

PROFESSIONAL TRAINING REPORT

AT

**Sathyabama Institute of Science and Technology
(Deemed to be University)**

Submitted in partial fulfillment of the requirements for the award
Of Bachelor of Technology Degree in Information Technology

By

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DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

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Accredited with Grade “A” by NAAC

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APRIL-2023



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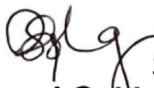
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BONAFIDE CERTIFICATE

This is to certify that this project report is the bonafide work of **AVINASH K, 40120014** who carried out the project entitled "**CURRENCY EXCHANGE ANALYSIS**" under my supervision from January 2023 to April 2023.


26/April/2023
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TRAINING CERTIFICATE

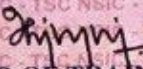
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us for a period of one week(30 Hours) from
09.03.2023 to 14.03.2023.




HEAD OF TRAINING


HEAD OF CENTRE

ABSTRACT

We analyze India's exchange rate regime through the prism of exchange market pressure. We estimate the various regimes that India's exchange rate has been through during the period from 2022 to 2023. We find four specific regimes of the which EMP in India has either been resisted through foreign exchange market intervention, or relieved through exchange rate change, across these four exchange rate regimes. We find that in only one of the four regimes the rupee-dollar exchange rate was relatively more flexible and the share of exchange rate in EMP absorption was the highest. This regime corresponded with the aftermath of the 2008 global crisis. In contrast, after 2013 the exchange rate was actively managed using spot as well as forward market intervention. We also find that the RBI has been intervening in the foreign exchange market in an asymmetric fashion to prevent the rupee from appreciating.

Keywords: Exchange rate regime, Forex intervention, Reserves, Exchange market pressure, Structural change

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ABBREVIATION AND EXPANSION

ABBREVIATIONS

EXPANSION

INR	INDIAN RUPEE
USD	UNITED STATES DOLLAR
GBP	BRITISH POUND STERLING
EUR	EUROPEAN DOLLAR
SGD	SINGAPORE DOLLAR
RUB	RUSSIAN RUBLE
NZD	NEWZEALAND DOLLAR
MYR	MALAYSIAN RINGGIT
LKR	SRILANKAN RUPEE
JPY	JAPANESE YEN
CNY	CHINESE YUAN RENMINBI
AUD	AUSTRALIAN DOLLAR
RMSE	ROOT MEAN SQUARE ERROR

1.INTRODUCTION

Currency exchange businesses, both physical and online, allow you to exchange one country's currency for another by executing buy and sell transactions. For example, if you have U.S. dollars and you want to exchange them for Australian dollars, you would bring your U.S. dollars (or bank card) to the currency exchange store and buy Australian dollars with them. The amount you would be able to purchase would be dependent on the international spot rate, which is basically a daily changing value set by a network of banks that trade currencies. The currency exchange store will modify the rate by a certain percentage to ensure that it makes a profit on the transaction. For example, suppose the spot rate for exchanging U.S. dollars into Australian dollars is listed as 1.2500 for the day. This means that for each U.S. dollar spent, you can buy 1.25 Australian dollars if traded at the spot rate. But the currency exchange store may modify this rate to 1.20, meaning you can buy 1.20 Australian dollars for 1 U.S. dollar. With this hypothetical rate change, their fee would effectively be 5 cents on the dollar.

Because the transaction is not conducted at the spot rate, and depends on the profit that the exchange wants to make, consumers may find that it is less expensive to incur ATM or credit card fees at the foreign destination, rather than use exchange services ahead of time. Travelers are advised to estimate how much money they will spend on a trip and compare the amounts saved through typical transactions. A currency exchange is a licensed business that allows customers to exchange one currency for another. Currency exchange of physical money (coins and paper bills) is usually done over the counter at a teller station, which can be found in various places such as airports, banks, hotels, and resorts. Currency exchanges make money by charging a nominal fee and through the bid-ask spread in a currency. Also known as a "bureau de change" or "casa de Cambio," a currency exchange should not be confused with the foreign exchange (forex) market where traders and financial institutions transact in currencies. The largest users of the foreign exchange market are commercial banks, which serve as intermediaries between currency buyers and sellers. Corporations and financial institutions also trade currencies.

2. AIM AND SCOPE

2.1 AIM

A currency exchange is a business that helps travelers exchange different types of currencies. Different countries use different currencies. For example, the United States uses dollars and much of Europe uses euros. Typically, businesses will use the currency issued by the local government, though in some cases businesses may be willing to make transactions in a few different currencies. If you travel to a country that uses a different currency than the one from your home country, you most likely won't be able to use the money you brought with you at the majority of businesses. Instead, you need to visit a currency exchange to trade in your currency for the one used in the country you're visiting. For example, if you visit Japan from the U.S., you'll have to trade your dollars in for yen. Some currency exchanges even let you exchange traditional currencies for cryptocurrencies. There are also other ways to get local currency. Many banks will let you use your debit card in foreign countries to withdraw money in the local currency, even though your account holds a different type of money.

You're exchanging the currency in your bank account for a different type of money. Currency exchanges list the exchange rate between different currencies. Often, currency exchange booths in airports and other travel hubs will provide a slightly worse exchange rate than is available elsewhere, or charge high fees, to help them earn a profit from exchanging currencies. The foreign exchange hedging profile shows how an organization can set a benchmark level based on future forecasts or purchases using a specific currency, such as US Dollars. And throughout time, the company can continuously hedge their benchmark. The ability of these reports to extract huge amounts of information, from both local and global markets, enables an organization to gain real-time analysis on their position within the foreign exchange market. The foreign exchange markets are decentralized and consist of thousands of businesses and governments throughout the world that buy and sell currency. Governments have a special interest in foreign exchange because an unstable or rapidly falling price for their currency can create economic disruption. Therefore, governments, or their central banks, intervene in foreign exchange through open market activities, namely, buying or selling of currencies to influence the exchange rate for their own. Other common players in foreign exchange markets include portfolio managers, foreign currency brokers, and commercial banks.

2.2 SCOPE

The Forex market is the most liquid market in the world because of its 24-hour trading activity. In this, users have the ability to buy and sell with minimal changes. Due to this, liquidity in the Forex market allows the people to trade with little risk. There are no prohibitions in the case of directional trading in the foreign currency exchange market. As you know that traders are buying or selling currency that depends on the status of the market. Forex market works around the globe and due to this trading occurs continuously in the market. It is open five days a week, and for 24 hours a day. Due to this, there is no kind of issue while doing online currency conversion. There are large numbers of people who are working in this field. So, there is no chance of controlling the market by a single organization. This advantage shows the importance of foreign exchange as an investment opportunity. In other words, there are no middlemen, and brokers to act as a medium between buyers and sellers.

If we talk about the transaction fees, you need to spend a small amount of money for the whole process of money conversion. There is no need for a huge amount of money required to begin online Forex trading and there are no significant transaction charges. You will get transparency in the whole currency conversion process from start to end. The users have no issue and get an exchange of currency without any hassle. Every year due to technological advancement, you can get major advantages to use foreign money exchange services. You will get your desired need accomplished in a minimal period. Today, there are a number of software's and mobile applications that are available for real-time trade from anywhere. There are a lot of benefits of using services of currency exchange that save your precious time. In this saved time, you can make plans for your journey even more effectively. Furthermore, in a foreign country, there is no kind of obstacle you will face due to lack of money. We hope after reading this blog you will get all answers to the queries that you have before reading. The foreign exchange market determines exchange rates. When demand for the currency of one country goes up in relation to that of another, the first currency is said to be more valuable (or stronger) in terms of the second currency.

3 SYSTEM REQUIREMENTS

3.1 Windows

- Microsoft® Windows® 7/8/10 64-bit
- 4 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum,
- 4 GB Recommended 500 MB for IDE + 1.5 GB for Android SDK and emulator system image
- 1280 x 800 minimum screen resolution

3.2 Mac

- Mac® OS X® 10.10 Yosemite or higher, up to 10.14 macOS Mojave
- 4 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum,
- 4 GB Recommended 500 MB for IDE + 1.5 GB for Android SDK and emulator system image
- 1280 x 800 minimum screen resolution

3.3 Linux

- GNOME or KDE desktop - Tested on Linux based on Debian.
- 64-bit distribution capable of running 32-bit applications
- GNU C Library glibc 2.19 or later 17
- 4 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum

4 METHODOLOGY

4.1 DATA COLLECTION

Once the project undertaking is completely comprehended, our subsequent stage is to gather the information that is required for future model building. The information accumulation was an issue as data was not situated at a single source. The data was kept in unique information design. To achieve the end goal, it requires a clear understanding of the correct location of the data. As we can see the Currency Exchange Bureau statistics gives detailed information on every single currency exchange rate, which incorporates their current high, current low, current price, current exchange rates at the time interval usually months. We consolidated a portion of the information properties with currency exchange bureaus to shape a join data set.

Since the datasets for every year are very massive, we decrease our concentration to one-year, i.e., 2018, which as of now contains 365 days records for the most significant currencies in the world. In this venture, we have taken 2022 as our preparation set and 2023 as our test set. There are also various factors affecting the exchange rates of the currencies such as inflation, interest rates, government debt/public, potential stability, economic recession, terms of trade, current account deficit, confidence and speculation, government intervention, the stock markets and etc., the datasets are taken based on the above factors that affect the exchange rates.

Regardless of the field of study or preference for defining data (quantitative, qualitative), accurate data collection is essential to maintaining the integrity of research. Both the selection of appropriate data collection instruments (existing, modified, or newly developed) and clearly delineated instructions for their correct use reduce the likelihood of errors occurring. inability to answer research questions accurately, inability to repeat and validate the study, distorted findings resulting in wasted resources, misleading other researchers to pursue fruitless avenues of investigation, compromising decisions for public policy causing harm to human participants and animal subjects.

