

SENTIMENT ANALYSIS OF PRODUCT REVIEWS

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INTRODUCTION:

Robotic process automation (or RPA) is a form of business process automation technology based on metaphorical software robots (bots) or on artificial intelligence (AI)/digital workers.[1] It is sometimes referred to as software robotics.

Sentiment Analysis

Sentiment analysis (or opinion mining) is a natural language processing technique used to determine whether data is positive, negative or neutral. Sentiment analysis is often performed on textual data to help businesses monitor brand and product sentiment in customer feedback, and understand customer needs.

Problem Statement:

Conduction of sentiment analysis on the user reviews of a product from an e-commerce website, using the concepts of machine learning, and Robotic Process Automation.

Existing Methodology/System:

In order to perform sentiment analysis without using automation, we first need to write a machine learning/ deep learning model, collect a huge number of sentences in order to create a dataset, train the model using the gathered data, and perform validation.

Then we pass the sentences to the model as input, of which we want to find the sentiments.

Then the model predicts the sentiment, with a certain amount of accuracy, precision, etc.

Problems with the existing system:

The existing system needs a lot of human supervision, and is also considerably more error prone.

This is because we need to keep updating the ML/DL model continuously, in order to maintain a

high level of performance. Also, the existing system to predict the sentiments is not much user-friendly.

OBJECTIVES:

Our objective is to perform sentiment analysis on the user reviews of a product from an e-commerce website using the concept of automation, and store it in an excel file, in order to access it easily.

We intend to utilize automation tools such as UiPath Studio, UiPath Orchestrator, and UiPath AI Center. We intend to lesser the influence of human factor to the said technological process, improved analysis' reliability, and increase prediction and analysis speed and quality.

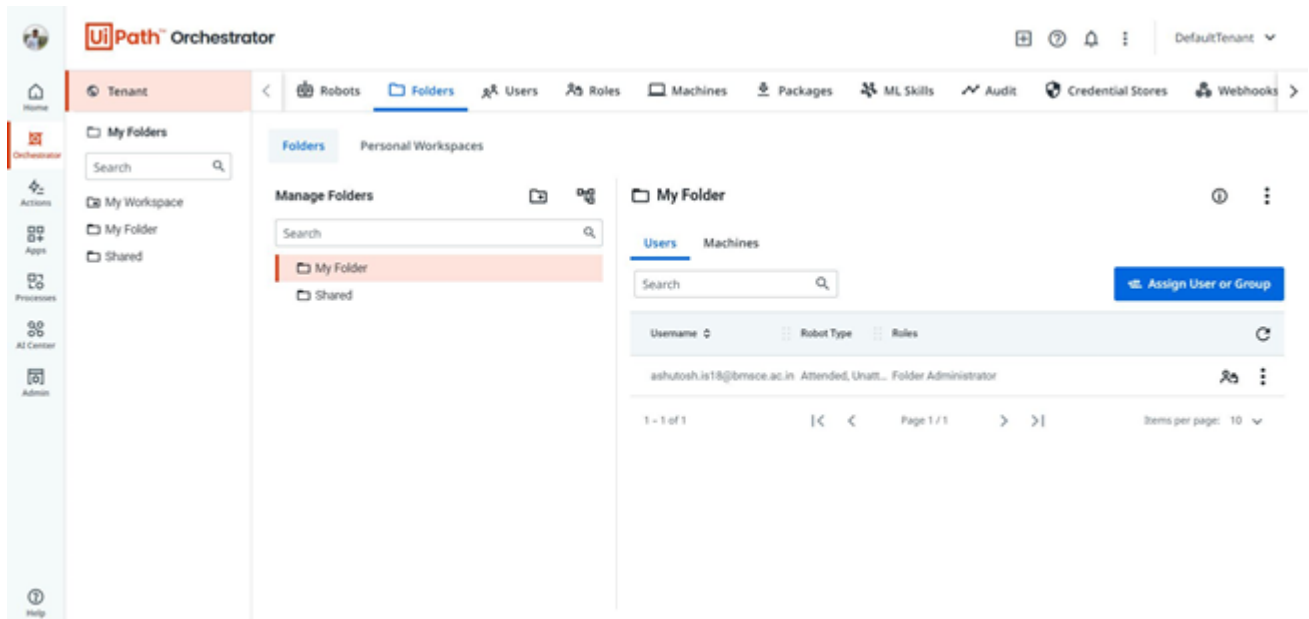
UiPath Studio: UiPath Studio is advanced automation software that gives everyone, from business users to advanced RPA developers, the right automation canvas to build great software robots—and organizations the right governance tools to manage them all.

