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REVIEW ON COMPUTER VISION AND REGEX OBJECT DETECTION MODEL IN ROBOTICS PROCESS AUTOMATION FOR ENHANCE ACCURACY TO A SPECIFIC PROCESS

[1]Ganga Dayal Yadav, [2]Dr. Bibek Kumar,
[1] M.Tech Scholar,[2]Head of Department
[1]Department of Computer Science & Engineering,
[1] Vishveshwarya Group of Institutions, Gautam Buddh Nagar, Uttar Pradesh, India

Abstract

This literature section has three structures. To learn more about RPA, first perform a literature search. The implementation of the project is then discussed in detail in the review. The purpose of this section is to clarify what has been studied so far for IT projects and what has been considered important for their implementation. The purpose of this section is to provide an overview of the many components that can be used to create process models for RPA applications. The materials are then assembled and synthesized into an RPA implementation model containing the parts most relevant to RPA.

Index Terms **- RPA, Object Detection, Computer Vision, Regular Expression(RegEx.)**

1. Introduction

In recent years, robotic process automation (RPA) has drawn a lot of interest as a way to automate monotonous activities in a variety of sectors. Software robots can recognise and manipulate items in digital environments thanks to object recognition, which is a crucial component of RPA. This overview of the literature examines how regular expressions and computer vision (CV) methods may be used to recognise objects for robotic process automation (RPA). By examining the available literature, this study seeks to offer an overview of current approaches, techniques, and difficulties in object detection in RPA.

2. RPA's Characteristics

The term "Robotic Process Automation" conjures up images of the future. People frequently associate the idea with actual robots roaming the office performing human-like tasks (Lacity & Willcocks, 2015B; Lacity and other, 2015). RPA is not as glamorous in reality. The idea of replacing processes that were previously performed by humans is similar to that of all automation; however, this time, by programming robotic software to carry out the necessary duties and integrating with different applications like spreadsheets, CRM platforms, or ERP software, the procedures are replaced (Lacitys & Willcock, 2015; Lacitys and others, 2015).

The tools and software required to automate rule-based logical processes are essentially provided by RPA that involve a deterministic set of beginning values and well-defined, structured data (Lacity and Willcocks, 2016). The duties are also frequently monotonous and less appealing to complete by hand (Lacity and Willcocks, 2016). Such activities are sometimes referred to as "spinning chairs," which refers to the movement of money from one party to another into goods with little demand (Willcocks et al., 2015B). RPA just interacts with its systems like people, without any mystery. To surpass humans in terms of quality, time, and cost, the robot must be process-appropriate and have clearly defined job logic (Willcocks et al., 2015B1).

RPA, in essence, offers the platforms and software necessary to automate rule-based logical processes that involve a deterministic set of beginning values and well-defined, structured data (Lacity and Willcocks, 2016). Also, when done manually, the task is often tedious and unattractive (Lacity and Willcocks, 2016 p.129). Activities are sometimes referred to as "spinning chairs," which refers to the movement of money from one party to another into goods with little demand (Willcocks et al., 2015B2). RPA just interacts with its systems like people, without any mystery.

A method to quantify robots must be established because RPA does not use actual physical robots. One robot is equivalent to one software license in the context of RPA. The RPA bots can be used full time, but ten robots or licenses would be required to conduct, say, ten processes at once.

RPA and other automation technologies differ primarily in two ways, both of which can be characterized as "lightness." First, despite appearances, configuring robots to perform these tasks does not require a deep understanding of programming language.

RPA is viewed as "lightweight" IT in terms of design; (Lacity, Willcocks,2015, Slaby, 2012). This has to do with the degree of coupling between different systems: the robot, like a person, only has access to systems at the user-interface level and doesn't, for example, write directly into a database; instead, it uses the presentation layer of programs. This is seen in Figure 2.1 RPA does not interfere with the underlying mechanism. There is no danger of non-compliance because it is simple to record every action a robot takes. This is distinct from the majority of traditional business process automations, which, for instance, can change data "under the hood" or directly in a database.