4.2 DATA MINING

In this section, there is an overview of the process of data mining and data modeling, collecting the data, through the data preparation and finally the data modeling. Data cleaning and formatting can be considered as the most critical part of the whole project according to several data scientists. Figure shows how the process of data mining works to extract knowledge using algorithms.

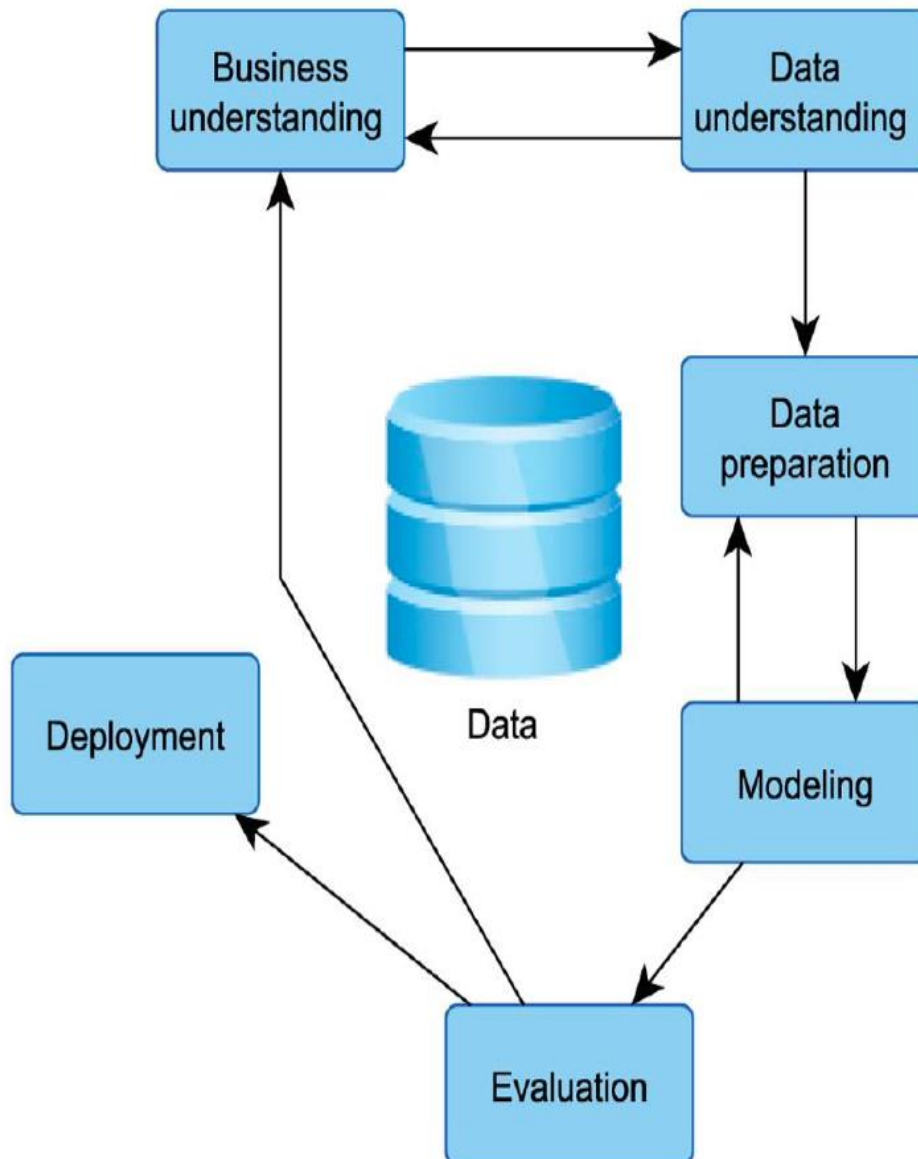


FIGURE 4.1: DATA MINING ARCHITECTURE

4.3 DATA ANALYSIS

The process of data analysis, or alternately, data analysis steps, involves gathering all the information, processing it, exploring the data, and using it to find patterns and other insights. The process of data analysis consists of: Data Requirement Gathering: Ask yourself why you're doing this analysis, what type of data you want to use, and what data you plan to analyze.

Data Collection: Guided by your identified requirements, it's time to collect the data from your sources. Sources include case studies, surveys, interviews, questionnaires, direct observation, and focus groups. Make sure to organize the collected data for analysis. Data Cleaning: Not all the data you collect will be useful, so it's time to clean it up. This process is where you remove white spaces, duplicate records, and basic errors. Data cleaning is mandatory before sending the information on for analysis.

Data Analysis: Here is where you use data analysis software and other tools to help you interpret and understand the data and arrive at conclusions. Data analysis tools include Excel, Python, R, Looker, Rapid Miner, Charito, Meta base, Rehash, and Microsoft Power BI. Data Interpretation: Now that you have your results, you need to interpret them and come up with the best courses of action based on your findings.

Data Visualization: Data visualization is a fancy way of saying, "graphically show your information in a way that people can read and understand it." You can use charts, graphs, maps, bullet points, or a host of other methods. Visualization helps you derive valuable insights by helping you compare datasets and observe relationships.

If you want to make informed decisions, you need data, but there's more to it. The data in question must be accurate. Data analysis helps businesses acquire relevant, accurate information, suitable for developing future marketing strategies, business plans, and realigning the company's vision or mission. A simple example of data analysis can be seen whenever we make a decision in our daily lives by evaluating what has happened in the past or what will happen if we make that decision. Basically, this is the process of analyzing the past or future and making a decision based on that analysis.

4.4 TYPES OF DATA ANALYSIS

The four types of data analysis are:

- Descriptive Analysis
- Diagnostic Analysis
- Predictive Analysis
- Prescriptive Analysis

4.4.1 DESCRIPTIVE ANALYSIS

Descriptive analytics answer the question, “What happened?”. This type of analytics is by far the most commonly used by customers, providing reporting and analysis centered on past events. It helps companies understand things such as:

- How much did we sell as a company?
- What was our overall productivity?
- How many customers churned in the last quarter?

Descriptive analytics is used to understand the overall performance at an aggregate level and is by far the easiest place for a company to start as data tends to be readily available to build reports and applications. It’s extremely important to build core competencies first in descriptive analytics before attempting to advance upward in the data analytics maturity model. Core competencies include things such as data modeling fundamentals, communicating data with right visualization and basic dashboard skills.

It’s likely you’ve adopted some form of descriptive analytics internally, whether that be static P&L statements, PDF reports, or reporting within an analytics tool. For a true descriptive analytics program to be implemented, the concepts of repeatability and automation of tasks must be top of mind. Repeatability in that a data process is standardized and can be regularly applied with minimal effort (think a weekly sales report), and automation in those complex tasks (VLOOKUPS, merging of excel spreadsheets, etc.) are automated—requiring little to no manual intervention.

4.4.2 DIAGNOSTIC ANALYSIS

Diagnostic analytics, just like descriptive analytics, uses historical data to answer a question. But instead of focusing on “what”, diagnostic analytics addresses the critical question of why an occurrence or anomaly occurred within your data. Diagnostic analytics also happens to be the most overlooked and skipped step within the analytics maturity model. Anecdotally, I see most customers attempting to go from “what happened” to “what will happen” without ever taking the time to address the “why did it happen” step. This type of analytics helps companies answer questions such as:

- Why did our company sales decrease in the previous quarter?
- Why are we seeing an increase in customer churn?
- Why is a specific basket of products vastly outperforming their prior year sales figures?

Diagnostic analytics tends to be more accessible and fit a wider range of use cases than machine learning/predictive analytics. You might even find that it solves some business problems you earmarked for predictive analytics use cases. Being at the diagnostic analytics phase likely means you’ve adopted a modern analytics tool. Most modern analytics tools contain a variety of search-based, or lightweight artificial intelligence capabilities.

These features allow for detailed insights a layer deeper (for example: the Key Drivers visualization in Power BI, or Qlik’s search-based insight functionality). To be clear, these are an effective lightweight means to address diagnostic analytics use cases but are not a means to a full-scale implementation. Software vendors like Sisu have built their core business around addressing diagnostic analytics use cases (what they call “augmented analytics”) and are a great bet. Diagnostic analytics is an important step in the maturity model that unfortunately tends to get skipped or obscured. If you cannot infer why your sales decreased 20% in 2020, then jumping to predictive analytics and trying to answer “what will happen to sales in 2021” is a stretch in advancing upward in the analytics maturity model.

4.4.3 PREDICTIVE ANALYSIS

Predictive analytics is a form of advanced analytics that determines what is likely to happen based on historical data using machine learning. Historical data that comprises the bulk of descriptive and diagnostic analytics is used as the basis of building predictive analytics models. Predictive analytics helps companies address use cases such as:

- Predicting maintenance issues and part breakdown in machines.
- Determining credit risk and identifying potential fraud.
- Predict and avoid customer churn by identifying signs of customer dissatisfaction.

At the outset of any predictive analytics build, three core elements need to be established:

- Identify a problem to solve,
- Define what is you want to predict, and
- State what you will achieve by doing so.

To start you should collect existing data, organize data in a useful way to allow for data modeling, cleanse your data and review overall quality, and finally determine your modeling objective.

While modeling takes up the spotlight in predictive analytics, data prep is a crucial step that needs to happen first. This is why organizations with a rock-solid foundation in descriptive and diagnostic analytics are better equipped to handle predictive analytics. Simply put, the time and effort to prep, transform, and ensure data quality for retrospective reporting has already taken place. The groundwork should be relatively well laid to quickly identify and leverage data for the modeling phase. I always encourage customers with well-defined KPIs and business logic in a specific business reporting area (think sales reporting for example) to use that as the first predictive analytics use case. The goal is to derive value quickly, and there is no better place to start than an area where you know data is well defined and of high quality.