UiPath Orchestrator: It is a web application that enables you to orchestrate your UiPath Robots in executing repetitive business processes. Orchestrator lets you manage the creation, monitoring, and deployment of resources in your environment. It acts as an integration point with third-party solutions and applications.

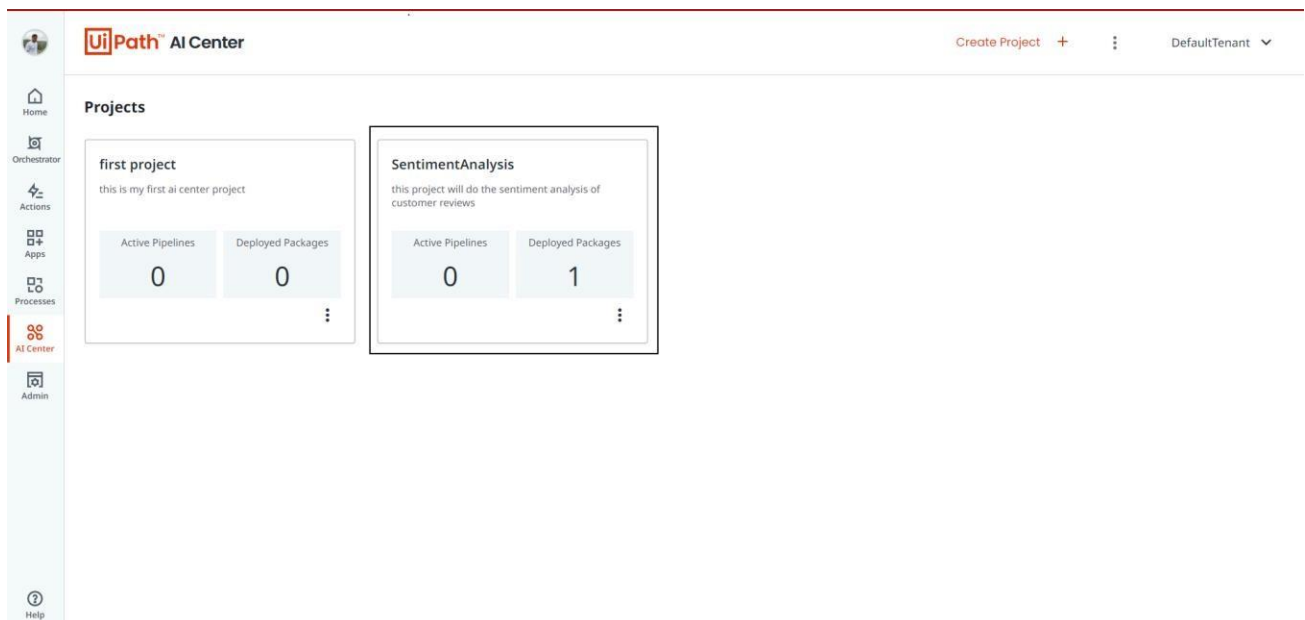
UiPath AI Center: AI Center is a service that allows you to deploy, manage, and continuously improve Machine Learning models and consume them within RPA workflows in Studio. The ML models can be built in a Python IDE or using an AutoML platform such as H2O Driverless AI.