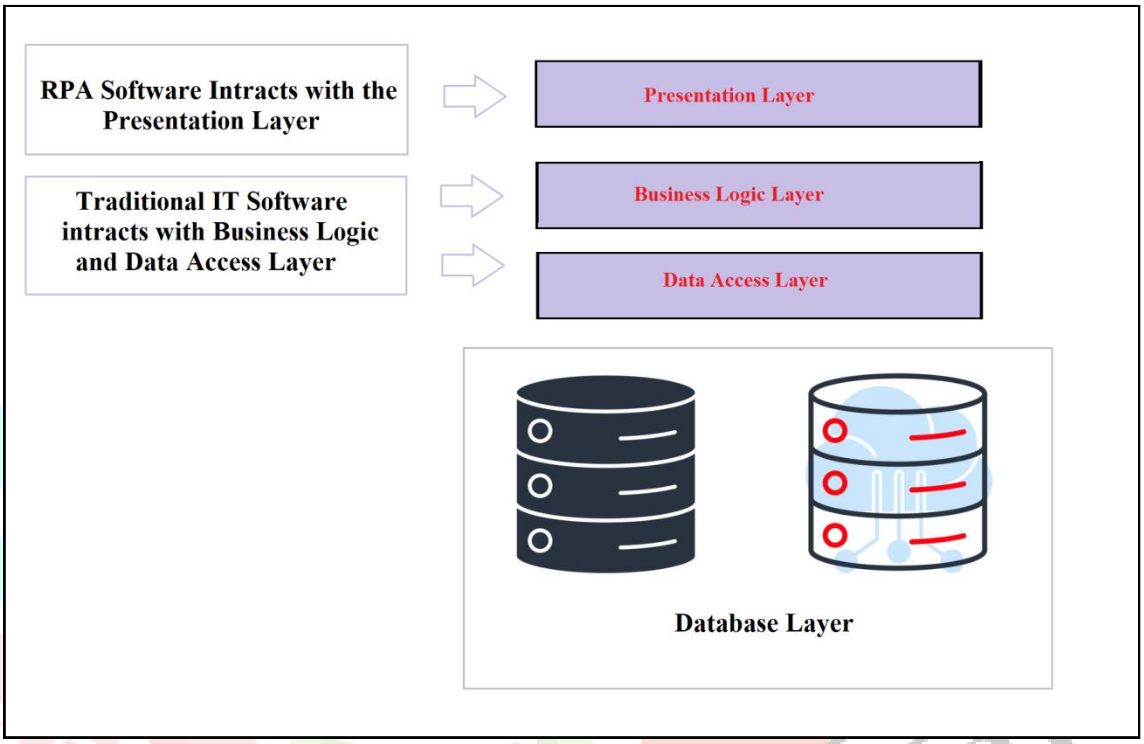

Figure 2.1 The layers of RPA's software

The cycles that are robotized using RPA are effectively modifiable. Asatiani and Penttinen (2016) state that modifying an employee's actions in a procedure are how RPA robots are set up. In contrast to traditional IT software, which requires advanced coding to modify a system, RPA is extremely adaptable to use and configure.
As far as plan, RPA is viewed as "lightweight" IT (Willcocks et, 2015B, 2015b). This has to do with how tightly coupled various systems are: Like a human, the robot only has user-interface access to systems and cannot, for instance, directly write to a database; all things considered, it uses the show layer of a program. Figure 2.1 shows this in pictorial form. RPA does not interfere with the fundamental mechanism. There is no danger of non-compliance because it is simple to record every action a robot takes. The following is different from the bulk of conventional business process automations, which, for example, have the ability to update data "under the hood" or directly in a database.

Task wise categories the RPA Bot

Category	Description
RPA's Task Bot	Even though they are capable of doing numerous tasks, these bots are used for repetitive chores. Task bots are mostly used for claims, financial, and accounting processing.
RPA's Meta Bot	Utilized for multi-skilled, complex processes.
RPA's IQ Bot	The most sophisticated and equipped to handle unstructured data. Decisions made by IQ bots might also be based on past experience. These machines can reason, learn, and make fewer errors than people.

Table 2.1 Categories of software robots.

An RPA robot can be programmed in a very short amount of time. Setting up an RPA-robot might take as little as 2 to 4 weeks, according to Asatiani & Penttinen (2016), which is far quicker than corporate software integration, which frequently takes months to years. Since robots mimic staff activity, there is no need to modify existing IT systems to implement RPA (Asatiani&Penttinen, -2016). Within the user interface (UI), robots are completely functional. This is a significant advantage over back-end integration, which automates processes but necessitates a significant overhaul of the current IT infrastructure (Asatiani&Penttinen,-2016).

3. Benefits of RPA

The most commonly claimed benefit in studies is reduced operational expenses, which are typically given as the number of full-time equivalent (FTE) personnel (replaced by robots). According to Syed et al.'s (2019) definition of the benefits of RPA focuses on four main areas: operational effectiveness, quality of service, deployment and integration, and risk control and compliance.