4.4.4 PRESCRIPTIVE ANALYSIS

Prescriptive analytics is the fourth and final pillar of modern analytics. Prescriptive analytics pertains to true guided analytics where your analytics is prescribing or guiding you toward a specific action to take. It is effectively the merging of descriptive, diagnostic, and predictive analytics to drive decision making. Existing scenarios or conditions (think your current fleet of freight trains) and the ramifications of a decision or occurrence (parts breakdown on the freight trains) are applied to create a guided decision or action for the user to take (proactively buy more parts for preventative maintenance).

Prescriptive analytics requires strong competencies in descriptive, diagnostic, and predictive analytics which is why it tends to be found in highly specialized industries (oil and gas, clinical healthcare, finance, and insurance to name a few) where use cases are well defined. Prescriptive analytics help to address use cases such as:

- Automatic adjustment of product pricing based on anticipated customer demand and external factors.
- Flagging selects employees for additional training based on incident reports in the field.

Prescriptive analytics' primary aim is to take the educated guess or assessment out of data analytics and streamline the decision-making process. Prescriptive analytics is commonly considered the merging of descriptive, diagnostic, and predictive analytics. Getting started isn't so much a step-by-step list but rather the time and effort up front to build your competencies within the analytics maturity curve.

Simply put, there is no starting point in prescriptive analytics without the requisite first three pillars of modern analytics being established first. If you're ready for prescriptive analytics, then quantifying your call to action and the underlying criteria will be the first requirement. For example: if the use case is to call corrective action for an employee (i.e. – additional training based on poor performance) then the factors that necessitate this action must be firmly established and the action itself must be clearly defined. Knowing how each kind of analytics helps you better understand your data and how to use it.

4.5 POWER BI

Microsoft Power BI is a business intelligence (BI) platform that provides nontechnical business users with tools for aggregating, analyzing, visualizing and sharing data. Power BI's user interface is fairly intuitive for users familiar with Excel, and its deep integration with other Microsoft products makes it a versatile self-service tool that requires little upfront training.

Users can download an application for Windows 10, called Power BI Desktop, and native mobile apps for Windows, Android and iOS devices. There is also Power BI Report Server for companies that must maintain their data and reports on premises. That version of Power BI requires a special version of the desktop app -- aptly called Power BI Desktop for Power BI Report Server.

4.5.1 USES OF POWER BI

Microsoft Power BI is used to find insights within an organization's data. Power BI can help connect disparate data sets, transform and clean the data into a data model and create charts or graphs to provide visuals of the data. All of this can be shared with other Power BI users within the organization.

The data models created from Power BI can be used in several ways for organizations, including the following:

- telling stories through charts and data visualizations;
- examining "what if" scenarios within the data; and
- creating reports that can answer questions in real time and help with forecasting to make sure departments meet business metrics.

Power BI can also provide executive dashboards for administrators or managers, giving management more insight into how departments are doing.

4.5.2 FEATURES OF POWER BI

Microsoft has added a number of data analytics features to Power BI since its inception and continues to do so. Some of the most important features are the following:

Artificial intelligence. Users can access image recognition and text analytics in Power BI, create machine learning models using automated ML capabilities and integrate with Azure Machine Learning.

Hybrid deployment support. This feature provides built-in connectors that allow Power BI tools to connect with a number of different data sources from Microsoft, Salesforce and other vendors.

Quick Insights. This feature allows users to create subsets of data and automatically apply analytics to that information.

Common data model support. Power BI's support for the common data model allows the use of a standardized and extensible collection of data schemas (entities, attributes and relationships).

Cortana integration. This feature, which is especially popular on mobile devices, allows users to verbally query data using natural language and access results using Cortana, Microsoft's digital assistant.

Customization. This feature allows developers to change the appearance of default visualization and reporting tools and import new tools into the platform.

APIs for integration. This feature provides developers with sample code and application program interfaces (APIs) for embedding the Power BI dashboard in other software products.

Self-service data prep. Using Power Query, business analysts can ingest, transform, integrate and enrich big data into the Power BI web service. Ingested data can be shared across multiple Power BI models, reports and dashboards.

Modeling view. This allows users to divide complex data models by subject area into separate diagrams, multiselect objects and set common properties, view and modify properties in the properties pane, and set display folders for simpler consumption of complex data models.

4.5.3 POWER BI EMBEDDED ANALYTICS

Power BI embedded analytics allows you to embed your Power BI items such as reports, dashboards and tiles, in a web application or in a website. Power BI embedded analytics gives you additional benefits over secure embed. It offers a rich, fully integrated experience with full API support, automatic authentication, and the reports can be hosted in apps as well as web pages. Embedded analytics allows you to automate the monitoring, management, and deployment of analytics, while getting full control of Power BI features and intelligent analytics.

Power BI Embedded has basically the same features as Power BI Premium.

You can:

- Deliver compelling data experiences for your end users, enabling them to take action based on insights from your solutions data.
- Quickly and easily provide exceptional customer-facing reports, dashboards, and analytics in your own apps by using and branding Power BI as your own.

4.5.4 SECURE EMBED

Secure embed is the simplest no-code way to embed a report into any portal that accepts a URL or frame. The viewer of the report must have the proper Power BI license. The viewer can interact with the report, but not edit, save, or make any changes to it. Secure embed is available in the Power BI service. For more advanced solutions that give your users more flexibility and control, use one of the Power BI embedded analytics solutions described in this article.

Anyone on the Internet can view your reports, and you have no control over who sees what you've published. They don't need a Power BI license. Publishing to the web is available only for reports that you can edit. You can't publish reports to the web if they're shared with you or if they're in an app.

4.6 ARCHITECTURE

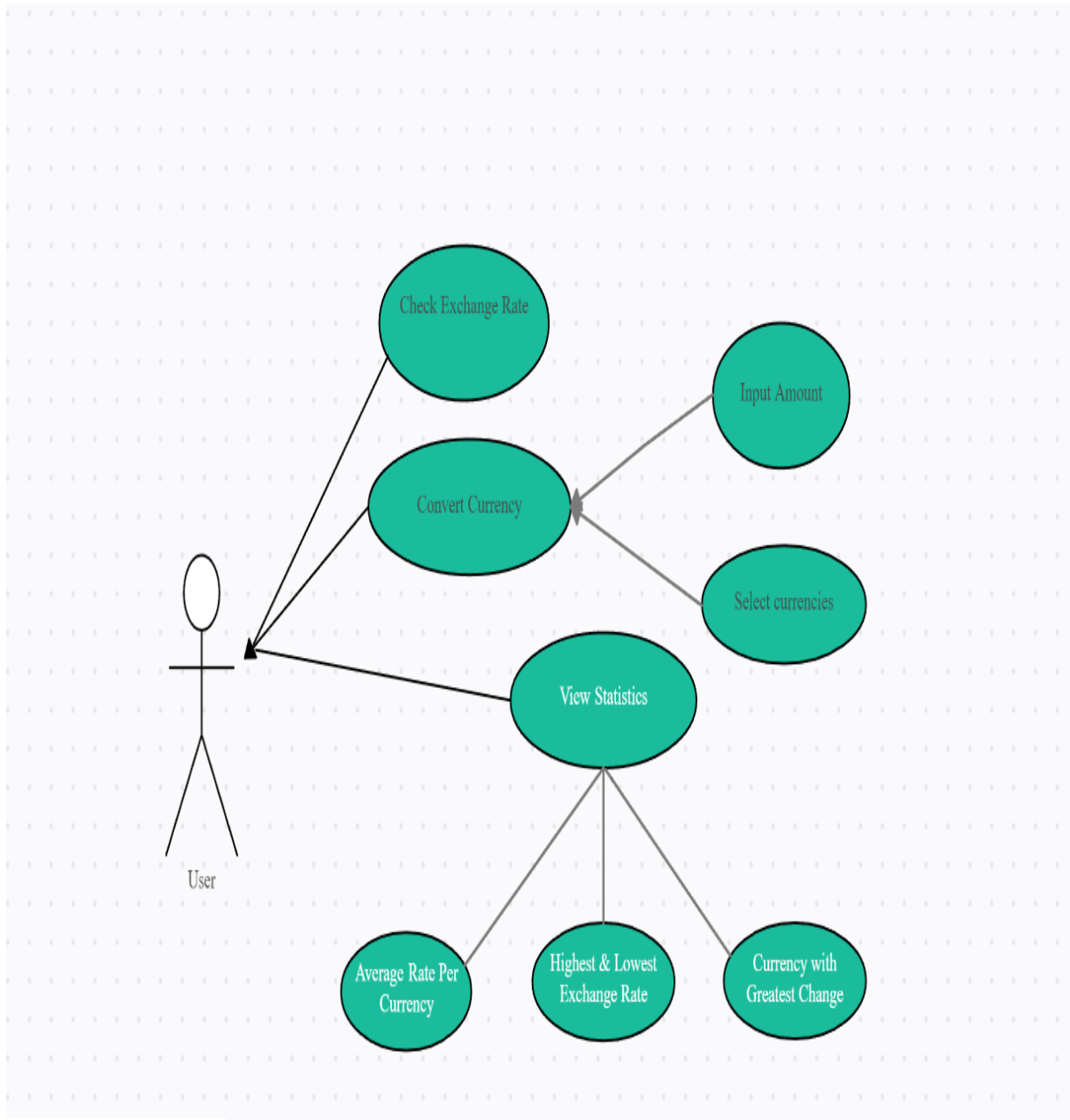


FIGURE 4.2: ARCHITECTURE

4.7 PROJECT IMPLEMENTATION

The project is implemented in Microsoft excel and Microsoft power Bi. The Microsoft excel is used to collect the data and form the data set into the table. Microsoft power bi is used to analyze and transform the raw data into an analyzable format.

