RPA Bot Working With Stock Market Share Prices | Stock Analysis & Stock Price Prediction

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Abstract

RPA (Robotic process automation) Bot work with stock market analysis & prediction because the bot will give large capital or medium capital will give details of share prices, technical and fundamental of stock details bot will give you all in one work to do.

Key words: RPA, uipath, stock market, prediction

Introduction

Robotic Process Automation (RPA) is a type of business process automation technology based on the use of software robots and artificial intelligence. The software robot reproduces human actions by interacting with the system interface.

Microsoft enlivens UiPath in the RPA market

It is still a small market, but its estimated growth of 60% contrasts, for now, with 13% of the rest of the enterprise software. One of the reasons why it is so agitated is that the big names in the sector did not measure the potential of RPA (Robotic Process Automation) in time, so now they have to get into the race or, perhaps, acquire one of the many smaller companies that have taken the rope in the meantime. The dean of these, UiPath, went public in April taking chest and reached a huge capitalization for its income: just yesterday, it was worth 28,000 million dollars, which is a lot for a quarterly turnover of 200 million with which it loses 100 million.

In traditional systems, a developer creates a list of actions to automate a task using application programming interfaces (APIs) or a scripting language. RPA systems develop a list of actions by observing how the user performs this task in the graphical user interface of the application.

The automation of repetitive tasks is something very attractive for organizations, which have seen in it a way to offload their employees from tedious operations without added value to allocate the savings to more profitable missions (or so they say). With the incorporation of artificial intelligence, as well as the simplification provided by low code development techniques, a leap to 'hyper-automation' is taking place that allows us to address processes that are no less redundant, but increasingly complex.

Back in 2019, the consulting firm Gartner pointed out that this category of software, born not long before as a replacement for imperfect APIs, was destined for very rapid growth. And so it has been because in 2021 it is expected that between all of them they will enter about 2,000 million dollars. Well look, it is not a lot of money to distribute among so many candidates.
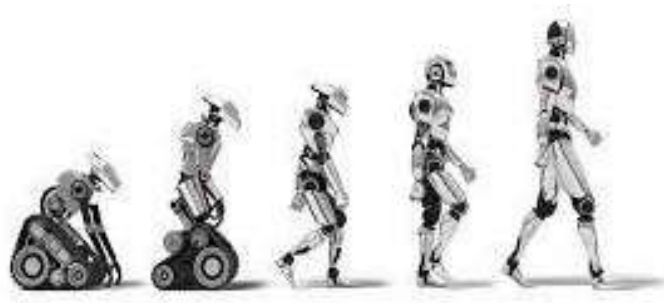
History of UI Path (RPA Automation)

The leader, UiPath, has a serious track record, one of the good and scarce trajectories of success in European software: founded by Daniel Dines and Marius Tircà in their native Romania sixteen years ago, they gave it a turn five years ago by turning exclusively to RPA and moving to New York thinking about the stock market. Last February, two months before their IPO, they raised 750 million dollars from a constellation of avid investment funds, a maneuver that gave a boost to capitalization. This represents 37 times the expected turnover this year. The business has grown by 65%, much more than its direct rivals Blue Prism (32%) and Pegasystems (18%) but, it must be said, UiPath shares have fallen 11% since the IPO.

Disparate figures circulate about the magnitude of the RPA market. According to Gartner, it will move around 30,000 million dollars, but Bain Capital raises it to 65,000 million, although it is not clear that the consultancy and private equity refer to the same perimeter. In any case, the prominence of UiPath is out of the question; it accounts for a third of the market.

Daniel Dines, in his role as CEO and visible face of the company, has been able to play the situation in his favor. Just before the outbreak of the pandemic, UiPat reinforced its global distribution through its marketplace with more than a thousand reusable components. Its open platform easily integrates with applications such as Google Workplace, Microsoft Office, Oracle, Salesforce, ServiceNow, and Workday. 60% of the business is outside the United States, with 580 million dollars in ARR (Annual Recurring

Revenue), a metric that adds up its subscription and maintenance revenues. That almost 40% of that amount is for maintenance contracts is an original feature.

The interesting thing is that, as Dines has told analysts, a thousand clients who contribute more than 100,000 dollars of ARR has grown by 68% and there are already 89 who contribute more than one million. As a result of these trends, UiPath has nearly doubled its turnover to $607 million in 2020 and expects to cross the $700 million bar this year.

UiPath's strategy has been what its CEO calls "landing and expanding": Once it wins a customer, it tries to sell them more products and services to generate new business. It works since the retention ratio is 145%. It already has 8,000 customers, with prominent references such as Amazon, Uber, or Bank of America.

UniPath's leadership is not enough to rest on its laurels. In its atomized market it finds pure competitors such as Blue Prism and Automation Everywhere, in addition to the conscientious penetration of Appian, a low code specialist that evolves as an automation platform. Without further details, there is talk of about 80 software companies more or less involved in RPA.

The case of Automation Anywhere deserves a mention. In addition to being the niche player that represents the most competition for UiPath – in Forrester's opinion – it has attracted a post-it investor, Softbank, through its Vision Fund, which attributes a value of 6,800 million; by the way, it is preparing its IPO in 2022. Another, Pegasystems, goes even beyond the limits of RPA, unifying this category with document processing and low code development.

