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Analysis and applicability of artificial intelligence technologies in the field of RPA software robots for automating business processes

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Abstract

Today, with the help of the synergy of AI (Artificial Intelligence) and RPA (Robotic Process Automation), you can do what was previously impossible within the framework of the usual automation of routine business processes. RPA is dedicated to applying cutting-edge technologies, including artificial intelligence (AI) and machine learning, to increasingly automate processes and empower people. We found several interesting recent case studies that illustrate the possibilities of using this approach in various business areas. In general, about 90% of the current cases of using AI are working with documents in various forms: recognition of passports, titles, diplomas, checks and payments. Particularly relevant are cases of recognizing useful content in emails. When receiving a letter from RPA, AI helps to select the main thing from the text, classify the letter accordingly and send it to the right addressee. Today, robots, with the help of AI, help accounting, human resources, sales, purchasing, logistics and other departments that deal with the collection and processing of information.

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Keywords: robotization of business processes, Robotic Process Automation (RPA), software robots, business processes, artificial intelligence, text recognition, image recognition, RPA solutions

1. Overview

The field of robotization and process automation - RPA (Robotic Process Automation) is actively developing, and more and more companies are using RPA solutions in their business processes. According to a Grand View Research

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report, the RPA market will exceed $25 billion by 2027, with a CAGR of over 40%. Developers of such solutions provide businesses with platforms to create "digital employees". The digital worker is the main component of the platform, a software robot that performs actions with software on the desktop. Additional platform components allow you to analyze business processes, automate them, and control execution in a productive environment.

For solution developers, it becomes natural to combine different technologies to create new opportunities. So, RPA and artificial intelligence (AI) are usually considered as separate fields, but they complement each other to a large extent. Combining these technologies results in intelligent automation that delivers end-to-end business processes quickly. The implementation of solutions that combine these two technologies is great for various industries and companies, in particular, providing services and having support services. What exactly are the possibilities of using RPA and AI together?

2. Intelligent Efficiency

The RPA platform itself is capable of automating many business processes based on different technological platforms (Windows Desktop, Web, Mainframe, Java, Web Services, API). Integration flexibility is achieved by using various ways to interact with the robot's user environment. One of the methods assumes that the robot can imitate human actions and works with the target application directly, while the target application does not know that it is controlled by the robot. That is, the standard work process is preserved without any additional changes, and the robot simply replaces the person. In other cases, system functions may also be used. For example, the robot may not use the explorer (user interface) while managing files using system commands. Working with tables and databases, the robot can bypass the user interface and work directly with data through the API, which significantly improves performance.

With the development of AI, additional scenarios for the use of digital employees have appeared. RPA is an efficient technology with many benefits, but robots can only perform the tasks that a human put in front of them. But AI can train robots and give them the opportunity to independently analyze certain issues. Thus, RPA can automate all tasks based on pre-prepared rules, and AI can fill the gap where RPA fails. If earlier robots could only work with structured data and well-defined logic, then thanks to AI technologies, robots were able to make independent decisions.

Consider the areas in which robots make independent decisions thanks to artificial intelligence.

3. Analytics: process discovery and activity identification

Companies often need a document describing business processes and employee activities. Such a document can simplify the process of training new employees, improve certain processes, improve the quality of work, and can also be used to build a robotic system.

Automated process analytics saves time spent by a business analyst on their description. An AI-based solution can discover new processes, explore and describe them in more detail and extensively. In most cases, such solutions are an agent program that is installed on the employee's desktop and monitors the actions performed. After some time, the agent forms the concept of the work performed by the employee. Thus, the time that a business analyst has to spend preparing a document is significantly reduced.

4. Text recognition

Text recognition (Optical Character Recognition, OCR) includes recognition of graphic characters, italics, and unstructured data. These technologies are used to automate applications that cannot be connected to at the system level, and to work with text files from which text cannot be extracted, such as scanned PDF files. Invoices, cheques, receipts and other standardized (but not necessarily structured) documents can be processed in this way. This use of AI leads to end-to-end process automation. Humans support the robots and process documents only when the robot is unsure of what to do next.

Thanks to AI-based technologies, additional text recognition capabilities are also available. They are required for smarter use of digitized documents - in cases where the document contains tables or different arrangements of text. For example, developers offer products for working with graphic documents belonging to the IDP (Intelligent

Document Processing) family. IDP differs from OCR in that in addition to converting graphic text to digital, it can also determine the type of document and find fields that change their location. The IDP goes through observable learning, where the analyst refines the concept of the document. It is very convenient when OCR and IDP provide not only the recognized text, but also an assessment of the confidence in the correctness of the digitization. Most text recognition solutions do not guarantee 100% correct recognition; however, AI technologies help to minimize errors even in complexly structured documents.

Some products also allow you to recognize handwritten text. Of course, much depends on the language and cultural component. For example, when it comes to a prescription written by a doctor, it is often difficult to recognize the text. But the recognition technology is there, and it works. Innovative solutions make it easy to work with scanned applications and other documents. Handwriting recognition is often used in reconciliation of proposed and accepted contractual obligations, where the accepting client manually rewrites the main provisions of the contract.

Speaking about the trends in the development of technologies for digitizing documents, experts recommend moving away from processes based on handwritten texts to digitalization of input. Processes will be much more efficient if you replace this approach with chatbots, forms, or IVR systems (intelligent voice recognition). In addition, handwriting recognition can also be used to compare and verify the signature.

5. Image recognition

Image recognition may be required when working with pictures. RPA platforms contain components for picture-in-picture search and for analyzing an image for different color content. AI technologies allow you to expand the scenarios for their use. By itself, this technology is interesting, and when combined with other technologies and systems, it opens up new opportunities in the robotization of business processes.

