DATA ANALYSIS REPORT

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(Theory And Practical)

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KEYWORDS

CONCEPT DEFINATION

CSV: comma- separated values

MATPLOTLIB: is a plotting library

EXCEL: is a spreadsheet program

XLSX: is a file extension

NUMPY: numeric python

1 INTRODUCTION

Data analytics is a wide term that incorporate numerous various kind of information examination .any kind of data can be exposed to information examination method to get the knowledge that can be utilize to improve thing.

This assignment will mainly discover how dissect data utilizing python together absorbed from the fundamental of python to analyzing a wide range of sort of data. This assignment illustrate Excel-based data analysis .finally this assignment will conclude how to prepare data for analysis ,performing simple statistical analysis ,create meaning full data visualization and predict future trend from data .

2 DATA ANALYSIS

It is the process of evaluating data using analytical or statistical tools to discover useful information. Some of these tools are business intelligence tools like Power BI, we have some other tools like Excel and also some programming languages like Python or R.

Once data is collected and sorted using these tools, the results are interpreted to make decisions. The end results can be delivered as a summary, or as a visual like a chart or graph. You can refer to our last week's digest to know about the most commonly used chart for analysis and why they are used.

The process of presenting data in visual form is known as data visualization. Data visualization tools make the job easier. Programs like Tableau or Microsoft Power BI provide many visuals that can bring your data to life in the form of dashboards and reports.

3 IMPORTANCE OF DATA ANALYSIS

Data Analysis is one of the most important processes that businesses can leverage to make the right decisions. There is virtually no company or business in this age and time that does not need analysis of their gathered data to be able to make the right decisions. Effective data analysis is a skill that can be applied to finance, retail business, medicine, and healthcare, and even in the world of sports. If you're in doubt as to why Liverpool FC has consistently been world-class in the last two years and why they've been dominating the Premier League the secret is data analysis. It's a universal language and it's more important than ever before

4 PYTHON IN DATA ANALYSIS

Data analysis involves a broad set of activities to clean, process and transform a data collection to learn from it. Python is commonly used as a programming language to perform data analysis because many tools, such as Jupyter notebook, pandas and booked, are written in Python and can be quickly applied rather than coding your own data analysis libraries from scratch.

- Learning Seattle's Work Habits from Bicycle Counts provides a great example of using open data, in this case from the city of Seattle, messing with it using Python and pandas, then charting it using ski kit-learn. You can do this type of analysis on almost any data set to find out its patterns.

- Exploring the shapes of stories using Python and sentiment APIs is a wonderful read with context for the problem being solved, plenty of insight into how to reproduce the results with your own code and a good number of charts that show how sentiment analysis can extract information from blocks of text.

- How to automate creating high end virtual machines on AWS for data science projects walks through setting up a development environment on Amazon Web Services so that you can perform data analysis without owning a high-end computer. Also check out the Introduction to AWS for Data Scientists for another tutorial that shows you how to set up additional commonly-used data science tools on AWS.

- Analyzing bugs.python.org uses extracted data from C Python development to show the most-commented issues and issues by version number throughout the project's history.

- Divergent and Convergent Phases of Data Analysis examines the flow most people doing data science and analysis projects go through during the exploration, synthesis, modeling and narration phases.

- Forget privacy: you're terrible at targeting anyway is a different type of article. It is a strong piece of commentary rather than a tutorial on a specific data analysis topic. The author argues that *collecting* data is typically easy but doing the dirty analysis work often yields little in the way of definitive, actionable insight. Overall it's a well-written thought piece that will make you at least stop and ask yourself, "do we *really* need to collect this user data?"

- Gender Distribution in North Korean Posters with Convolutional Neural Networks is a fascinating post that uses convolutional neural networks as a mechanism to identify gender by faces in North Korean posters. The article's analysis on this messy data set and the results it produces using some Python glue code with various open source libraries is a great example of how data analysis can answer questions that would be very time consuming for a person to figure out without a computer.

- Time Series Analysis in Python: An Introduction shows how to use the open source Prophet library to perform time series analysis on a data set.

- Python Data Wrangling Tutorial: Crypto currency Edition uses the panda's library to clean up a messy crypto currency data set and shift the data into a structure that is useful for analysis the author wants to perform.

- Handy Python Libraries for Formatting and Cleaning Data provides a short overview of the libraries such as Arrow and Dora that make it easier to wrangle your data before doing analysis.

- Analyzing one million robots.txt files explains what a robots.txt file is, why it matters, how to download a bunch of them and then perform some analysis with NumPy.

- Safely Analyzing Popular Licenses on GitHub Projects uses a Google Big Query Python helper library to work with a massive 3 terabyte data set provided by GitHub.

- Cleaning and Preparing Data in Python shows how to uses pandas to do the "boring" part of a data analysis job and convert dirty data into a more consistent, structured format.

- 9 obscure Python libraries for data science presents several lesser-known but still very useful libraries for performing data analysis such as fuzzy wuzzy and gym.