Beyond these specialists, several major software companies are invited to the party: Microsoft, SAP, Salesforce, and ServiceNow (which acquired the Indian company Intellibot). With some of them, UiPath collaborates, but that's another story. You also have to count on IBM, which in June of this year bought a Brazilian specialist to integrate it with its tools.

Salesforce extends its tentacles. Through its ownership of MuleSoft, it has taken control of Servicetrace, which has an RPA platform that could complement integrations via APIs to share data between applications. The idea is neither new nor exclusive: in January, UiPath acquired Cloud Elements, a small competitor to Mulesoft.

SAP has discovered that RPA can be a component of its offering and that it can be packaged with its solutions, so it has developed several task automation connectors.

But the most dangerous rival of all is Microsoft, which is bolstering its artillery in the RPA category following the purchase of Softomotive. Its CEO, Satya Nadella highlighted at the last results conference the role it plays in process automation and productivity. It should be noted that the last 'magic' quadrant of Gartner already placed Microsoft next to UiPath as leaders of the RPA market, something to take into account since only a year ago it did not appear in any pool.

This is probably the biggest threat to UiPath. Despite the rapid deployment of its brand, its partnerships, and the new features added to the software thanks to the generosity of its investors, Dines' company still lacks a web-based RPA development environment. Meanwhile, Microsoft presents its Power platform as a unique offering covering automation, integration, and low code with – attention to the figure – 15.8 million bots deployed, representing 1.5 million daily actions. By the way, it's an offer available through Azure, which would give it a potential reach of 1 billion people.

If all the above elements are combined, UiPath seems to have a promising few years ahead. Whether he continues alone or if – despite his excessive valuation – he finds himself with an offer to buy. Its large-capitalization is good news for Dines and its partners, but it is a deterrent for eventual buyers: after all, the proliferation of competitors reveals that in its current state it is not technology so sophisticated that it cannot be replicated. Buy clientele? Perhaps, but it is not the only way to get on the train nor does it justify any price.

Precisely, the trump card that Dines plays in his public appearances is the independence of UiPath, which he equates to its ability to implement in multi-cloud and multiplatform environments. "Being independent," he said predictably, "means providing the same level to all commercial application platforms."

It is good for the CEO of the company to say so, but it must be recognized that, despite the hybrid workstream, RPA is still a complementary segment – peripheral, if it is not understood pejoratively – of enterprise software.

It is a market that has yet to mature. While it is true that a few companies in certain industries have begun to explore the advantages of hyper-automation, it is worth not exaggerating. There is still a way to go with the addition of cognitive technologies, which could give it a leap in quality: not only increase the number of companies but, most importantly, the use cases of RPA. Attention: all forecasts point to 2026 onwards, so the landscape may change for one reason or another.

RPA for Finance and Accounting

In 2020, the financial industry faced a number of unprecedented challenges. However, in everything, it is worth looking for advantages. Now more than ever, companies can strengthen their position by using robotic process automation (or RPA) for financial and accounting operations.

In this article, we will demonstrate the 10 best use cases for robotic process automation in financial transactions.

Why do banks invest in RPA instruments?

To secure a place in the sun in a highly competitive market, banks are turning to technological solutions.

Robotic automation of processes in the field of financial services allows you to achieve maximum efficiency by automating repetitive tasks without harming staff. The banking industry is investing in RPA to gain a competitive advantage in the race for digital transformation by reducing costs, improving the quality of business processes, and improving customer service.

Examples of using RPA in finance and accounting

Here are some examples of robotic automation of processes in the financial sector and the benefits that business owners can get from using it.

1. Automation of accounts receivable accounting

Proper accounting of accounts receivable directly affects the state of the organization. Errors in the accounting of receivables can lead to undesirable consequences. Performing such tasks manually can take quite a long time since information needs to be processed in several systems.

Using RPA in the financial industry to automate the process of compiling and accounting for accounts receivable will help speed up the payment of invoices through the automatic sending of information to customers by e-mail. The sooner the customer receives the invoice, the sooner he will pay, which will eliminate the unwanted delay in payment.

In general, accounts receivable are a good starting point for automating finance departments, as they tend to be less dependent on external documents.

Below is a list of operations related to accounting for receivables in which automation can be useful:

- *Creation of a commercial offer;*
- *Distribution of accounts;*
- *Credit monitoring of clients;*
- *Send email notifications.*

2. Automation of accounts payable accounting

Processing accounts payable is an important task that requires a large amount of data that has to be processed manually. By using RPA software robots as digital employees, invoices can be automatically sent to the employee responsible for approving them, as well as automatic deadline reminders. Software robots will easily compare purchase data with the necessary account, make a comparison, and highlight discrepancies (if any) for further verification by a person.

A few examples of the use of automation in accounting for accounts payable:

- *Processing of invoices from suppliers;*
- *Cross-check the supplier's invoices with the purchase order;*
- *Payment management;*
- *Responses to vendor requests.*

3. Automation of customer due diligence processes

As regulatory requirements become more stringent, the customer due diligence process can be delayed. Employees often spend hours browsing internal and external systems to gather information about the customer.