We need to collect the datasets for price of various currencies. We need to collect the INR price of USD, EURO, POUND, NZD, MYR, AUD, SGD etc.,

The dataset includes:

- Exchange rates of currency of one year
- Increasing rate of currencies every month

Now enter the dataset in Microsoft excel sheet as per the date and month. Next one is the main objective of the project that is outcome of currency exchange.

The value of currency exchange rate depends on various factor namely:

- Current value
- Current High
- Current Low
- Rate of increase
- Rate of decrease

Now collect the dataset of these values for all the currencies. Import to the excel sheet. These data are taken for the currencies such as us dollar, European currency, Indian rupee, pound, Singapore dollar, Sri Lankan rupee, Australian dollar, Chinese yuan etc.,

Then import the excel sheet into the Microsoft power bi.

The following diagram shows the datasets taken:

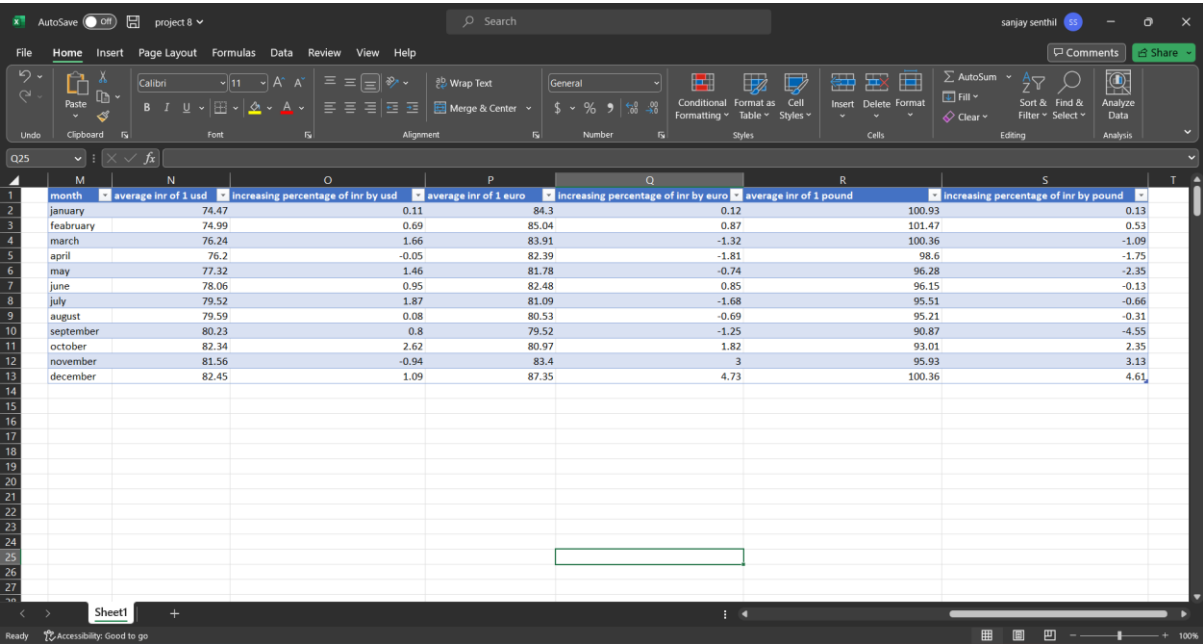


FIGURE 4.3: DATASET 1

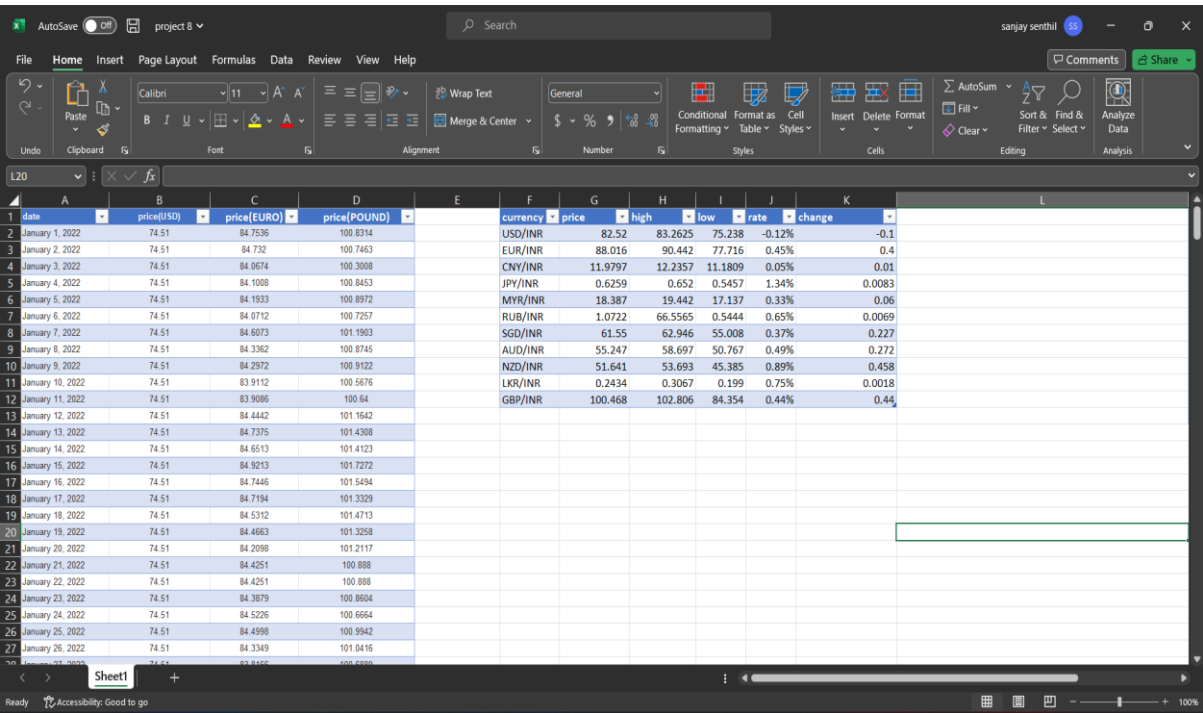


FIGURE 4.4: DATASET 2

5 RESULTS AND DISCUSSION

As a first exploratory examination, we consider the watched likelihood of deferral in minutes on the whole dataset. The best path is through a histogram and graphs.

5.1 PREDICTION

Although its primary purpose is data visualization, Power BI contains surprisingly powerful predictive forecasting options, specifically in the area of time series forecasting. Time series forecasting is defined as taking a model that is fit to historical data and using it to predict future observations. That is, predicting what a certain numerical value (e.g., sales or revenue) will be at a specific point in the future.

There are many different statistical models and methods that can be applied in this use case, but with Power BI, the end user doesn't have to worry about the behind-the-scenes math going on. Instead, they can use one of Power BI's preexisting visualization tools to quickly build a forecast model and visualize the results. If you'd like to learn more about the math behind the model, we recommend reading this blog post, which goes into detail on the math behind numerous different types of time series models.

- We need to upload the data of INR value of one USD (For minimum one year)
- Draw a line chart for the above data and enable forecast.
- Using this graph, we can predict the INR value of one USD for upcoming days.

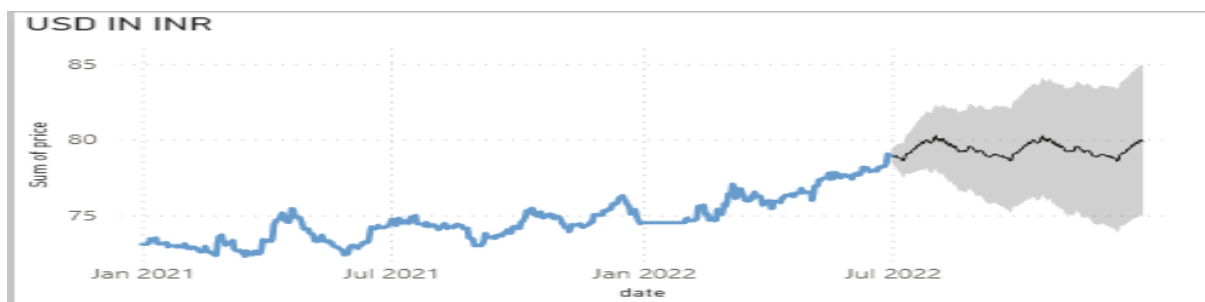


FIGURE 5.1: PREDICTION TABLE

5.1.1 ACCURACY OF MODEL

The accuracy of the model can be determined by comparing the original value and the predicted value. First, we need to predict the value for already existing value using the model and find the difference between them. By taking the root mean square error, we can determine the accuracy of the model. If the RMSE is between or closer to 0 to 1, the model predicts accurate value.

