business process. This tool is a combination of cognitive automation and natural language processing and analytics. It is a web-based management system which uses control room to run the automated tasks. It can also automate end to end business operations.

- Task bots - These bots automate rule-based, repetitive task in IT services and business process. This helps to improve the productivity, error reduction and cost saving.
- Meta bots - These are the building blocks of automation and the changes made are automatically updated to the bots.
- IQBot - It uses advanced cognitive technology. It can organize unstructured data which improves performance of the bot. It learns on its own and performs a task according to it.

B. UiPath

UiPath is one of the most widely used RPA tools. UiPath is a complete software solution which is used to automate repetitive back office tasks and converts the tedious tasks into complete UI automation. UiPath consists of the following three main components

- UiPath Studio - It is a visual designer which helps the developer to build automation workflows with pre-built activities
- UiPath Robot - The workflows developed in the UiPath studio are executed in the UiPath robot. So, UiPath robot should be in a running state.
- UiPath Orchestrator - It enables the user to orchestrate the UiPath robots in continuously executing repetitive process on various platforms.

III. EXISTING SYSTEM

Robotic Process Automation (RPA) emerges software-based solution to automate rule-based business processes that involve routine task, structured data and deterministic outcomes. Most of the applications were implemented on back office business process where customers are not directly involved. If highly structured, routine and manual tasks could be handled by a robot, the knowledge workers have more time for value added tasks. RPA tools requires a manual effort with respect to identification, elicitation and programming to be automated tasks. It has the capability to reimagine the business process management. The rule based and knowledge-based tasks that form a large chunk of BPM jobs in human resources, finance and accounting, procurement, supply chain, customer experience management and legal processes can be automated using RPA. In the automation process, software robots are developed and trained with structured data sets. These robots extract the necessary information from the data sets to automatically generate invoices using Optical Character Recognition and Natural Processing Capabilities. After extracting the information, the robots start processing the invoices one by one. A notification in the form of e-mail is sent to the vendor or supplier regarding the status of invoice whether paid or not.

IV. PROPOSED SYSTEM

Robotic Process Automation (RPA) is a type of business process automation technology supported by Artificial Intelligence and Data Analytics. These are capable of doing low value activities in a quick and efficient manner. It is helpful in processing high volume, labour intensive, rule-based and repetitive tasks. RPA bots are developed as a learning instance. They are classified according to the type of document. The bot will automatically organize similar documents into groups and map fields with areas on the document. They are trained by using classification results. Once the bots are trained, they are set to the review phase by the developer where the developer make the necessary corrections. The bots learn from these corrections and improve the accuracy of data extraction. Once the bot training is complete, they are used in the production by calling it from the RPA platform. Software bots extract information to generate invoices using Machine Learning Algorithms and Intelligent OCR. Robots verify whether the request contains a valid receipt, if the receipt is valid further processing is done. If the receipt is invalid, an alert message is sent via email. It also contains payment, due date information about the customer and it helps the customer to make the payment on time.

V. SYSTEM ARCHITECTURE

In order to reduce the human intervention in the business processes, we are going to automate the business processing task which helps to reduce the errors. To automate these business processes bots needs to be developed which performs rule-based and

repetitive task. It is important to know that these are not physical robots; it is a software-based solution that is configured on the user's desktop. There are two types of software bots.

- Attended automation/robots – These robots need human intervention which is the key for attended robots.
- Unattended automation/robots – They operate without human intervention where back-office activities are automated.

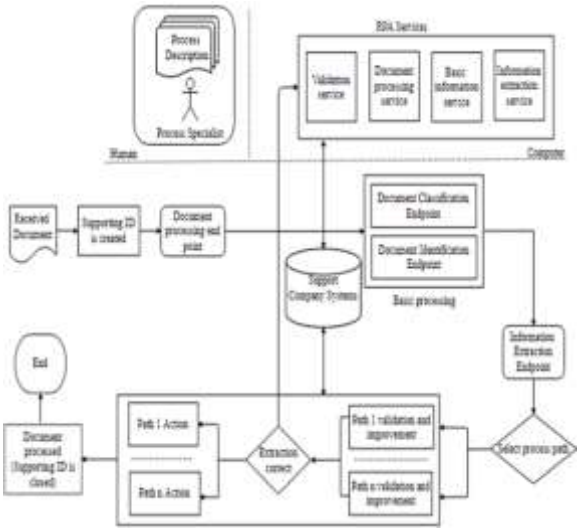

Fig 1. System architecture

VI. MODULES

The invoice processing system is a desktop-based application which automates the rule-based business processes that involves routine tasks, structured data and deterministic outcomes. For invoice processing, a learning instance that is a software bot is created which is then trained with structured and semi-structured data sets. Analysis of the trained bot is performed to verify the accuracy of the outcome. Once the analysis is completed, review of the bot is performed using sample inputs. After completion, the bot is deployed in the desktop.

Robotic Process Automation uses cognitive technology to automate the business process. For processing the customer requests, the bots need to be highly effective. The bots need to keep track of the purchase order information.

Initially, the system admin login to the control room and get purchase orders from the CRM. Once the request for invoice is raised, the request is transferred to the system administrator. The admin will trigger the bot. The bot will start processing the invoices and extract the information from the invoices. The details of the customer and purchase order will be cross checked with the CRM by the bot. After successful verification, an e-mail notification is sent to the system admin by the bot.