Software robots can collect all the necessary information using optical character recognition. This extracted data can be compared with the information in the file, and the report will be presented to management for an informed decision. If no disagreements are found, the robots will automatically enter the data into the client's profile.

4. Financial reconciliations

Another example of finance automation is data reconciliation. By the end of the reporting period, accounting must close the monthly entries to balance the accounts and provide an accurate financial statement.

This process is a source of constant stress for accountants due to the extraction and entry of data manually, overtime and attention to detail. Among other things, this paralyzes the work of the entire department.

With the help of robotization, your team will be able to switch its attention from entering data to performing real analytical work that robots cannot yet perform. The software robot can be configured to verify various orders and transactional data collected from multiple sources. The robot will automatically approve all matching orders and notify you of discrepancies.

Software robots can also simplify bank reconciliations by uploading bank statements and linking them to user accounts, verifying balances and transactions, creating journal entries, and more.

What else can a software robot do:

- *Download data (e.g. bank statements, sub-account balances) from various sources into internal systems and provide reports in a pre-approved format;*
- *Download bank statements for user accounts;*
- *Balance and transaction verification and reconciliation of information with user accounts*
- *Create and track data in a ledger*
- *Notice of any inaccuracies*

5. Processing of documents on travel expenses

Before Covid-19, people went on business trips, meetings, and conferences. They came back with a list of receipts and invoices. When processing documents manually, it is often discovered that

some of the receipts are missing or are not considered a business expense. This has a direct impact on compliance and may even hurt the satisfaction of the employee concerned.

Software robots can not only extract data from the submitted forms but also compare them with the internal rules of the company or the norms of legislation and notify the accounting department and employees in case of violation of the policy.

Some examples of the use of software robots in the processing of receipts:

- *Extracting data from the submitted receipt/invoice;*
- *Verification of data for compliance with the company's policy and legal requirements;*
- *Send an email to request more information if there is any discrepancy.*

6. RPA in Investment Management

The RPA platform can even serve as an investment manager and financial advisor. Software robots can track past and current investment values in real-time. They can evaluate the portfolio and manage risk. This will allow you to make a more informed investment decision, thanks to information based on changes in the market in real-time.

7. RPA in Financial Planning and Forecasting

To clearly see the curre of affairs, it is important to plan for the future and set the right goals. Robots can be configured to process earlier data, compile financial reports from different departments, and on their basis create a financial forecast, as well as reports on deviations. Empower your employees to engage in the most important processes with a plan of action.

8. RPA in Operational Finance and Accounting

Bank account balances are uploaded to accounting systems. It's a time-consuming process that organizations automate to cut costs by saving their employee's effort.

Robotic process automation can convert data into a format that can be processed by the accounting or finance department for subsequent reporting.

- *Formatting information into data that the accounting system can recognize;*
- *Updating of treasury systems;*
- *Sending reports;*
- *Update the ledger.*

9. Preparation of financial statements

A safe way to monitor a company's financial performance is to track profit and loss statements daily. However, creating this report manually is a time-consuming task, RPA can remove this task from your finance department and generate these reports in near real-time, reducing the risk of inaccuracies.

10. Tax reporting

Tax reporting is filled with routine processes, often performed manually. Disparate systems and financial processes for many organizations often make it difficult to collect and reconcile tax data.

Automation can help a lot here. Software robots can be responsible for collecting data, preparing reports, calculating taxes payable, and even sending documents to tax systems.

RPA Time: Why Businesses Need Robots

The RPA segment, or robotic process automation, back in 2019 was noted by Gartner analysts as the fastest-growing category of enterprise software. But investors and large corporations are only now really interested in this market. Anton Alikov, an investor in artificial intelligence, RPA, education, fintech, and space, shared his view on events in the RPA sector and told why this market can already be of interest to investors and start-ups.

Why the RPA Market Is Growing Now

Last year, it became clear that small and medium-sized businesses urgently need to reduce costs, and robots are more reliable in situations where people are massively ill and recover for a long time.

The shift of staff to remote work has allowed companies to reconsider the usefulness of many tasks and workplaces without causing significant strain among employees.

RPA technologies themselves have matured, began to use artificial intelligence, and became more interesting for customers.

The pandemic has sharpened the focus on necessity and accelerated the development of solutions to automate routine work. According to wikibon.com, in 2007-2017 in the United States and 15 European countries, the rate of annual growth in labor productivity decreased from 1.5 - 2.5% to 0.5 - 1.0%, which can be partly explained by the widespread computerization and use of the Internet in the workplace.

RPA technologies can increase staff productivity by allowing employees to concentrate on complex tasks, as well as reducing the risk of human error in simple ones.

RPA Market in Numbers

By the end of 2020, the RPA technology market was still valued at $1.5 billion, and after the pandemic is over, due to the big technological shift it has caused, the market is expected to grow by more than 30% per year and reach $19.5 billion to $25.6 billion by 2027.

Software development and installation costs account for approximately 40-50% of this market; the rest is accounted for by integration costs. The first component is the main driver of growth in the industry, its rate is projected at 60-70% per year.

Looking more globally, RPA technologies, artificial intelligence, and low-code will be the main drivers of hyperautomatization of enterprises in the near future.