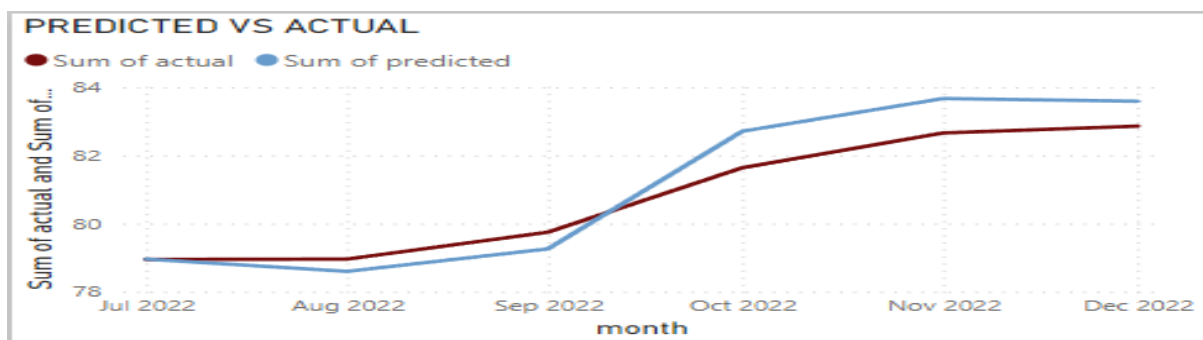


FIGURE 5.2: Accuracy

5.1.2 ROOT MEAN SQUARE ERROR

The Root Mean Squared Error (RMSE) is one of the two main performance indicators for a regression model. It measures the average difference between values predicted by a model and the actual values. It provides an estimation of how well the model is able to predict the target value (accuracy). In this model, we calculated the predicted value for six months. Using this predicted and original value for these six months we can calculate root mean square error, thus the RMSE of a model can be determined as 0.703. since it is closer to zero it is a good model.

month	actual	predicted
1-Jul-22	78.95	78.96
1-Aug-22	78.96	78.6
1-Sep-22	79.75	79.26
1-Oct-22	81.64	82.71
1-Nov-22	82.66	83.67
1-Dec-22	82.86	83.59

FIGURE 5.3: RMSE

5.2 Q & A

A report designer can add a specific type of interactive visual called the Q&A visual. Power BI report end users can ask natural language questions and create a new report visual that represents the answer to the question. The Q&A visual behaves like any other visual in a report. Cross-filter, cross-highlight, bookmarks, and comments are enabled.

Q&A visuals have a question box across the top of the visual. You type your question into the question box and Q&A responds with a visual. The Q&A visual can be used over and over again to ask questions about your data. When you leave the report, the Q&A visual resets to its default.

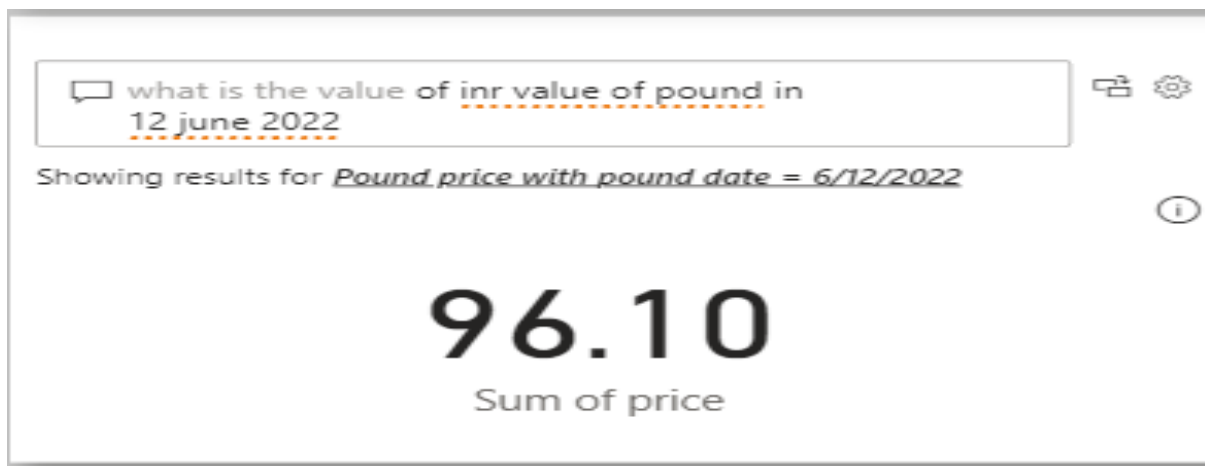


FIGURE 5.4: Q&A

- Q&A feature lets you explore your data or query your data in your own words.
- The smart narrative visualization helps you provide a quick text summary of visuals & reports.

The Q&A feature in Power BI lets you explore your data in your own words by using natural language. Q&A is interactive, even fun. Often, one question leads to others as the visualizations reveal interesting paths to pursue. Asking the question is just the beginning.

5.3 SMART NARRATIVE:

The smart narrative visualization helps you provide a quick text summary of visuals and reports. It provides relevant innovative insights that you can customize. Use smart narrative summaries in your reports to address key takeaways, to point out trends, and to edit the language and format for a specific audience.

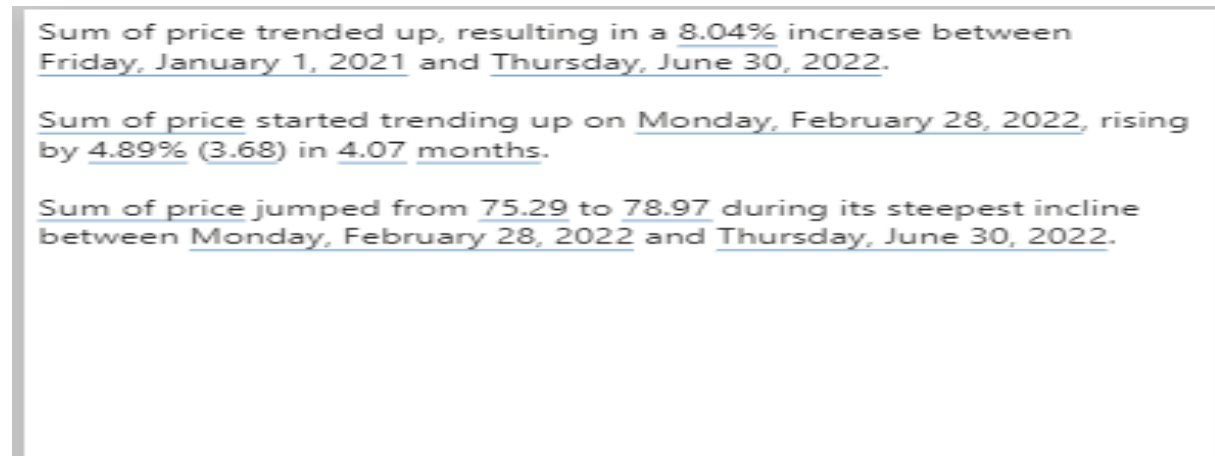


FIGURE 5.5: SMART NARRATIVE

- Q&A feature lets you explore your data or query your data in your own words.
- The smart narrative visualization helps you provide a quick text summary of visuals & reports.

You see a narrative that's based on all of the visuals on the page. For example, in the sample file, smart narratives can automatically generate a summary of the report's visuals that address revenue, website visits, and sales. Power BI automatically analyzes trends to show that revenue and visits have both grown. It even calculates growth, which in this case is 72 percent. Sometimes a hidden-summary symbol appears in the smart narrative. It indicates that current data and filters produce no result for the value. A summary is empty when no insights are available.

5.4 USD ANALYSIS

The USD (United States dollar) is the official currency of the United States of America. The United States dollar, or U.S. dollar, is made up of 100 cents. It is represented by the symbol \$ or US\$ to differentiate it from other dollar-based currencies.

The U.S. dollar is considered a benchmark currency and is the most used currency in transactions across the world. In addition, it is used as the official currency in many territories outside of the U.S., while many others use it alongside their own as an unofficial currency.



FIGURE 5.6: USD ANALYSIS

The U.S. Dollar Index (USDIX) is an index (or measure) of the value of the United States dollar relative to a basket of foreign currencies. These currencies are the Euro (constituting 57.6% of the weighting), Japanese Yen (13.6%), British Pound (11.9%), Canadian Dollar (9.1%), Swedish Krona (4.2%) and Swiss Franc (3.6%). The index started in 1973 -with the absorption of Bretton Woods- with a base of 100.000, and values since then are relative to this base. For example, if the current reading says 99.800, this means that the dollar has fallen 0.2% since the start of the index (99.800 - 100.000).

Being the Dollar Index a geometrically weighted index and not a trade-weighted one, it is too concentrated in Europe and does not include two of the U.S. top four trading partners Mexico and China. It does not appear to be used by corporates or many asset managers, like mutual funds, insurance companies, and endowments. It is primarily a speculative vehicle. It's also important to acknowledge that a geometric mean artificially lowers the value of the USD over time.

5.5 AVERAGE INR OF 1 USD

This image shows the graph that contains the average INR value of 1 us dollar. This is based on the data of INR value of 1 USD in the year of 2022. the average value of USD for every month is calculated and compared. For example, the average INR value of 1 USD in the month of January is 74.47 INR

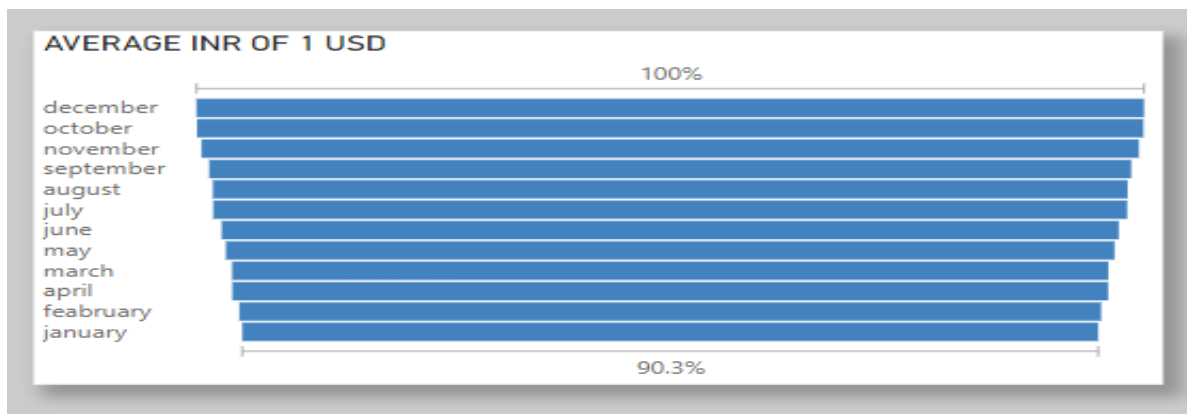


FIGURE 5.7 : AVERAGE USD

5.6 INCREASING RATE OF USD

Increasing rate is defined as the speed of change in the value of a currency. The currency price may increase or decrease due to various factors. in this image the increasing rate of USD every month is shown. For example, the increasing rate of USD in the month of January is 0.11% and April is -0.05%.