A. IQ bot Creation

In this module, an IQ bot is developed to handle multiple documents. A learning instance (i.e.) bot is created once all the required documents are uploaded. After creating IQ bot learning instance, it will be trained to organize similar documents into groups and map fields with the areas on the document. Once the bot is trained, the developer should review field mapping for each group and make necessary corrections. IQ bot will learn from these corrections and improve the accuracy of data extraction. Finally, the IQ bot is set to production and this bot is called by an RPA task bot in the control room. In this module, an IQ bot is developed to handle multiple documents. A learning instance (i.e.) bot is created once all the required documents are uploaded. After creating IQ bot learning instance, it will be trained to organize similar documents into groups and map fields with the areas on the document. Once the bot is trained, the developer should review field mapping for each group and make necessary corrections. IQ bot will learn from these corrections and improve the accuracy of data extraction. Finally, the IQ bot is set to production and this bot is called by an RPA task bot in the control room.

B. Task bot Creation

This module helps to call the IQ bot which is developed in the previous module. Task bot is developed with intend to configure the IQ bot within a task bot. Bot will classify the files and set the files to download. Task bot helps to download all the documents from the server after the deployment of IQ bot. It also helps to send an email notification to the user. This module helps to call the IQ bot which is developed in the previous module. Task bot is developed with intend to configure the IQ bot within a task bot. Bot will classify the files and set the files to download. Task bot helps to download all the documents from the server after the deployment of

IQ bot. It also helps to send an email notification to the user.

C. Bot insight and E-mail notification

Bot insight shows the performance statistics of the bots and helps to improve the performance of the bots developed in the system. After processing the information provided the bot will notify the status of the invoice through an e-mail notification to the system admin. System admin forwards the status to the corresponding customer, then closes the bot.

VII. TECHNIQUES USED

A. Intelligent OCR with RPA

To overcome the challenges in OCR, we are moving to Intelligent OCR. Intelligent OCR is needed to simplify paper driven processes where inputs are received in varied multiple formats such as PDF, Scanned, Fax and Handwritten documents. Intelligent OCR helps in the process of image processing such as DE-skew, speckled image with text, noise removal (blobs and shadows), character repair, smoothing and grow. The post processing of Intelligent OCR involves AI and fuzzy logic – Auto location, data validation, auto correction, auto formatting and rule-based conversion. Its in-built advanced OCR capability is integrated with AI and fuzzy logic. It helps in intelligent data capture from various unstructured documents with 99% accuracy. It improves data capture productivity by up to 400% as against manual data capture. It also helps in integrating with other third-party RPA platforms. It can process 23 million documents. Intelligent Optical character recognition (IOCR) algorithms allow computers to automatically analyze the document and convert the text data into editable formats for computers to process them efficiently. RPA + IOCR = Total Process Automation. IOCR is used to digitize the document by extracting useful information. ABBYY OCR engine is used in invoice processing automation to extract key information from the invoices.

B. Natural Language Processing in RPA

Natural language processing in RPA analyses structured, unstructured and semi-structured documents to identify, extract and structure the data within the context. The application of NLP mainly focuses on structured and semi-structured documents which includes invoices. financial data, etc.

Combining OCR bot with a semi-structured data parser and an NLP model helps to extract, analyse and insert the appropriate data into the databases. NLP model helps to recognize the text using OCR engine and fuzzy logic.

VIII.CONCLUSION

In today's world, it is difficult for humans to perform rule-based and repetitive tasks. In execution of business processes, human involvement is needed more. To make such processes easy, efficient and less prone to errors, we are introducing an emerging technology known as Robotic Process Automation (RPA). In this technology, robots which is a software-based solution that is configured to carry out repetitive tasks. In most industries, in an average an employee spends 80% of his time in performing rule-based repetitive tasks which does not require creativity or deep-thinking abilities. These are the tasks referred to be automated. These bots will replace the humans and they are configured either in the desktop or it can be web-based. These are capable of doing low value activities in a quick and efficient manner. It is helpful in processing high volume, labour intensive, rule-based and repetitive tasks. RPA bots are developed as a learning instance. RPA bots promises to work 24/7 non-stop, without breaks, sleeping time, vacations, sick leave, and works without forgetting, omitting, misunderstanding, or underestimating errors and also without encountering problems. A robot has to be trained intelligent with cognitive skills as it has to emulate human capabilities and make decision with a basic interaction with a human employee. Therefore, a robot should be intelligent to emulate human capabilities.

REFERENCES

[1] Peter Hofmann, Caroline Samp, Nils Urbach, "Robotic Process Automation" Electronic Markets - The International Journal on Networked Business, in November 2019 https://doi.org/10.1007/s12525-019-00365-8.

[2] K P Naveen Reddy, Undavalli Harichandana, T Alekhya, Rajesh S M, "A Study of Robotic Process Automation Among Artificial

Intelligence", International Journal of Scientific and Research Publications, Volume 9, Issue 2, February 2019.

[3] Junxiong Gao, Sebastiaan J. van Zelst, Xixi Lu, and Wil M. P. van der Aalst," Automated Robotic Process Automation: A Self-Learning Approach", Springer Nature Switzerland AG 2019 H. Panetto et al. (Eds.): OTM 2019, LNCS 11877, pp. 95–112, 2019 https://doi.org/10.1007/978-3-030-33246-4_6.

[4] Santiago Aguirre and Alejandro Rodriguez," Automation of a Business Process Using Robotic Process Automation (RPA): A Case Study", Springer International Publishing AG 2017 J.C. Figueroa-García et al. (Eds.): WEA 2017, CCIS 742, pp. 1–7, 2017.

[5] Volodymyr Leno, Marlon Dumas, Marcello La Rosa, Fabrizio M. Maggi, Artem Polyvyanyy, "Automated Discovery of Data Transformations for Robotic Process Automation", was uploaded by Marlon Dumas on 11 January 2020.