Gartner analysts believe that the market will grow by a quarter from 2020 to 2022, to almost $ 600 billion.

There comes an understanding that the introduction of robotization of processes is no longer an alternative, but an economic necessity. But the market is growing not only due to new customers. According to Deloitte, at the beginning of 2020 in Russia, 42% of the companies participating in the study began to introduce robotization in one way or another, in the world - 53%.

Interestingly, in Russia, only 4% of respondents automated more than 50 processes; most companies start robotizing their business with one or three processes. At the same time, Deloitte talks about almost global automation in five years, if the current pace of RPA adoption continues.

In addition to the depth of penetration of robotization, the growth potential of the market is associated with access to adjacent segments. These can be intelligent business process management and integration platforms as a service.

Further development of RPA technologies will shift to more complex areas: digital transformation of business processes and automatic decision-making systems.

In 2020, noticeable acquisitions began in the RPA market, which continues this year: Microsoft bought Softomotive, IBM - WDG Automation, ServiceNow - Intellibot. Corporations are rushing to take their place in a potentially multibillion-dollar market.

Who uses RPA and for what

Most often, RPA solutions are of interest to financial organizations, telecom and IT, retail and wholesale trade, energy, and mining. Last year, the pharmacology and healthcare industries ranked fourth among the industries in which RPA was most prevalent.

Startup Olive, for example, used a combination of computer vision and RPA to make it easier to manually enter data when testing customers for coronavirus. And a hospital in Dublin used RPA to process coronavirus tests and get tests faster than manual processing.

Automation lends itself to both simple processes that obey a given set of rules, and complex tasks that require developers to create self-learning artificial intelligence.

Usually, accounting, HR, and IT tasks are robotized. McKinsey's research shows that at least a third of the processes in 60% of positions can be automated.

Deloitte says that organizations, having tested RPA technologies on simple processes, become bolder and begin to implement cognitive technologies that reproduce human functions.

Key players in the market

Among the developers of RPA products, there are both individual companies, such as UiPath, Automation Anywhere, NICE, Blue Prism, AntWorks, Appian, Datamatics, Nintex, Rocketboy, and world software giants developing the RPA direction within their own business, for example, Microsoft, IBM, and SAP.

In total, the segment has about 80 vendors.

In 2021, the success of RPA technologies was recognized by the stock market, when UiPath, the largest player in the sector with a market share of 27%, held an IPO on the New York Stock Exchange, raising $ 1.4 billion. UiPath had a market cap of $29.1 billion, its investors include CapitalG and Sequoia Capital, and the client list includes names such as Amazon, EY, and Bank of America.

Another notable market participant that is now on everyone's lips is Automation Anywhere. The company controls 19% of the RPA technology market. In March of this year, it introduced the new Automation 360 software platform for unified business automation

using artificial intelligence technologies and announced a strategic partnership with Google Cloud.

While it is a private company, its IPO is waiting for experts - Automation Anywhere looks stronger than other competitors. After the success of UiPath, the market has become bolder in its expectations, investors are looking for an opportunity to enter the share capital of Automation Anywhere at the stage of initial growth.

This has already been done by Salesforce Ventures, Goldman Sachs, and Softbank Vision Fund. The company was valued at $6.9 billion in its final round in 2019.

The top three include the public British company Blue Prism with a valuation of $ 2.2 billion. It is the oldest player in the market, founded back in 2001. A mature product allows the company to consistently maintain a market share of 8-10%, but the stock price, on the contrary, is volatile.

Advantages of RPA

- Save humanity from routine and boring tasks
- Allow businesses to free up human resources by reducing operating costs with a direct positive impact on ROI
- The robot works 24/7, does not get tired, does not go on vacation, does not give birth to children
- The robot's behavior is predictable. Predictable result. All steps are in the log.
- Robots do not have errors due to the "human factor"
- The robot, as a rule, works faster and carries out the tasks set almost without errors.
- Integrated can work with existing systems without changing the IT landscape
- Easily provide 100 full logs of your actions and allow you to flexibly monitor operational performance

RPA tools are designed to link a small fragment of one legacy application to another similar application. Let's say an employee wants to download data from one application and upload it to a spreadsheet or another application. Obviously, this procedure takes a lot of time, besides, it is possible that the employee may enter erroneous data. In comparison, RPA tools can "record" this process and copy it. The technology is aimed at automating individual simple tasks. Gartner estimates that it eliminates data entry errors, speeds up processes, and reduces costs. In addition, RPA can link two different applications, even if their providers have not provided for the possibility of integrating them through the API.