5 JUPYTER NOTEBOOK

The **Jupyter Notebook** is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

6 DATA SCIENCE

The principal purpose of Data Science is to find patterns within data. It uses **various statistical techniques** to analyze and draw insights from the data. From data extraction, wrangling and pre-processing, a Data Scientist must scrutinize the data thoroughly. Then, he has the responsibility of making predictions from the data. The goal of a Data Scientist is to derive conclusions from the data. Through these conclusions, he is able to assist companies in making smarter business decisions. We will divide this blog in various sections to understand the **role of a Data Scientist** in more detail.

Data science is a "concept to unify statistics, data analysis and their related methods" in order to "understand and analyze actual phenomena" with data It uses techniques and theories drawn from many fields within the context of mathematics, statistics, computer science, domain knowledge and information science. Turing award winner Jim Gray imagined data science as a "fourth paradigm" of science (theoretical, computational and now data-driven) and asserted that "everything about science is changing because of the impact of information technology" and the data deluge

7 IMPORTANCE OF DATA SCIENCE

Data creates magic. Industries need data to help them make careful decisions. Data Science churns raw data into meaningful insights.

Therefore, industries need data science. A Data Scientist is a wizard who knows how to create magic using data. A skilled Data Scientist will know how to dig out meaningful information with whatever data he comes across. He helps the company in the right direction. The company requires strong data-driven decisions at which he's an expert. The Data Scientist is an expert in various underlying fields of Statistics and Computer Science. He uses his analytical aptitude to solve business problems.

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8 SOME IMPORTANT LIBRARIES

The Python Standard Library is a collection of exact syntax, token, and semantics of Python. It comes bundled with core Python distribution. We mentioned this when we began with an introduction.

It is written in C, and handles functionality like I/O and other core modules. All this functionality together makes Python the language it is. More than 200 core modules sit at the heart of the standard library. This library ships with Python. But in addition to this library, you can also access a growing collection of several thousand components from the Python Package Index (PyPI). We mentioned it in the previous blog.

8.1 NUMPY

NumPy is a Python library used for working with arrays It also has functions for working in domain of linear algebra, Fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open source project and you can use it freely. NumPy stands for Numerical Python. In Python we have lists that serve the purpose of arrays, but they are slow to process. NumPy aims to provide an array object that is up to 50x faster than traditional Python lists the array object in NumPy is called ND array it provides a lot of supporting functions that make working with ND array very

easy. Arrays are very frequently used in data science, where speed and resources are very important.

8.2 Pandas

In computer programming, **pandas** is a software library written for the **Python** programming language for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series. It is free software released under the three-clause BSD license. **Pandas** is the most popular **python** library that is **used** for data analysis. It provides highly optimized performance with back-end source code is purely written in C or **Python**.

8.3 MATPLOTLIB

Matplotlib's is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits like Tkinter, wxPython, Qt, or GTK+. There is also a procedural "pylab" interface based on a state machine (like OpenGL), designed to closely resemble that of MATLAB, though its use is discouraged SciPy makes use of Matplotlib's.

Matplotlib's was originally written by John D. Hunter, since then it has an active development community, and is distributed under a BSD-style license. Michael Droettboom was nominated as matplotlib's lead developer shortly before John Hunter's death in August 2012, and further joined by Thomas Caswell.

Matplotlib's 2.0.x supports Python versions 2.7 through 3.6. Python 3 support started with Matplotlib's 1.2. Matplotlib's 1.4 is the last version to support Python 2.6[ ] Matplotlib's has pledged not to support Python 2 past 2020 by signing the Python 3 Statement.[ ]

9 DATA BASED ON FILE

One of the most common tasks that you can do with Python is reading and writing files. Whether it's writing to a simple text file, reading a complicated server log, or even analyzing raw byte data, all of these situations require reading or writing a file .When you access a file on an operating system, a file path is required. The file path is a string that represents the location of a file. It's broken up into three major parts:

1. **Folder Path:** the file folder location on the file system where subsequent folders are separated by a forward slash / (Unix) or backslash \ (Windows)
2. **File Name:** the actual name of the file
3. **Extension:** the end of the file path pre-pended with a period (.) used to indicate the file type

10 DATA VISUALIZATION

Data visualization is the discipline of trying to understand data by placing it in a visual context so that patterns, trends and correlations that might not otherwise be detected can be exposed.

Python offers multiple great graphing libraries that come packed with lots of different features. No matter if you want to create interactive, live or highly customized plots python has an excellent library for you.