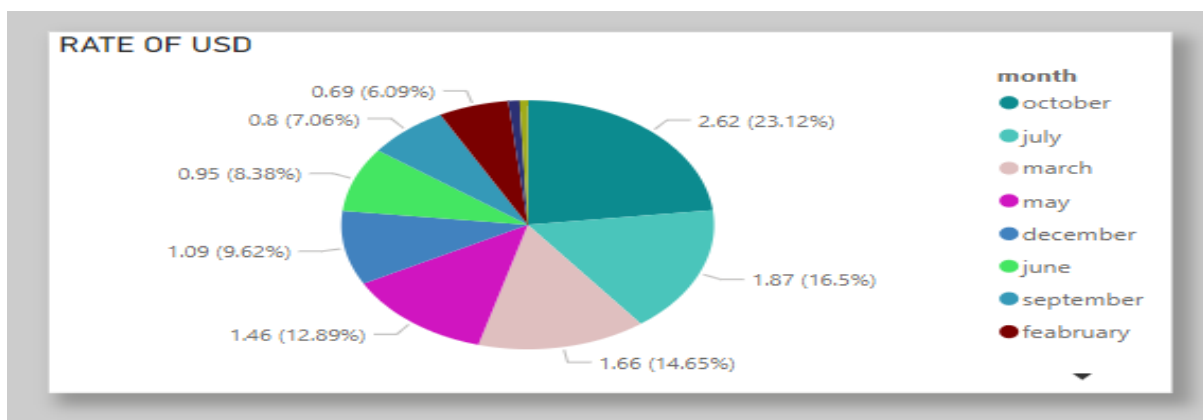


FIGURE 5.8: INCREASING RATE OF USD

5.7 POUND ANALYSIS

Sterling is the currency of the United Kingdom and nine of its associated territories.¹ The pound (sign: £) is the main unit of sterling, and the word "pound" is also used to refer to the British currency generally, often qualified in international contexts as the British pound or the pound sterling.

Sterling is the world's oldest currency that is still in use and that has been in continuous use since its inception. It is currently the fourth most-traded currency in the foreign exchange market, after the United States dollar, the euro, and the Japanese yen.^[8] Together with those three currencies and Renminbi, it forms the basket of currencies which calculate the value of IMF special drawing rights. As of late 2022, sterling is also the fourth most-held reserve currency in global reserves.^[9]



FIGURE 5.9: POUND ANALYSIS

The Bank of England is the central bank for sterling, issuing its own banknotes, and regulating issuance of banknotes by private banks in Scotland and Northern Ireland. Sterling banknotes issued by other jurisdictions are not regulated by the Bank of England; their governments guarantee convertibility at par. Historically, sterling was also used to varying degrees by the colonies and territories of the British Empire.

5.8 AVERAGE INR OF 1 POUND

This image shows the graph that contains the average INR value of 1 POUND. This is based on the data of INR value of 1 POUND in the year of 2022. the average value of POUND for every month is calculated and compared. For example, the average INR value of 1 POUND in the month of January is 100.03 INR

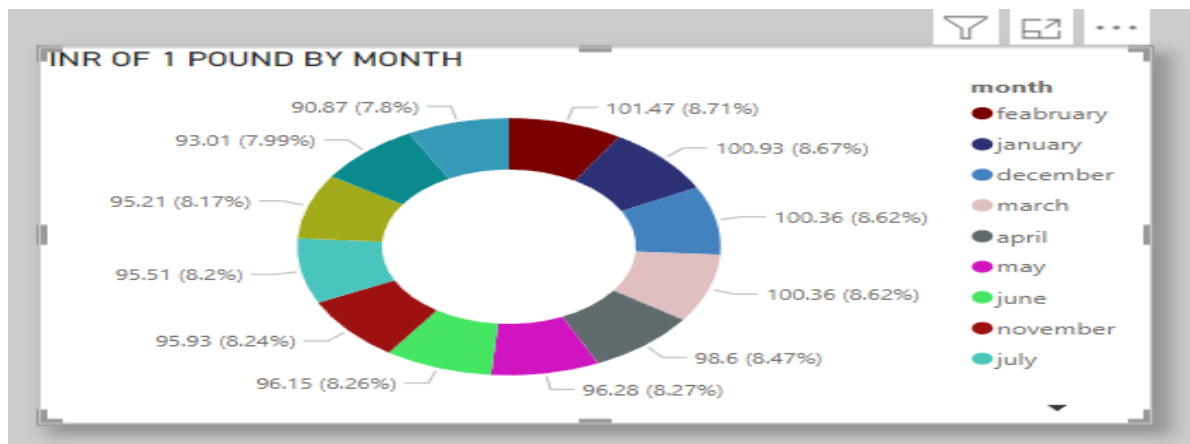


FIGURE 5.10: AVERAGE POUND VALUE

5.9 INCREASING RATE OF USD

Increasing rate is defined as the speed of change in the value of a currency. The currency price may increase or decrease due to various factors. in this image the increasing rate of POUND every month is shown. For example, the increasing rate of POUND in the month of November is 3.13% and October is 2.35%

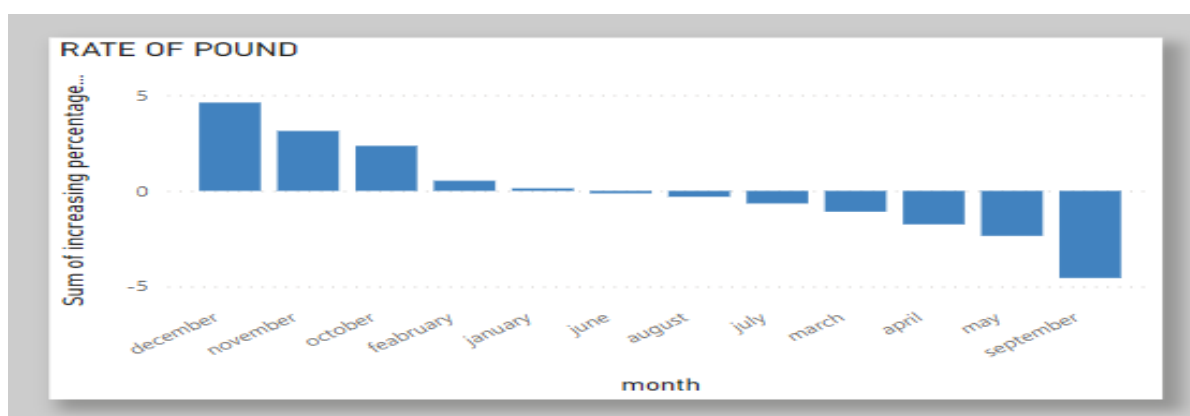


FIGURE 5.11: INCREASING RATE OF USD

5.10 EURO ANALYSIS

The currency is also used officially by the institutions of the European Union, by four European microstates that are not EU members, the British Overseas Territory of Akrotiri and Dhekelia, as well as unilaterally by Montenegro and Kosovo. Outside Europe, a number of special territories of EU members also use the euro as their currency. Additionally, over 200 million people worldwide use currencies pegged to the euro.

The euro is the second-largest reserve currency as well as the second-most traded currency in the world after the United States dollar. As of December 2019, with more than €1.3 trillion in circulation, the euro has one of the highest combined values of banknotes and coins in circulation in the world. The name *euro* was officially adopted on 16 December 1995 in Madrid. The euro was introduced to world financial markets as an accounting currency on 1 January 1999, replacing the former European Currency Unit (ECU) at a ratio of 1:1 (US\$1.1743).

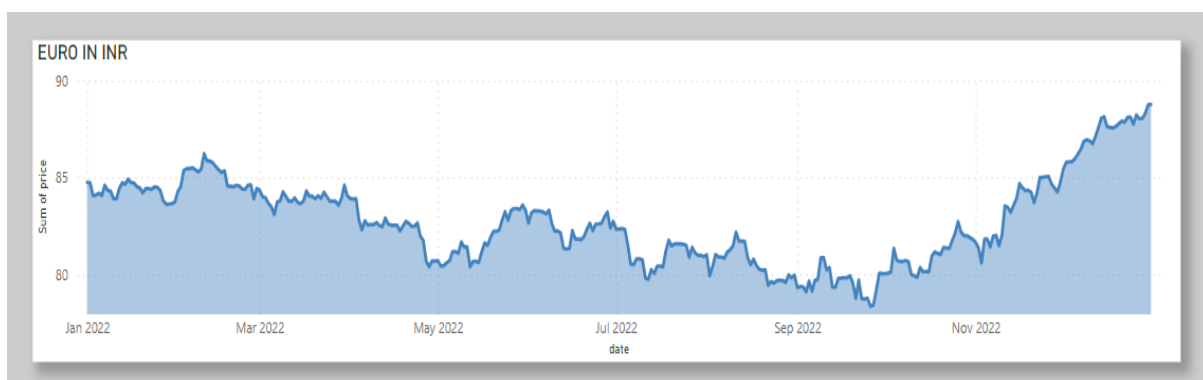


FIGURE 5.12: INR OF EURO

Physical euro coins and banknotes entered into circulation on 1 January 2002, making it the day-to-day operating currency of its original members, and by March 2002 it had completely replaced the former currencies. Between December 1999 and December 2002, the euro traded below the US dollar, but has since traded near parity with or above the US dollar, peaking at US\$1.60 on 18 July 2008 and since then returning near to its original issue rate. On 13 July 2022, the two currencies hit parity for the first time in nearly two decades due in part to the 2022 Russian invasion of Ukraine.