The reduction of manual activities and labour also resulted in time efficiencies that significantly (30–70%) decreased task processing time, process cycle, and waiting time. Continuous operation of robotic process automation (RPA) robots increases productivity and frees up human resources from boring and repetitive tasks (Asatiani and Penttinen, 2016). By applying RPA, workers could produce more work with added value and make wiser judgements, claims Fung (2014). The research also mentions the improvement of service quality as an advantage. Suri et al. (2017), Vanmali (2017), Lacity and Willcocks (2016), and Vanmali (2017) all claim that the use of RPA reduces frequent errors such erroneous records or typical human errors. RPA is also noted as being simple and inexpensive to set up and maintain in comparison to huge business systems. Increased compliance is cited by Lamberton, Brigo, and Hoy (2017) as an additional advantage of RPA. To make sure that automated operations adhere to legal standards, RPA software can monitor completed tasks (Hallikainen, Bekkhus, & Pan, 2018). Figure 3.1 by Rutaganda, Bergström, Jayashekhar, Jayasinghe, and Ahmed (2017) illustrates the advantages of RPA.

Figure 3.1 Business Benefits of RPA (Robotic Process Automation)

4. Challenges of RPA Technology

RPA has various difficulties as well. Four difficulties are outlined by Asatiani and Penttinen (2016) for RPA. First, they claim that even while RPA is adaptable and easy to adopt, It still falls short of legacy IT systems because it can be used as a stopgap measure to automate manual tasks. Second, compared to alternative solutions like outsourcing, adoption of RPA as a solution may need to make a strong case for itself. The final difficulty is how RPA will affect present employees. Employees might view RPA as a rival, according to Asatiani and Penttinen (2016), escalating tensions and possibly undermining employee confidence.

Last but not least, RPA is suitable for particular procedures that only involve work that is governed by rules and is well-described. Another significant point in the literature on project of RPA is the claim made by Bygstad (2017) that RPA falls under the category of "lightweight IT." 'Heavyweight IT' and 'lightweight IT' are terms used by Bygstad (2017) to distinguish between them.

Heavyweight IT refers to the back-end systems, including enterprise resource planning systems, that are typically delivered by IT divisions.Finally, RPA is appropriate for some processes that solely require labour that follows precisely defined rules, as long as that work is subjective.

It is not essential to use human judgment (Asatiani and Penttinen, 2016). Another crucial aspect of the RPA literature is the labelling of RPA as "light IT" by Bygstad (2017). Bygstad (2017) makes a distinction between what are known as heavy and light IT.

Enterprise resource planning systems are an example of heavy IT, which are back-end solutions that are often offered by IT departments.

Work processes are supported by the front-end solutions of lightweight IT (Bygstad, 2017). Bygstad (2017) argues that lightweight IT can be used without the assistance of IT experts and is simple, economical, and adaptable. It's important to keep in mind that the two fields work well together. Heavyweight IT "serves as an infrastructure and repository for information that is heavily dependent on lightweight IT," claims Bygstad (2017). For innovation and organizational agility, which is the opposite but less obvious, heavyweight IT is dependent on lightweight IT.

5. Implementation Process of RPA Procedure

According to Trullen, Bos-Nehles, and Valverde (2020), implementation procedures for innovations, changes, and strategies frequently have a significant human element. A process definition is the definition that is utilised the most in the science of implementation. A RPA process Implementation is described by Klein and Sorra(1996) as a "transition period during which targeted organisational members ideally become increasingly skillful, consistent, and committed in their use of an innovation" (p. 1057).

The adoption of robotic process automation entails a number of processes, commencing with introduction or introduction, through adaption and acceptance, to routinization, according to the principles created by Klein and Sorra (1996) and Choi and Chang (2009). encompasses the phases of Real and Poole's (2005) description of the implementation perspective as adaptable because it allows for the possibility of the original concept's evolution via the more fluid process of implementation. This is consistent with Repenning's study from 2002, which claims that implementation is a dynamic process in which workers may alter their behavior in response to manager comments or initiatives (Higgs & Rowland, 2011).

The following definition of robotic process automation (RPA) implementation is based on Trullen et al.'s (2020) definition of implementation: "a dynamic process starting with the decision to introduce robotic process automation (also known as adoption), during which organizational actors (such as line managers, IT, and personnel) engage with it, interacting with it and trying to shape it to fit their requirements and needs, until the use of robotic process automation." The significance of the roles played by employees, CEOs, executives, and other organizational actors, in addition to the frequently studied role of line managers, has been highlighted by recent research, so this definition includes all organizational stakeholders who interact with RPA (Trullen et al., 2020).

6. Making and Retaining Senses

The sensemaking and sensegiving lens is useful for gaining an understanding of the RPA implementation process through the eyes of organizational process actors.

According to Balogun and Johnson (2004, 2005), a change in how people interpret the organisation and surroundings is necessary for successful implementation and change. According to Canato, Ravasi, and Philips (2013), p. 1744, past research has appropriately been looking on the "cycles of sensemaking and sensegiving" that change in associations unfolds into.