What it gives for business

- Reducing the cost of performing routine operations
- Fewer errors in processes, higher quality, and speed of their execution
- Ability to scale your business economically
- Reduce business risk
- Shifting the focus of employees to perform intellectual tasks
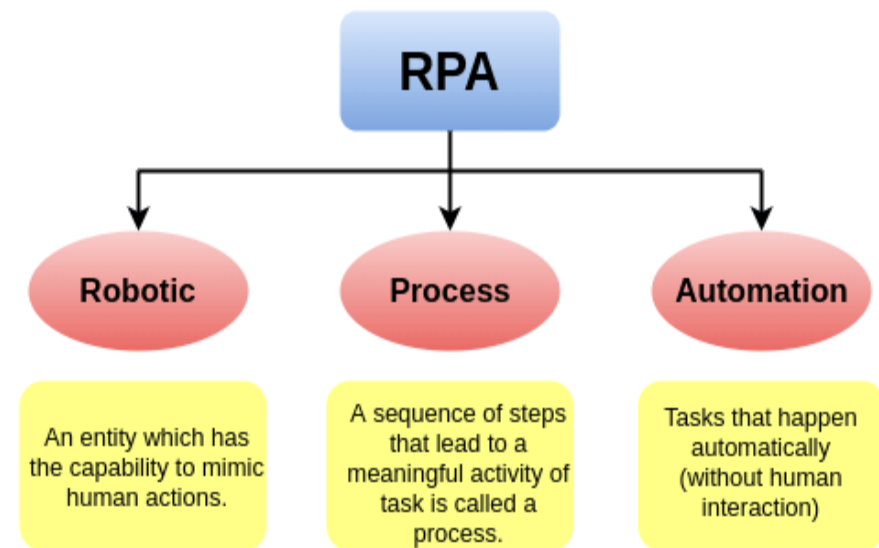
What is usually done with Software Robots:

- Data extraction (OCR, E-Mail, PDF)
- Data Migration, Integration
- Data Transformation
- Transactions in ERP
- Working with forms
- Writing letters, working with SM\IM

- *Data analysis, reporting*

AI vs RPA

AI:

- *Promising technology, insufficient expertise of implementations;*
- *Real implementation processes require investment, experience, data;*
- *Training machines to identify problems and find solutions from algorithms and data to draw conclusions similar to human intelligence, but without controlling it.*

RPA:

- *There is no decision-making mechanism, only following certain rules and algorithms;*
- *It is not "smart" automation if by "smart" we mean the ability to adapt to previously unknown circumstances;*
- *All circumstances are encoded by a set of rules and instructions, in the form of scripts or bot flows, and only emulate AI, but are not;*
- *Unlike autonomy, the work of an RPA is more like the work of an assistant in a team – someone who can be trusted with manual, repetitive, and low-priority tasks.*

What types of processes can be automated with RPA

- *Repeatable, simple, and standardizable actions*
- *The process is performed by many employees*
- *Monotonous process for which an instruction already exists*
- *Relatively high standardization of incoming data*
- *Possibility of stand-alone execution*

How RPA Helps Automate Content Management

RPA technology is designed to save people from performing monotonous, repetitive business processes, saving money and increasing efficiency by saving them time to implement more creative tasks. She has proven herself in many areas of business, including content management. RPA becomes a driving force in this direction, simplifying the quality control of content, and optimizing the process of delivering the necessary content to a specific consumer. How does RPA improve content management? Let's look at a few examples[1].

Ensuring the quality of content. As you know, content acts as a link between brands and buyers – if the content is trustworthy, this usually extends to the brand. Nothing devalues content more than poor quality, which could be due to grammatical errors or incoherent context. To eliminate these flaws, you can proofread the content using tools such as Grammarly. The service automatically detects potential spelling and style errors and is available through a browser extension for Chrome, Safari, Firefox, and Edge.

Content marketing. The list of tasks associated with effective content marketing is quite long, and most of them can be easily automated. As a rule, automation tools are built into CRM systems, but they can be performed using RPA, which will save you from overpaying the CRM provider for additional functionality. Among the most routine procedures can be identified marketing mailing of advertising materials by e-mail, which requires the continuous construction of an address list and the transfer of content to social networks. As for the creation of lists, BuzzBuilder Pro will help automate it, while Mailchimp will take on the task of automating the exchange of messages by e-mail. Promoting content on social media is another tedious procedure as it involves multiple platforms. It can be automated with tools like Zapper, which centralizes the distribution of content across all major platforms.

Content curation. Another way RPA improves content management is through content curation. To do this, the method of cultivating content is applied by collecting, systematizing and presenting fragments that are prepared to attract customers. All three

processes can be automated. Scoop.it is one of a number of tools that can detect content relevant to a particular topic or field.

Content monitoring. One of the most important tasks of CRM is to collect and evaluate the audience's reaction to content, which is explained by the desire of marketers to evaluate its effectiveness and, accordingly, improve or get rid of it. Tracking consumer reactions can be automated with an RPA tool like Mention. Its tasks include tracking brand mentions by keyword on social networks and other sources.

# RPA Bot Working With Stock Exchange Share Prices

we are going to see how the bot is working with the stock exchange share data so here we will see what is going to read the data from the input excel and it will extract the share price from google finance and also it is going to suggest to the user whether the particular stock is running in a loss or it is running in a profit okay so before the start in case.

Okay, so this small process which I am going to demonstrate to you is very helpful for those who are very new to the RPA or a student who is learning RPA so I would request you to kindly replicate this process, uh using automation anywhere a 2019 or whatever tool you are using so it will give you a little idea about the development background okay so let me go to the automation anyway to show you the code so before showing the code let me go to the excel.

Which I am going to use here so this is the input excel so here I have currently 10 stock names so you can see here so based on your requirement you can put 10 50 20 whatever number you want and our bot will read data from this excel so whatever number will be there it will read and it will uh try to extract the information.