5.11 AVERAGE INR OF 1 EURO

This image shows the graph that contains the average INR value of 1 EURO. This is based on the data of INR value of 1 EURO in the year of 2022. the average value of EURO for every month is calculated and compared. For example, the average INR value of 1 EURO in the month of January is 84.3INR.

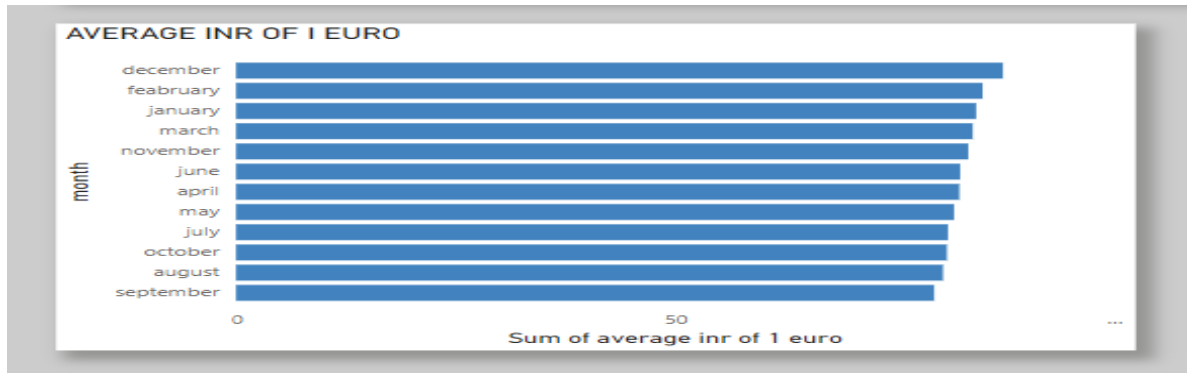


FIGURE 5.13: AVEARGE INR OF EURO

5.12 INCREASING RATE OF USD

Increasing rate is defined as the speed of change in the value of a currency. The currency price may increase or decrease due to various factors.in this image the increasing rate of POUND every month is shown. For example, the increasing rate of POUND in the month of November is 3% and October is 1.82%. in these pictures the rate is denoted by every month.

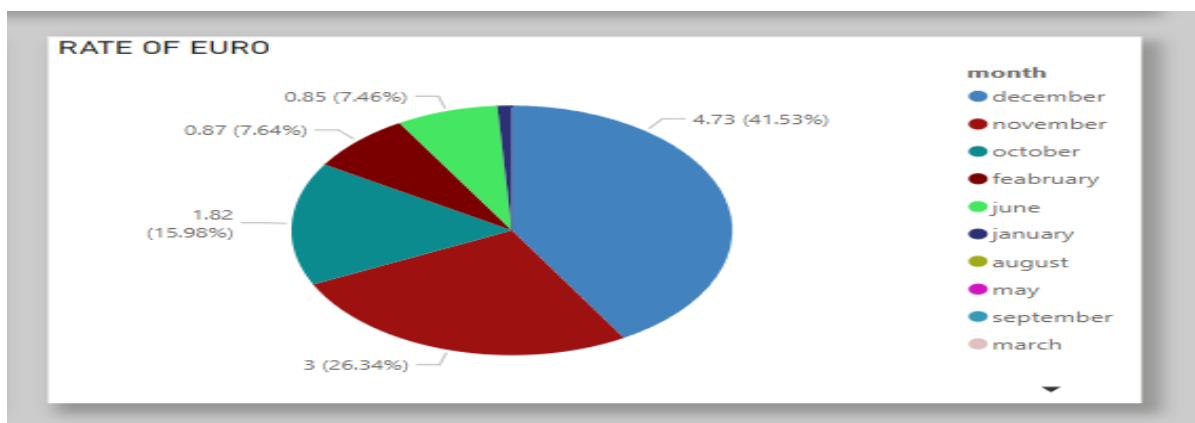


FIGURE 5.14: RATE OF INCREASE

5.13 CURRENT PRICE

Currency prices can be determined in two main ways: a floating rate or a fixed rate. A floating rate is determined by the open market through supply and demand on global currency markets. Therefore, if the demand for the currency is high, the value will increase. in the below image contain current price of various currencies all over the world.

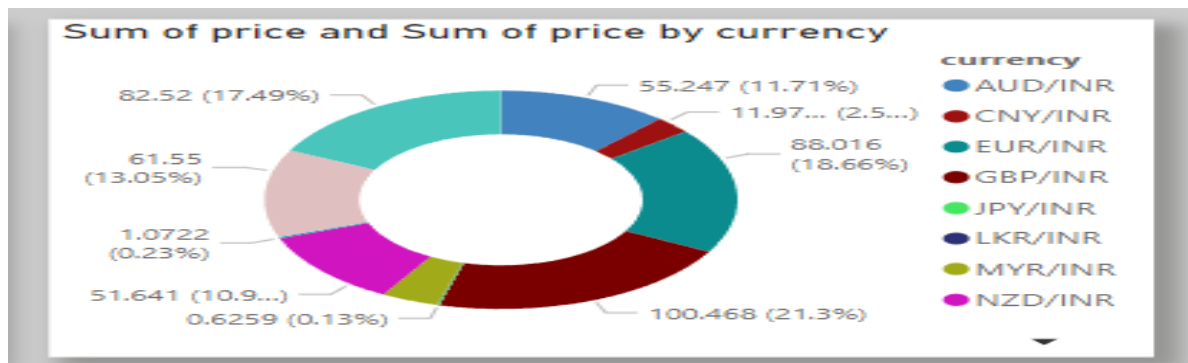


FIGURE 5.15: CURRENT PRICE

5.14 RATE OF CHANGE

Currency conversion rates differ between companies as each company manipulates the interbank rate to make a profit. We come across a lot of competitors that post interbank rates online as a bait to hook new customers, but, once customers are onboard, they change the rate drastically, not usually in the customers' favour. The below image contains rate of various currencies all over the world.

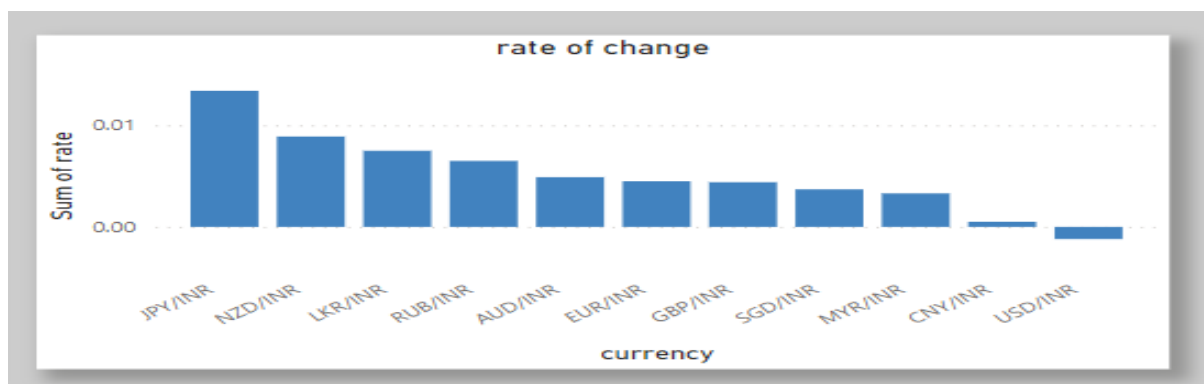


FIGURE 5.16: RATE OF CHANGE

5.15 CURRENT HIGH

Higher interest rates in a country can increase the value of that country's currency relative to nations offering lower interest rates. Political and economic stability and the demand for a country's goods and services are also prime factors in currency valuation. The x-axis contains the types of currencies and y-axis contains the current high.

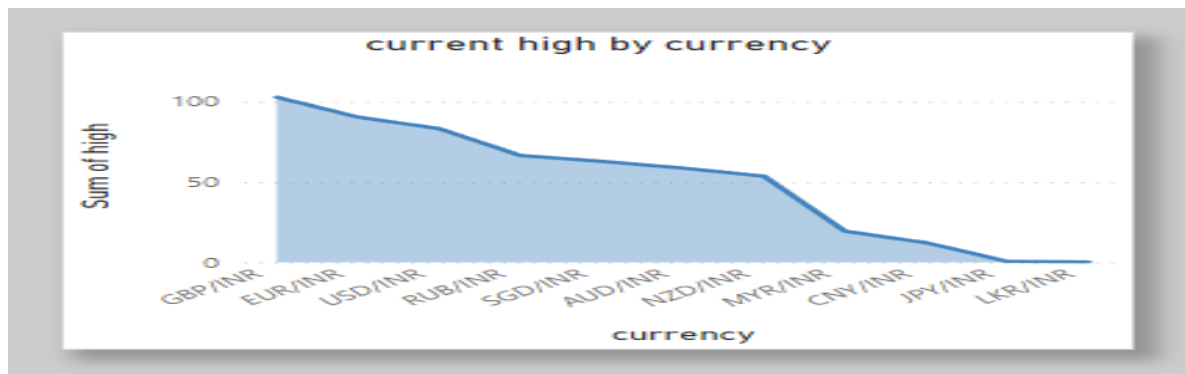


FIGURE 5.17: CURRENT HIGH

5.16 CURRENT LOW

Currency devaluations can be used by countries to achieve economic policy. Having a weaker currency relative to the rest of the world can help boost exports, shrink trade deficits and reduce the cost of interest payments on its outstanding government debts. The image contains the current low of various currencies all over the world.