IMPLEMENTATION AND RESULTS:

1. Open UiPath orchestrator, sign in, and create a folder, and a robot, as shown below:



2. Open UiPath AI Center, create a new project with a name of your choice:



3. Click on the newly created project, click on ML packages, then click on “Out of the box Packages”, then click on “Language Analysis”. Then click on “SentimentAnalysis”. After that click on submit button, write a package name, and then click submit. You will have a ML package as shown below:

The screenshot shows the UiPath AI Center interface. The left sidebar contains navigation options: Home, Orchestrator, Actions, Apps, Processes, AI Center (selected), and Admin. The main content area is titled 'SentimentAnalysis' and features a 'Create a new package' section with two options: 'Upload zip file' and 'Out of the box Packages'. The 'Out of the box Packages' option is selected. Below this, the 'ML Packages' section displays a table with the following data:

| Name | Description | Status | Modified Date | Modified By | |
|---------------------|---|----------|---------------------|----------------|--|
| P_SentimentAnalysis | This model was open sourced by Faceb... | Deployed | 2021-06-08 05:21 pm | Ashutosh Patil | |

At the bottom of the table, it indicates '1 - 1 of 1' items and 'Page 1 / 1'.

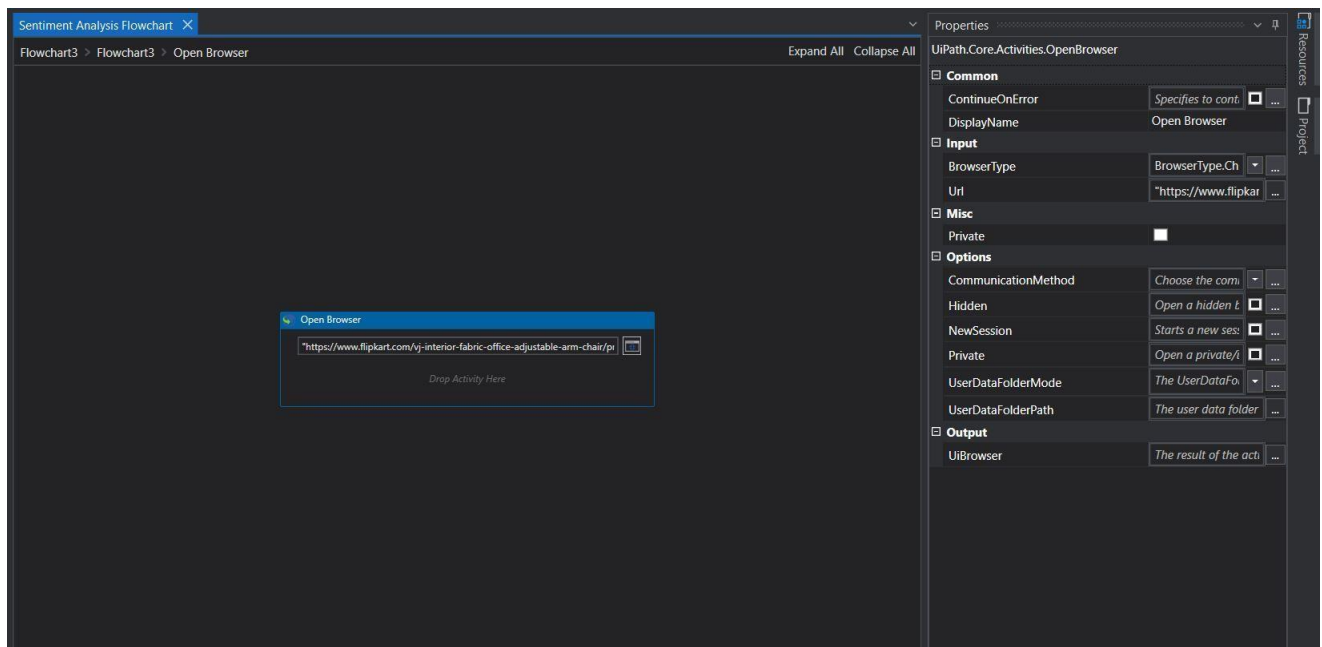
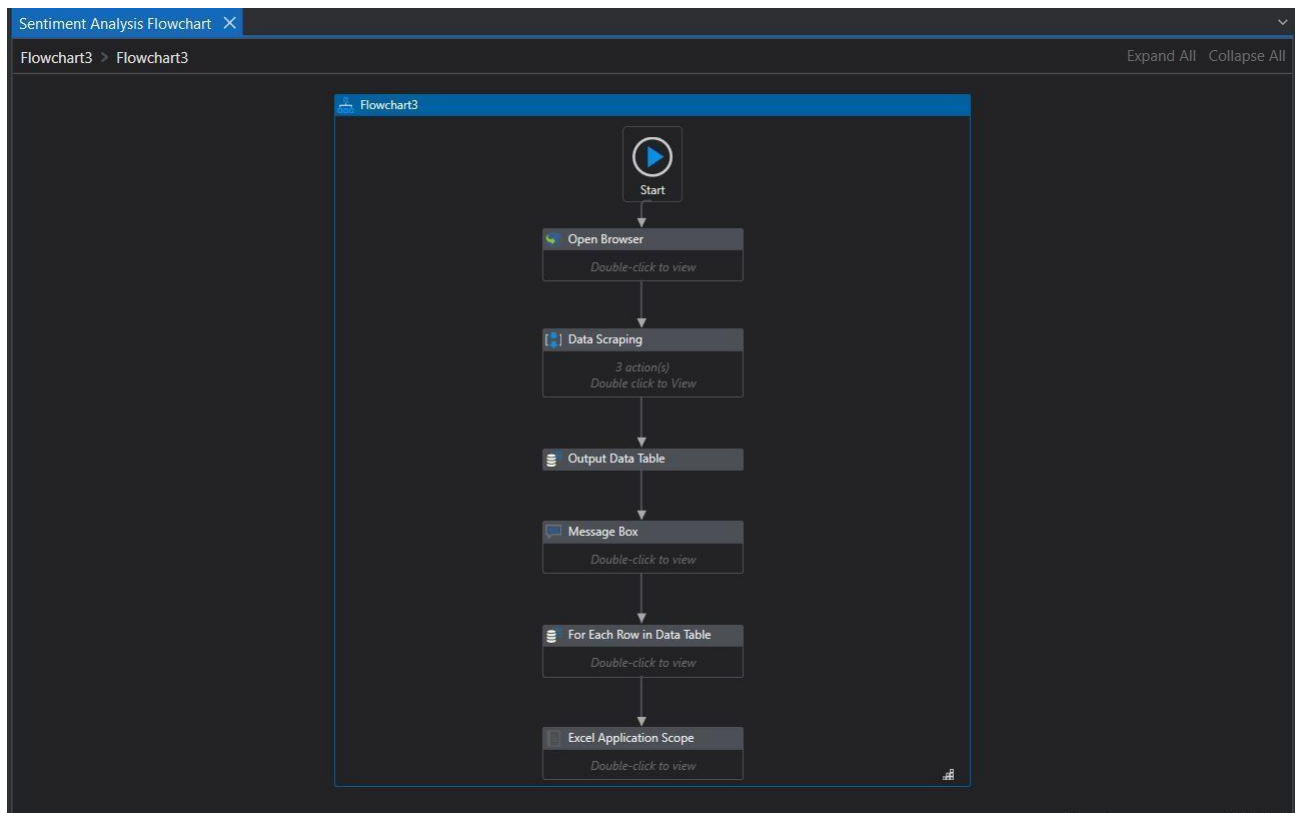
4. Click on ML skills, then click on “create new”. Give the skill a name, choose the previously created ML package, choose the correct versions, and click create. You will have created an ML skill as shown below:

The screenshot shows the UiPath AI Center interface. The left sidebar is the same as in the previous screenshot. The main content area is titled 'SentimentAnalysis' and features an 'ML Skills' section. A 'Create new' button is visible in the top right corner. Below this, the 'ML Skills' section displays a table with the following data:

| ML Skill Name | Package Name | Version | Status | Deployed | GPU | Prediction | |
|---------------------------|---------------------|---------|-----------|---------------------|-----|------------|--|
| MLSkill_SentimentAnalysis | P_SentimentAnalysis | 2.0 | Available | 2021-06-08 05:13 pm | X | 65 | |

At the bottom of the table, it indicates '1 - 1 of 1' items and 'Page 1 / 1'.

5. Open UiPath Studio, create a new blank process and name it. Install 2 packages, uipath.MLServices.Activities, and uipath.WebAPI.Activities. Create a new flowchart, with the elements as shown below:



Sentiment Analysis Flowchart

C:\Users\ashu\OneDrive\Documents\UiPath\RPA Project\Sentiment Analysis Flowchart.xaml

Expand All Collapse All

Data Scraping

Attach Browser 'Vjnterio Page'

Do

Extract Structured Data 'DIV'

Add Data Column

Add Data Column

Properties

UIPath.Core.Activities.AddDataColumn<System.Object>

Common

DisplayName Add Data Column

Input

Column A DataColumn object

ColumnName "Sentiment"

DataTable ExtractDataTable

Misc

Private

TypeArgument Object

Options

AllowDBNull Specifies whether the column can contain null values. ☐

AutoIncrement Specifies if the column is an auto-increment column. ☐

DefaultValue Specifies the default value for the column. ☐

MaxLength Specifies the maximum length of the column. ☐

Unique Specifies that the column values must be unique. ☐

Sentiment Analysis Flowchart

Flowchart3 > Flowchart3

Expand All Collapse All

Flowchart3

Start

Open Browser

Data Scraping

Output Data Table

Message Box

For Each Row in Data Table

Excel Application Scope

Properties

UIPath.Core.Activities.OutputDataTable

Common

DisplayName Output Data Table

Input

DataTable ExtractDataTable

Misc

Private

Output

Text dtAsString

Sentiment Analysis Flowchart

Flowchart3 > Flowchart3

Expand All Collapse All

Flowchart3

Data Scraping

Output Data Table

Message Box

For Each Row in Data Table

Excel Application Scope

Properties

UIPath.Core.Activities.MessageBox

Common

DisplayName Message Box

Input

Buttons Specifies which buttons to display. ☐

Caption The title of the message box. ☐

Text dtAsString

Misc

Private

TopMost If selected, always on top. ☐

Output

ChosenButton A string representing the chosen button. ☐

| Name | Variable type | Scope | Default |
|------------------|---------------|------------|---------------------------|
| ExtractDataTable | DataTable | Flowchart3 | New System.Data.DataTable |
| dtAsString | String | Flowchart3 | Enter a VB expression |
| Create Variable | | | |

Sentiment Analysis Flowchart

Flowchart3 > Flowchart3 > For Each Row in D...

Expand All Collapse All

For Each Row in Data Table

ForEach In ExtractDataTable

Body

MLSkill

Connection Mode Robot

MLSkill.SentimentAnalysis

Description: skill for sentiment analysis

Input Type: JSON

Description: Test to be analyzed.

Output Type: JSON

Description: JSON with class name and confidence on t...

Test Skill

Deserialize JSON

output_JSONResponse

Assign

row["Sentiment"] = JSONObject.Select

Assign

row["Confidence"] = JSONObject.Select

Properties

UIPath.Core.Activities.ForEachRow

Common

DisplayName For Each Row in Data Table

Input

DataTable ExtractDataTable

Misc

Private

Output

Index The zero-based index

Sentiment Analysis Flowchart

Flowchart3 > Flowchart3 > Excel Application...

Expand All Collapse All

Excel Application Scope

"sentiment analysis1.xlsx"

Do

Write Range

"Sheet1" "A1"

ExtractDataTable

Properties

UIPath.Excel.Activities.ExcelApplicationScope

Common

DisplayName Excel Application Scope

File

Edit password The password for editi...

Password The password of the w...

Workbook path "sentiment analysis1.x...