So we have the field here like stock name target price current price the status like you know the gain or loss and this is the final status so this is the target price which I have given for this shares, okay and the current price is going to read by the bot from the google finance dot com based on this excel formula.

It will say it will show you whether the stock is running in a loss or a profit okay so once we start the bot part will delete this uh current price and it will face the data and it will put into this particular excel so let me close this excel now I am going to the automation anywhere so you can see I have already written this code for you so you can try and you can let me know in case of any problem so let me take you through the code so you can see I have added the error handling.
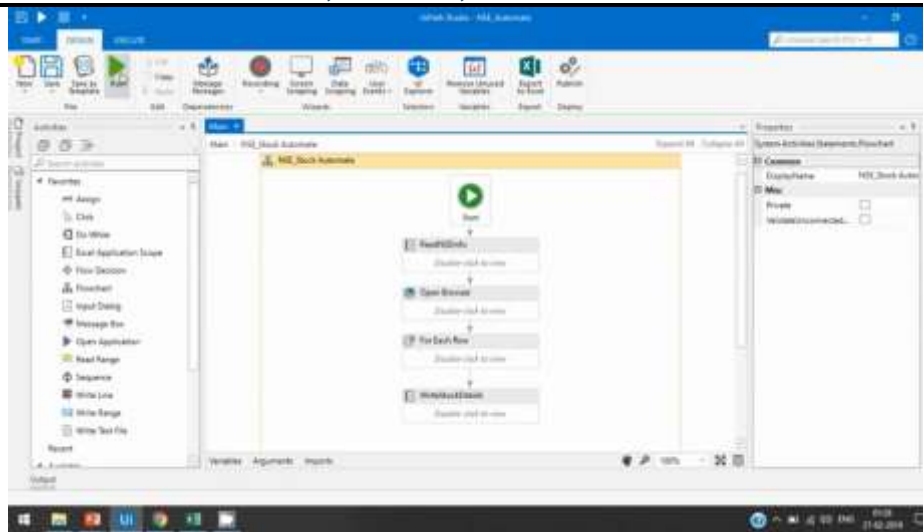
So here bot is trying to launch the page and so basically here bot will try for a maximum of five times okay, so you can see here I have built the logic and everything then here I'm using mostly the object cloning and also I'm using keystrokes, okay and the excel operation so this is the code so our main code is starting from here so the bot will start reading data from this loop and it will put the information okay all right so now I'm just closing this I will run this code from the automation anywhere control room.

So I've already uploaded the code so now let me log in with my bot runner access, okay I have logged in now the code is already available in the control room so now I'm going to the automation anywhere control room I'll go to the boards I will go to my bots and from there I have the folder called stock market here I have the bot so I will select this bot and from here I will click on the run bot so as soon as you click on run bot it will ask you to select the bot runner so currently.

I have one bot runner which is available in this system i will select that and i will click on the run now so once you click on run now the bot will automatically start running so you can see support is giving you the message box the process started okay so you can see it has launched the google finance successfully and it is showing in the message box the current sensex and the nifty uh value which is

available so this bot is a very helpful for those who is doing the trading okay so this board can be scheduled and it can run during a particular time period for example our indian stock exchange timing is let's say the 9 am to 3 pm.
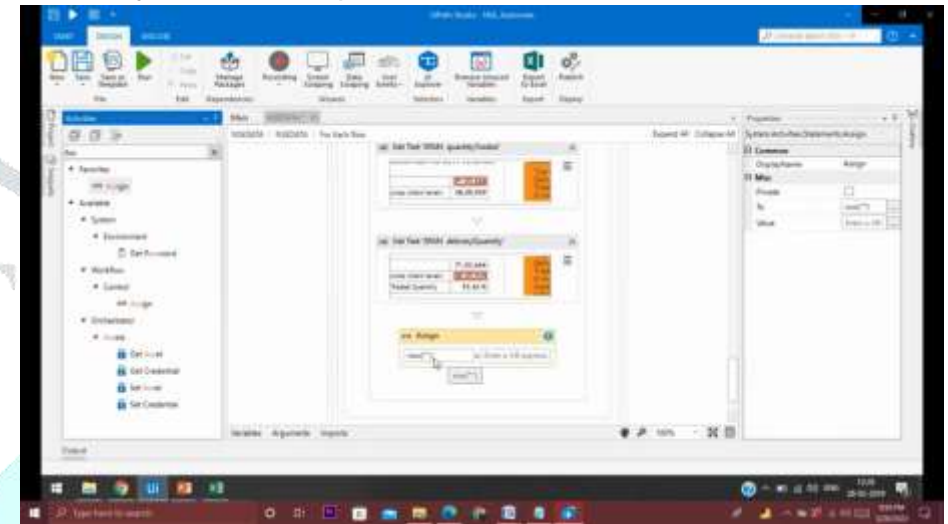
So we can schedule this bot and this board can run whatever time or like you know based onsome trigger we can put those triggers so it can run and it can face the data and also we can put some uh like a concept of um like sending uh messages or the email and other things can bedone also so this is very helpful in case if youare looking for some solutions like where botis going to read all the data based onthe certain like you know the target price the bot can inform the particular user to sell or keep this particular stock so you can see it's whenever we are getting like the current price is more than the target price the message box is showing okay so this is done now now let me goto the excel so you can see the excel is updated nowso this is the data we can say like youknow this five stockwhich is running in the profit so if somebody wants to sell this stock in case if they are holding they can sell this stock so yes so in case if you are looking for this code i would request you to kindly uh send us an email at rp.developers1gmail.come we will send you the code or in case ifyou have any query or if you face any challenges in terms of developing this pleasemail us we will definitely help you.