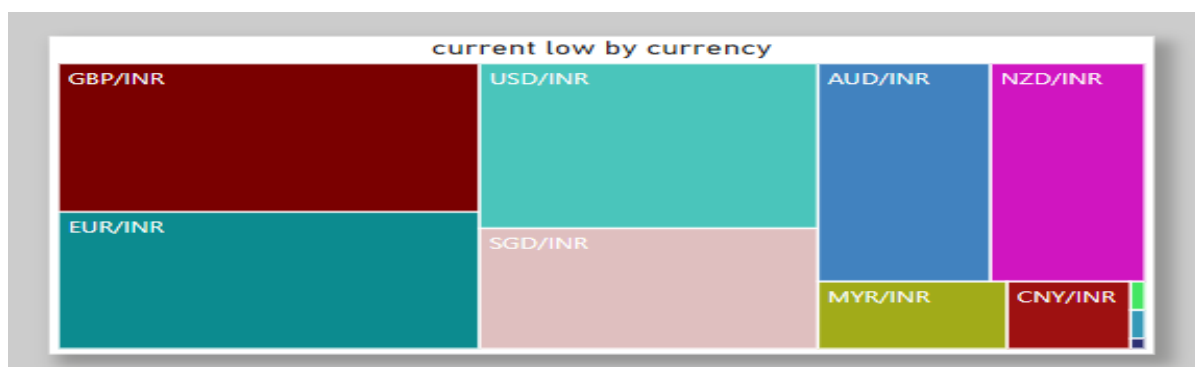


FIGURE 5.18: CURRENT LOW

5.17 DATE FILTER

Power BI Date Slicer and Filters provide users with features to easily select and visualize historical data with preferred date ranges. Power BI Date Slicers and Filters can be added to any column with date data and users can easily navigate through data to get a better understanding of data.

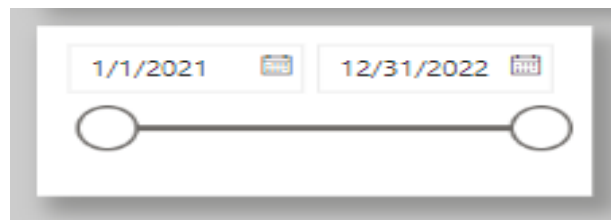


FIGURE 5.19: DATE FILTER

5.18 ACCURACY CARD

This card represents the accuracy of the prediction model that we determined using power bi. The accuracy of the model can be determined using the root mean square error value. If the root mean square value is less than or closer to 0 and 1 then model gives accurate value.

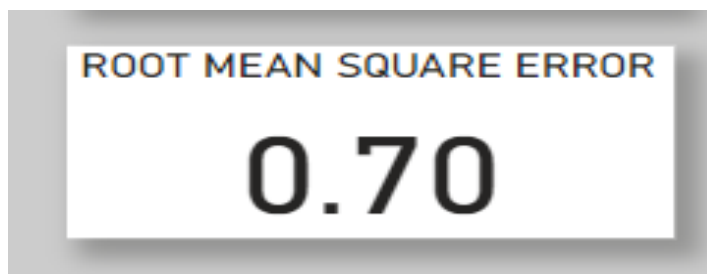


FIGURE 5.20 ACCURACY CARD

5.19 ERROR BAR GRAPH

It is a bar graph that compares the predicted and actual value of the model created for predicting the currency price. As the graph shows the bars of both predicted and actual or approximately equal shows that the error is very less.

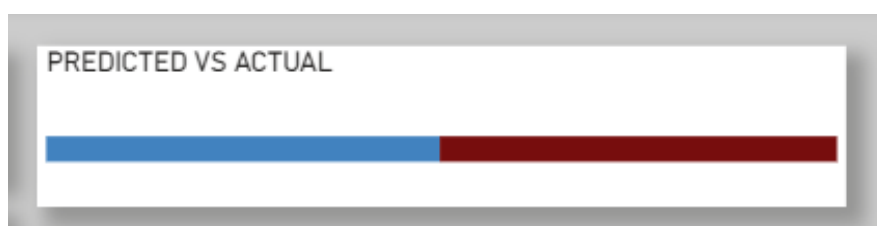


FIGURE 5.21 ERROR BAR GRAPH

5.20 CARDS FOR CURRENCY PRICE

Card visualization is a participatory method for capturing data that uses paper cards to allow groups to brainstorm and share their ideas. A card visualization session revolves around a brainstorming group which uses individual paper cards to express their thoughts about particular ideas or issues.

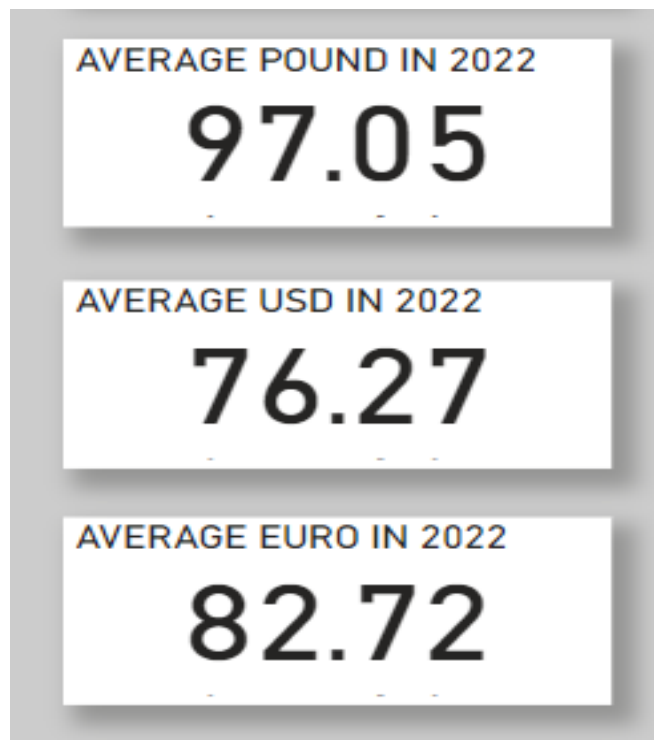


FIGURE 5.25: CARDS FOR CURRENCIES

This card represents the average value of EURO, USD, POUND in the year of 2022. Actually, there are three cards inside the image representing the three currencies. This value is calculated for all the twelve months of the year 2022. Then the average of all the twelve values is taken to get the average value of pound, USD, and Euro in 2022. This value is calculated by INR.

To calculate the yearly average of a currency, first we have to calculate the monthly average of a currency. Some months have thirty days, and some have thirty-one days. Based on the days the monthly average of currency can be calculated. The using the average of twelve months we can calculate the average of currencies for the year of 2022 can be calculated.

6.CONCLUSION AND FUTURE WORK

6.1 CONCLUSION

The choice of the exchange rate regime is one of the central macroeconomic decisions made by a government. This choice affects both a key price in the economy and the conduct of monetary policy. Exchange rate determination is a very important part of macroeconomics. As the currency is the moving force of an economy, changes in its rates affect everyone. Therefore, governments try to increase the value of their currencies so that the balance of payments could be managed at a satisfactory level. They allow for currency conversions, facilitating global trade (across borders), which can include investments, the exchange of goods and services, and financial transactions. Exchange rate changes affect businesses by changing the cost of supplies that are purchased from a different country, and by changing the demand for their products from overseas customers.

Since 1973, there has been a wide variety of choices of the exchange rate regime, with some countries choosing to peg their currencies, others selecting a floating exchange rate, and the vast majority of countries flipping, at one time or another, between one exchange rate regime and another. This distinguishes the modern era from the Bretton Woods period and the earlier gold standard. The heterogeneity of choices in the modern era has also made it possible to study the impact of the choice of the exchange rate regime on economic performance. Most notably, analysis of this era suggests that, in the presence of capital mobility, governments truly do have to choose between monetary policy independence and exchange rate management. Although foreign exchange may be confusing, in today's global marketplace, there is a critical need for almost everyone to understand foreign exchange like never before. As the world shrinks, there is an ever-increasing likelihood that is required to address the risks associated with the fact that there are different currencies used all around the world and that these currencies have an immediate impact on the world. One must be able to evaluate the effects of, and actively respond to, changes in exchange rates with respect to consumption decisions, investment portfolios, business plans, government policies, and other life choices.

6.2 FUTURE WORK

This project is based on data analysis from year 2022. A large dataset is available from 1987-2023 but handling a bigger dataset requires a great amount of preprocessing and cleaning of the data.

Therefore, the future work of this project includes incorporating a larger dataset. There are many ways to preprocess a larger dataset like running a Spark cluster over a server or using a cloud-based services like AWS and Azure to process the data. With the new advancement in the field of deep learning, we can use Neural Networks algorithm on the currency data. Neural Network works on the pattern matching methodology. It is divided into three basic parts for data modelling that includes feed forward networks, feedback networks, and self-organizing network. Feed-forward and feedback networks are generally used in the areas of prediction, pattern recognition, associative memory, and optimization calculation, whereas self-organization networks are generally used in cluster analysis. Neural Network offers distributed computer architecture with important learning abilities to represent nonlinear relationships.

Also, the scope of this project is very much confined to data of some of the currencies from India, Europe, China, United States, but we can include more countries like Australia, Canada, Japan. Expanding the scope of this project, we can also add the dynamic data from the websites that are updating the prices on daily prices and not just restrict ourselves for the past data.

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