Misc

Private

Options

Create if not exists

InstanceCachePeriod 3000

MacroSetting EnableAll

Read-only

Save changes

Visible

Output

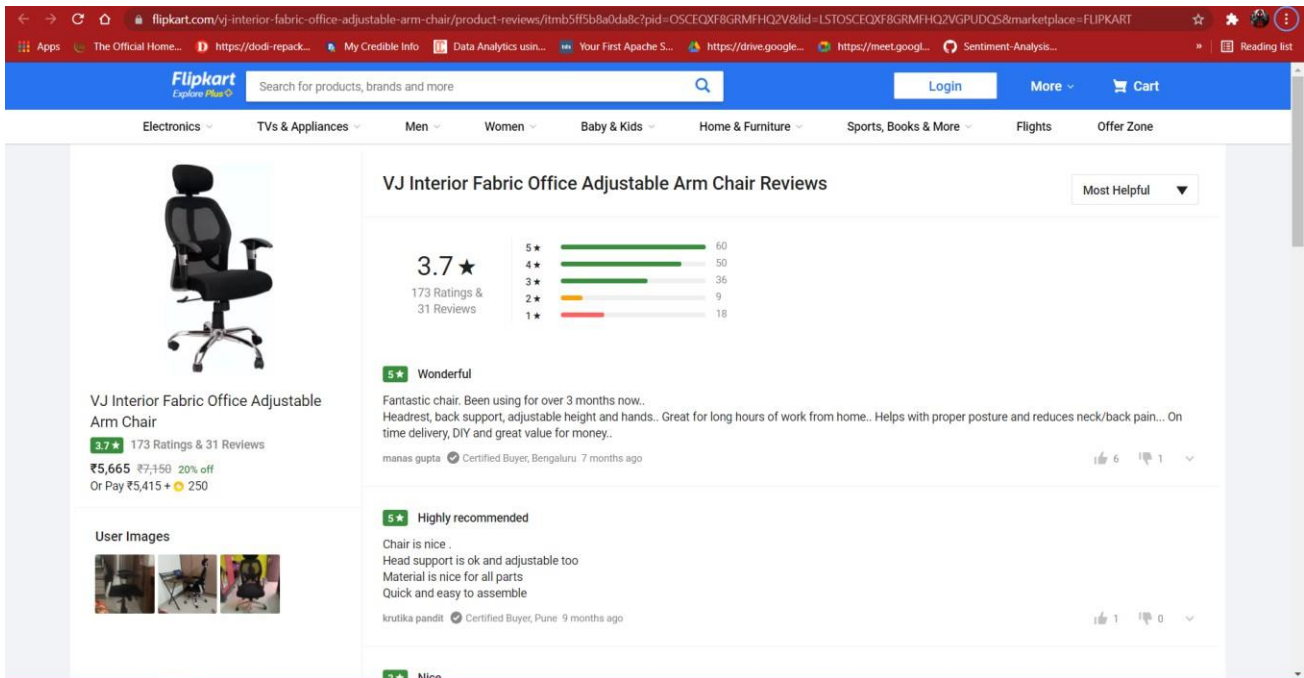
Workbook Enter a VB expression

Use Existing Workbook

ExistingWorkbook Enter a VB expression

Final Output:

We are taking reviews from this product from flipkart.com website:



VJ Interior Fabric Office Adjustable Arm Chair Reviews

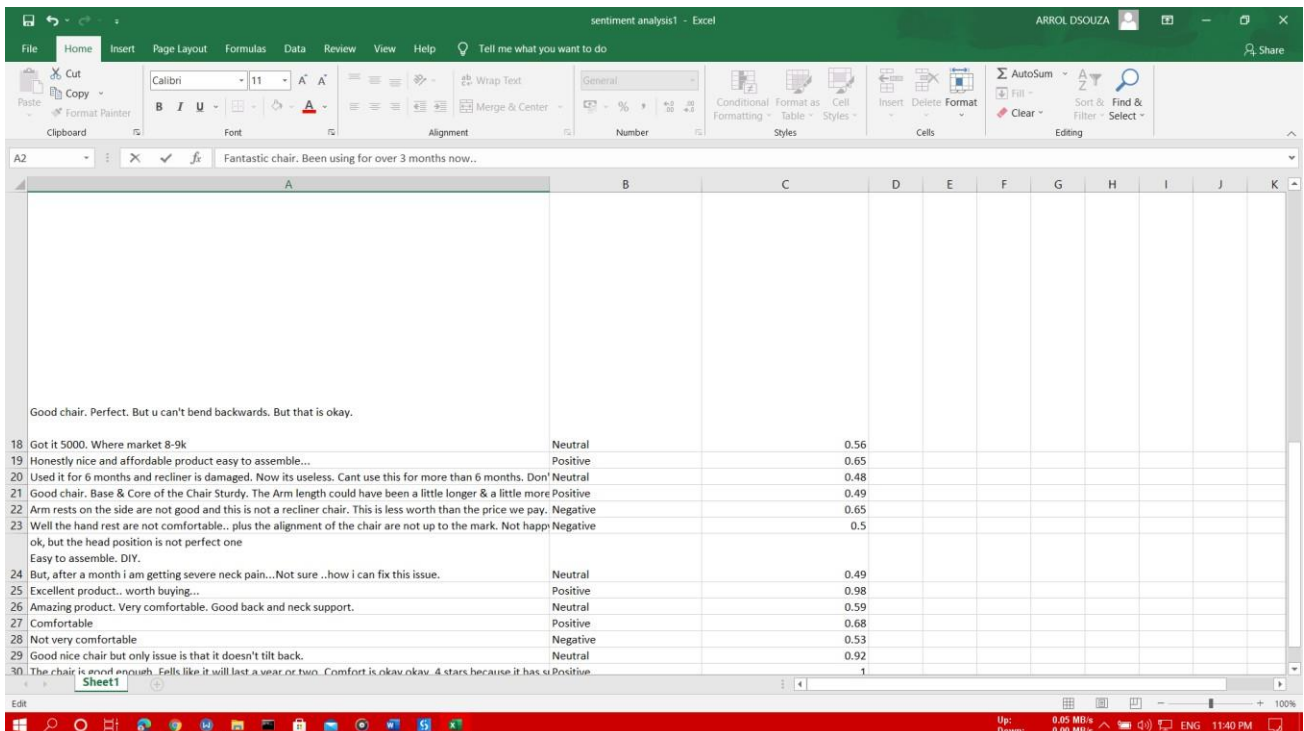
3.7★
173 Ratings & 31 Reviews

5★ Wonderful
Fantastic chair. Been using for over 3 months now.. Headrest, back support, adjustable height and hands.. Great for long hours of work from home.. Helps with proper posture and reduces neck/back pain... On time delivery, DIY and great value for money.
manas gupta Certified Buyer, Bengaluru 7 months ago

5★ Highly recommended
Chair is nice . Head support is ok and adjustable too Material is nice for all parts Quick and easy to assemble
krutika pandit Certified Buyer, Pune 9 months ago

3★ Nice

The sentiment predictions, and confidence scores of the reviews are stored in an excel sheet as follows:



| Review | Sentiment | Confidence |
|--|-----------|------------|
| 18 Got it 5000. Where market 8-9k | Neutral | 0.56 |
| 19 Honestly nice and affordable product easy to assemble... | Positive | 0.65 |
| 20 Used it for 6 months and recliner is damaged. Now its useless. Cant use this for more than 6 months. Don't | Neutral | 0.48 |
| 21 Good chair. Base & Core of the Chair Sturdy. The Arm length could have been a little longer & a little more | Positive | 0.49 |
| 22 Arm rests on the side are not good and this is not a recliner chair. This is less worth than the price we pay. Negative | Negative | 0.65 |
| 23 Well the hand rest are not comfortable.. plus the alignment of the chair are not up to the mark. Not happy | Negative | 0.5 |
| 24 Easy to assemble. DIY. | Positive | 0.49 |
| 25 But, after a month i am getting severe neck pain...Not sure ..how i can fix this issue. | Neutral | 0.49 |
| 26 Excellent product.. worth buying... | Positive | 0.98 |
| 27 Amazing product. Very comfortable. Good back and neck support. | Positive | 0.59 |
| 28 Comfortable | Positive | 0.68 |
| 29 Not very comfortable | Negative | 0.53 |
| 30 Good nice chair but only issue is that it doesn't tilt back. | Neutral | 0.92 |
| 30 The chair is good enough. Feels like it will last a year or two. Comfort is okay okay. 4 stars because it has a | Positive | 1 |

CONCLUSION:

We were successfully able to predict the sentiments of the user reviews using the concepts of RPA. We were able to predict the sentiments and estimate the confidence of predictions, and store the results in an excel sheet.

The predictions were highly accurate, although, there were some wrong predictions, but they were mostly because of gramatical and spelling mistakes within the reviews.