Machine Learning: Predicting Stock Prices in the Stock Market
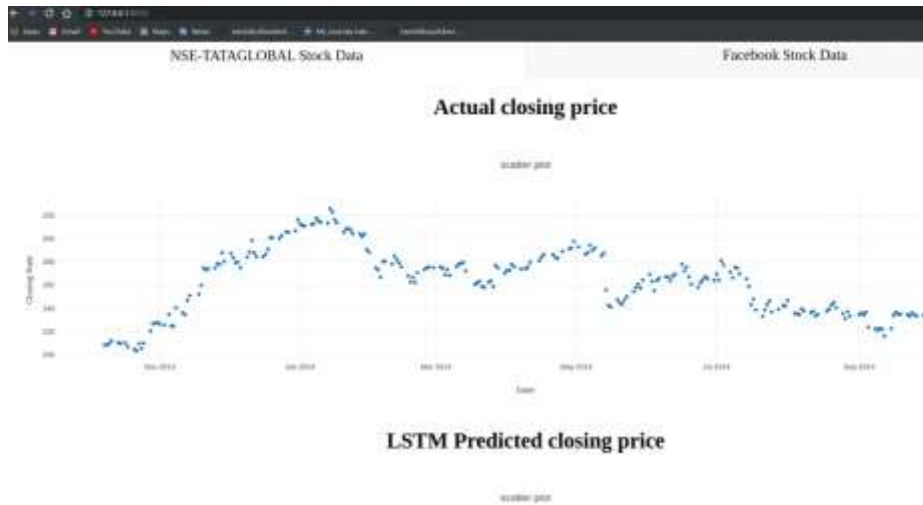
Translator Polina Kabirova especially for "Neurology", adapted an article by Cambridge University engineer Vivek Palaniappan on how to use neural networks to create a model capable of predicting stock prices on the stock exchange.

Machine learning and deep learning have become effective new strategies that many investment funds use to increase returns. In this article, I'll explain how neural networks help predict a stock market situation — for example, a stock price (or index). The text is based on my project, written in Python. The full code and guide to the program can be found on GitHub. Read more articles on the topic on the blog on Medium.

Neural networks in economics

Changes in finance occur non-linearly, and sometimes it can seem that stock prices are formed completely randomly. Traditional time series methods such as the ARIMA and GARCH models are effective when the series is stationary— its basic properties do not change over time. And this requires that the row be pre-processed with the help or brought to stationarity differently. However, the main problem arises when implementing these models in a real trading system, since stationarity is not guaranteed when new data is added.

The solution to this problem may be neural networks that do not require stationarity. Neural networks are initially very effective in finding connections between data and can predict (or classify) new data on their basis.

Typically, a data science project consists of the following operations: `log returns`

1. Data collection —Provides a set of required properties.
2. Preprocessing data is an often intimidating but necessary step before using data.
3. The development and implementation of the model is the choice of the type of neural network and its parameters.
4. Backtesting models (testing on historical data) are a key step in any trading strategy.
5. Optimization – search for suitable parameters.

The input data for our neural network is stock price data for the last 10 days. With their help, we predict prices for the next day.

Data collection

Fortunately, the data needed for this project can be found on Yahoo Finance. Data can be collected using their Python API or directly from the site. `pdr.get_yahoo_data(ticker, start_date, end_date)`

Data pre-processing

In our case, the data should be divided into training sets consisting of 10 past prices and the price of the next day. To do this, I defined a class that will work with training and test data. Inside the class, I defined a method that converts the training inputs and outputs into arrays, specifying a specific window length (in our case, 10). The whole code looks like this:

```
import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
%matplotlib inline

from matplotlib.pylab import rcParams
rcParams['figure.figsize']=20,10
from keras.models import Sequential
from keras.layers import LSTM,Dropout,Dense

from sklearn.preprocessing import MinMaxScaler
```

Neural Network Models

For the project, I used two neural network models: the Rumelhart Multilayer Perceptron (MLP) and the Long Short Term Model (LSTM). I will briefly talk about how these models work. Read more about MLP in another article, and about the work of LSTM – in the material of Jacob Aungiers.

MLP is the simplest form of neural network. The input data enters the model and, with the help of certain weights, the values are passed through hidden layers to obtain the output data. The algorithm's learning comes from propagating backward through hidden layers to change the weight value of each neuron. The problem with this model is the lack of "memory". It is impossible to determine what the previous data was and how it can and should affect the new ones. In the context of our model, 10-day differences between data from two datasets may matter, but MLPs are not capable of analyzing such relationships.