Comparative analysis of images allows you to find a "picture in picture" with some discrepancy between them. A great example of this technology is Google Image Search. The search results are both identical and similar images. A use case might be to search all sources on the internet that contain a similar photo. Such a solution can be used to verify the authenticity of personal data. If the same or a similar portrait was used on social networks for different accounts, then the authenticity of the information is in question. In the same way, you can search for logos.

This feature also includes the face recognition option: identifying the concept of faces in an image - for example, a photo from a passport. With automated hiring, you can recognize passport data using IDP, automatically determine and save an employee photo in a local personnel management system. Passport data can be compared with personal data, and a photo can be checked in databases of photographs (for example, wanted criminals).

It is also possible to recognize faces and human images from the video surveillance stream. The video stream is cut into frames, and selective frames are passed through a face recognition system. Frames with faces are verified with personnel management systems and decisions are made based on the identification of a person by face. For example, if there is a warehouse with blocks A and B, and an employee assigned to block A is found in block B, this may cause an automatic alert to the warehouse security service. Intelligent robots provide communication between systems and link individual capabilities into one end-to-end useful activity.

Object recognition is the recognition of a concept or phenomenon in an image. There are virtually endless possibilities for use in industries ranging from medicine for detecting anomalies, defense for detecting objects, ecology for detecting pollution, to the oil refining industry. The use of the solution is that the AI is trained to identify the concept on a set of images. Once trained, the AI will be able to classify the image into content or lack of concept. A good example of the use of such a solution is the treatment of rust on the pipeline. Imagine a drone flying over a pipeline line and picking up pipes from above. The video is processed, and the frames are examined for rust. If rust is noticed, then the service team receives a notification with an image and the geolocation of the image, and then decides if action is required. Of course, the drone cannot fly hundreds of kilometers of the pipeline and must be accompanied by a crew, but it is faster than climbing the pipeline and inspecting it step by step.

Of course, all this can be done by people. But for how long and how often? Robots do not get tired and do not stray from prolonged monotonous work. They can process information as it comes in, even if they have to analyze the same image every 10 minutes, while analyzing thousands of images per hour.

Robotic AI systems also make it possible to describe an image by listing concepts of objects seen. This is the case when AI is being used to bypass technology built against AI and robots. A great example of this is technology designed

to verify the user as a human ("select all images with traffic lights to confirm you are not a robot"). Descriptive analysis of the image will tell you that the image contains an urban environment containing a car and a traffic light.

6. Opportunities to improve customer service efficiency

Solutions that combine RPA and AI help improve customer service efficiency through automated analysis of calls (voice, text), determining the mood, priority and context of calls.

Sentiment Analysis allows you to determine the mood of the writer or the tone of the letter. This technology can be used in support centers to prioritize a request. A help desk employee more competent in working with problem customers is assigned to the request, and text analyzers reveal the general context from the text. A support request letter is classified as a license, installation, or usage request. Also, the technology can be integrated with chatbots to achieve the same goal - determining the context and general meaning of the request for further distribution for processing - by robots, manually or hybrid.

Voice recognition makes it possible to create a voice communication channel between a robot and a human. It is used in conjunction with context recognition systems. Voice messages are digitized into text, which in turn goes through the definition of meaning. Such communication based on a predefined context is used in chatbots. When contacting the support service, the client identifies himself and describes the nature of his request. The system guides the user through the dialogue and processes the request. If the system cannot understand or process the request, the call is transferred to a support agent who already has the information and sees answers to automated questions from the system.

There are also service solutions (Service Assist) that connect in one end-to-end process the client asking for help, the help desk agent, and the robot that does all the work using different corporate systems to collect data and make changes.

Another solution is to convert text to voice. The robot can prepare a text, then this text is translated into voice and a call is made with a targeted message. Imitation of human speech is used for automated robocalls aimed at mass notification. There are many scenarios when such functionality is indispensable - for example, immediate notification of personnel. The use of this technology could also be useful for alerting passengers about flight delays at airports. Mail needs access, and not all letters are read immediately upon receipt. The telephone or public address system is more synchronous in sending and receiving a message.

In addition, it is worth noting about an extremely interesting direction - a virtual announcer. The robot can send the text to create a video release with a virtual speaker, wait for the video editing, and place the video in the video storage and publishing system.

As for context recognition, a simple example would be chatbots. They usually start with a specific question. The user's responses are classified into predefined categories, which is context recognition. Chatbots are mainly used in external customer support and internal employee support, where the results of communication are processed by robots. So, you can send an estimate for home or car insurance, help you find the nearest branch of the organization or suggest contact information for the support service. External support consists in providing a user-friendliness to the client in the search for publicly available information. However, if it is possible to authorize the client, it is possible to provide services relating to personal data.

If we talk about support for internal customers, then this can be password recovery, service request, assistance in finding internal procedures, regulations, templates, etc. This will significantly speed up the training of a new employee, since the chatbot assistant will be able to help the employee process unfamiliar situations.

7. Development prospects

Many companies have long been combining RPA and AI technologies, freeing up human resources. And the development of these technologies, as well as their popularization, can lead to revolutionary changes in terms of digitalization of business processes. AI allows you to go beyond what RPA platforms can do. Thanks to AI, digital employees become intelligent, acquire the ability to analyze and make controlled, but independent decisions.

In this article, we examined the features of the RPA architecture of the UiPath solution. The main components and levels of architecture were disassembled. This knowledge allows you to model and create more efficient software robots, and, thanks to a similar architecture, use them to develop projects in other RPA solutions.

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