One of the first researchers to connect sensemaking with change was Gioia and Chittipeddi. In this review, sensemaking and sensegiving were identified as a cycle with four stages: visualising (sensemaking), signalling (sensegiving), revising (sensemaking), and energising (sensegiving). According to the sensemaking and sensegiving hypothesis, sensemaking is associated with "making a comprehension of a change, and sensegiving is associated with impacting the results, imparting considerations about change to others, and obtaining support" (Kezar, 2013, pg. 763). Gioia and Chittipeddi (1991.) defined sensegiving as "the process of attempting to influence the sensemaking and meaning construction of others towards a preferred redefinition of organisational reality".

7. RPA Technology and BPM

RPA and BPM differ from one another in many ways. Business Process Management (BPM) aims to reengineer processes, i.e., add new elements to sub-processes. This objective of RPA is to automate current processes, model them exactly as they are, and then have a robot carry out those processes. Therefore, the technological conclusion of RPA is that no additional applications (apart from the RPA program) are needed. Contrarily, BPM frequently provides new software for automation. Unlike BPM, which has a deeper connection to the systems' back ends, RPA employs the user interface layer without the need for a direct connectivity to, say, a database.

RPA does not require programming knowledge; instead, the developer only has to be conversant with the process logic, as was already mentioned. BPM developers are software engineers with the ability to create tools for users but no prior knowledge of the target process. BPM developers require more experience due to the vast array of concepts they must comprehend. In addition, RPA has fewer testing requirements, requiring simply output verification, whereas BPM, a new piece of software, requires system testing. Both BPM and RPA have high levels of component reuse, albeit BPM makes it more challenging while RPA makes it more nimble.

To increase efficiency, BPM focuses on simplifying and reengineering core business processes. Business processes can be made better by examining how they function in various situations, making adjustments, observing the new processes, and then continuing to optimize them.

It's crucial to understand that BPM is not a project management tool or a task management tool. Similar to RPA, it focuses on improving ongoing, repeated processes with a known pattern.

The two technologies do, however, differ greatly in several key ways.

Table 7.1 RPA vs BPM Comparison

Attribute	RPA	BPM
•**Technology**	RPA automates repetitive, time-consuming operations so that workers may concentrate on more difficult, high-value jobs while saving time.	BPM finds bottlenecks in the business process and simplifies it to get shorter cycles.
•**Primary Focus**	RPA reducing the amount of manual, routine, and rule-based work that doesn't require advanced decision-making	Reengineering and altering business processes to increase productivity and efficiency across the entire organization
•**Deployment effort**	Low effort is needed because RPA systems may seamlessly integrate with the applications and procedures already in place in your organization.	High levels of effort are required because BPM calls for changing your organization's business processes.
•**Business impact**	Returns happen quickly and directly. Despite the fact that some fundamental inefficiencies in your business processes may not always be addressed by RPA deployments	BPM provides significant and long-term returns because the use of BPM increases productivity, compliance, agility, and cost savings.

Conclusion

Robotic Process Automation (RPA) systems can now be more accurate thanks to a mix of Regular Expressions (RegEx) and computer vision object identification models. Businesses may increase process automation and efficiency by combining the benefits of the two technologies.

RegEx is a good choice for jobs involving the extraction or validation of structured data due to its pattern matching capabilities. RPA systems can reliably recognise and extract certain information from documents or text data as a result. Organizations may guarantee the correctness and dependability of data processing activities, lower human mistakes, and boost overall productivity by using RegEx. On the other hand, computer vision object detection models are excellent at jobs requiring visual understanding and interpretation. By using massive datasets to train these models, RPA systems are able to precisely recognize and locate objects in movies or photos. This capacity allows them to automate processes involving object identification, quality control, or visual inspection. Because RPA systems incorporate RegEx and Computer Vision object identification, they can perform a greater range of automated jobs. RegEx, for instance, may be used to extract structured data from invoices, such as invoice numbers, dates, and amounts. RegEx, for instance, may be used to extract structured data from invoices, such as invoice numbers, dates, and amounts. On the other hand, object detection may be used to recognise and confirm the presence of certain objects or trademarks inside the invoice.

RegEx and computer vision object recognition work together in harmony to accurately extract and validate data from both structured and unstructured sources, increasing accuracy. Organisations may reduce mistakes, increase process effectiveness, and achieve higher degrees of automation in their RPA systems by combining the best elements of the two methodologies.
It is crucial to keep in mind that the efficacy of this strategy depends on the dependability and calibre of the training data used to develop the object detection model as well as the strength of the RegEx pattern. To adjust to changes in data formats and visual features, models and patterns need to be updated and improved on a regular basis.

In conclusion, organisations will be able to increase the precision of their RPA systems, making them more effective and dependable to automate a larger range of operations, with the aid of RegEx and computer vision object recognition models. This strategy significantly increases organisational efficiency and cost savings while also advancing process automation.

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