To do this, LSTM or Recurrent Neural Networks (RNN) is used. RNNs store certain information about the data for later use, this helps the neural network analyze the complex structure of the relationships between the data on stock prices. But with RNN, there is a disappearing gradient problem. The gradient decreases because the number of layers increases and the level of learning (the value is less than one) is multiplied several times. LSTM solves this problem by increasing efficiency.

Implementing the Model

To implement the model, I used, it because there the layers are added gradually, rather than defining the entire network at once. So we can quickly change the number and type of layers, optimizing the neural network.

An important stage in working with stock prices is the normalization of data. Usually, to do this, you subtract the average error and divide it by the standard error. But we need this system to be able to be used in real trading for a certain period. Thus, using statistics may not be the most accurate way to normalize data. So I just divided all the data by 200 (an arbitrary number compared to which all other numbers are small). And although it seems that such normalization is unfounded and makes no sense, it is effective to make sure that the weights in the neural network do not become too large.

Let's start with a simpler model – MLP. In Keras, a sequence is built and dense layers are added on top of it. The complete code looks like   this:

Using Keras in five lines of code, we created an MLP with hidden layers, one hundred neurons each. And now a little bit about the optimizer. The Adam method (adaptive moment estimation) is gaining popularity - a more efficient optimization algorithm compared to stochastic gradient descent. There are two other extensions of stochastic gradient descent – against their background, the advantages of Adam are immediately visible:

AdaGrad supports a set learning rate that improves results when gradients diverge (for example, in problems with natural language and computer vision).

RMSProp - Maintains a set learning rate that can vary depending on the average values of recent gradients for the weight (for example, how quickly it changes). This means that the algorithm copes well with non-stationary problems (for example, noise).

Adam combines the benefits of these extensions, so I chose it.

Now adjust the model to our training data. Keras simplifies the task again, all you need is the following code:

When the model is ready, you need to test it on test data to determine how well it worked. This is done as follows:

The information obtained as a result of verification can be used to assess the ability of the model to predict stock prices.

The LSTM model uses a similar procedure, so I'll show you the code and explain it a bit:

Note that Keras requires data of a certain size, depending on your model. It is very important to change the shape of the array using NumPy.`Keras`
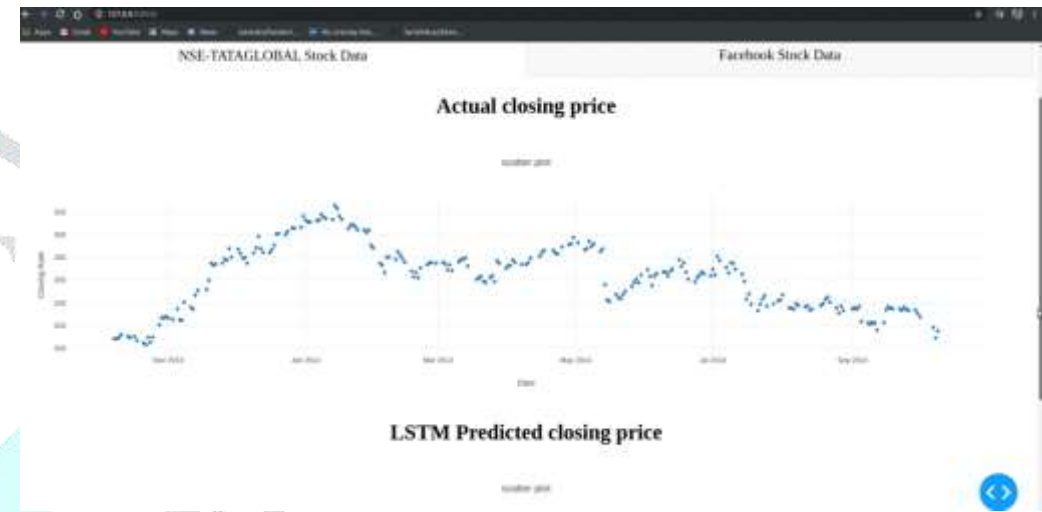
Backtesting models

Once we have prepared our models using the training data and tested them on the test data, we can test the model on historical data. This is done as follows:

However, this is a simplified version of testing. For a complete backtesting system, factors such as survivorship bias, look-ahead bias, market changes, and transaction costs need to be taken into account. Since this is only an educational project, simple backtesting is enough.

Forecast of my LSTM model on Apple's stock price in February

For a simple LSTM model without optimization, this is a very good result. It shows that neural networks and machine learning models are capable of a building complex, stable relationships between parameters.

Hyperparameter Optimization

Optimization is often needed to improve model results after testing. I didn't include it in the open-source version so that readers could try to optimize the model themselves. Those who do not know how to optimize will have to find hyperparameters that will improve the performance of the model. There are several methods for searching for hyperparameters: from the selection of parameters by a grid to stochastic   methods.

I am sure that with the optimization of models, knowledge in the field of machine learning is reaching a new level. Try to optimize the model so that it works better than mine. Compare the result with the graph above.

Inference

Machine learning is constantly evolving – new methods are emerging every day, so it is very important to constantly learn. The best way to do this is to create interesting projects, for example, to build models for forecasting stock prices. And while my LSTM model isn't good enough to be used in real trading, the foundation laid in developing such a model could help in the future.

References

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