To get a little overview here are a few popular plotting libraries:

- **Matplotlib's:** low level, provides lots of freedom

- **Pandas Visualization:** easy to use interface, built on Matplotlib

- **Seaborn:** high-level interface, great default styles

- **plot:** based on R's ggplot2, uses grammar of graphic

- **Plotly:** can create interactive plots

11- IMPORTANT TERMS AND RATIOS USED IN OUR PROGRAM

Keyword=ABL,AKBL,FABL,MCB,SCBL,SNBAL,UBL,HMB,BAHL,TATO, ROA,ROE,EPS,EBT

- **_ABL_**= ALLIED BANK LIMITED
- **_AKBL_**= ASKARI BANK LIMITED
- **_FABL_**= FAISAL BANK LIMITED
- **_MCB_**= MUSLIM CUMMERICAL BANK
- **_SCBL_**=STANDARD CHARATERED BANK
- **_SNBAL_**=SONERI BANK LIMITED
- **_UBL_**=UNITED BANK LIMITED
- **_HMB_**=HABIB MATROPOLITANT BANK
- **_BAHL_**=BANK AL HABIB
- **_TATO_**=TOTAL ASSET TURNOVER
- **_ROA_**=RETURN ON ASSET
- **_ROE_**=RETURN ON EQUITY
- **_EPS_**=EARNING PER SHARE
- **_EBT_**= EARNING BEFORE TAX

DEFINITIONS

SHARE CAPITAL
Share capital is the money rises by issuing common and preferred stock. The amount of share the capital or equity financing the company has can change over time it additional public offerings

FACE VALUE
Face value of a share also known as the par value, is the value at which a share is listed a stock market.

EQUILTY
In finance the equity is ownership of assets that may have debts and other liabilities attached to them

ASSETS
In financial accounting an asset is anything resource owned or control by a business or an economic entity.

EBT(EARNING BEFORE TAX)
Earning before tax is the calculation of a firm earning before tax are considers.

- # *EPS(EARNING PER SHARE)*
  Earing payout ratio is the ratio of the total amount of dividends paid out to share holder relative to the net income of the company.

- # *DIVIDEND %*
  A dividend is the distribution of the profit by a corporation to its shareholder.

- # *NET INCOME*
  Net income is a calculation that measure the amount of total revenue that exceed total expenses in other words it show how much revenue are left over after all expenses have been paid.

- # *RATIOS*
  ### 6- *Total asset turnover*
  It is a financial ratio that measure the efficiency of a companies use of it assets in generating sale revenue

  Total asset turnover = net sales/ total asset

  ### 7- *Return on asset*
  Return on asset ratio measure how effectively assets are being used for generating profit

  Return on asset = Net income /total asset

  The ROA is the product of two common ratios; profit margin and total asset turnover.

  ### 8- *Return on equity*
  The return on equity measure how effectively a company is using its equity to generate its profit

  Return on equity = net income /shareholder equity

  Shareholder equity is also known as share capital

  ### 9- *Profit margin*
  Profit margin is a ratio of companies profit divided by its revenue .profit margin is the percentage of sales that a business retain after all expenses have being deducted this margin is one of the key performance indicator for management .company with low profit margin tend to have high asset turnover.

  Profit margin =Net Income/ Sales

  ### 10- *Capital intensity*

Capital intensity ratio is an analytical tool used to gauge the effectiveness of assets in production .high intensity ratio indicates that the company has to spend more on asset to generate the revenue or a company bought new assets.

Capital intensity = Total asset /Sales

12-PRACTICE DATA ANALYSIS FOR _COMPARISON_ BETWEEN NINE BANKs OF PAKISTAN FOR INVESTING POINT OF VEIW (2009 to 2017)

The purpose of this study is to analysis of financial performance of eight bank between year of 2009 AND 2017.Quantitative analysis was undertaking by looking at various set of ratio that are routinely used to measure bank performance .conclusion were then drawn from the computational of the relevant issue that allow us to make an effective comparison said banks .This type of analysis was used to summarize the overall stabilities of each banks performance.

A commercial bank performances is evaluated for several reason depending on personal objective. An entity like a bank regulator, for example, may need to identify and call attention to banks that are experiencing chronic financial problems in order that they may fixed them before they get out of control .such is the case with so called "banks runs" . Shareholders, on the other hand need to assess which bank they can deem suitable to financially invest in.

-RESEARCH OBJECTIVE

The overall objectives of this research is to measure the performance of eight leading private sector commercial banks using financial ratios that will indicates the performance develop over the period 2009 to 2017 .Moreover ,the study will make comparative assessment of the performance between the all banks

-FINANICAL RATIOS

The number contain in financial statement need to be put in to context so that investor can better understand different aspect of the companies operation. Ratio analysis is one method an investor can used to gain that understanding.

The use of quantitative techniques on values taken from an enterprises financial statement.

13- ANALYSIS WITH PYTHON -INTRODUCTION

In this program we used data from this address (https://opendoors.pk/financials/) .the purpose of this analysis this data is to find which bank is suitable for investment and from which bank we make profit. first we download(link: https://opendoors.pk/financials/) all data of these bank **ABL,AKBL,FABL,MCB,SCBL,SNBAL,UBL,HMB,BAHL** in single folder then copy the folder address then open anaconda prompt type cd space paste this folder address then enter then type Jupyter notebook and press enter. Now our Jupyter windows open in that particular folder address. Now for analyzing that which bank is good for investment we analysis data throw these steps which are as follow

- ## STEP 1 IMPORTING IMPORTANT LIBRARY

The first step is to import important libraries which help us to interact and manipulate the data
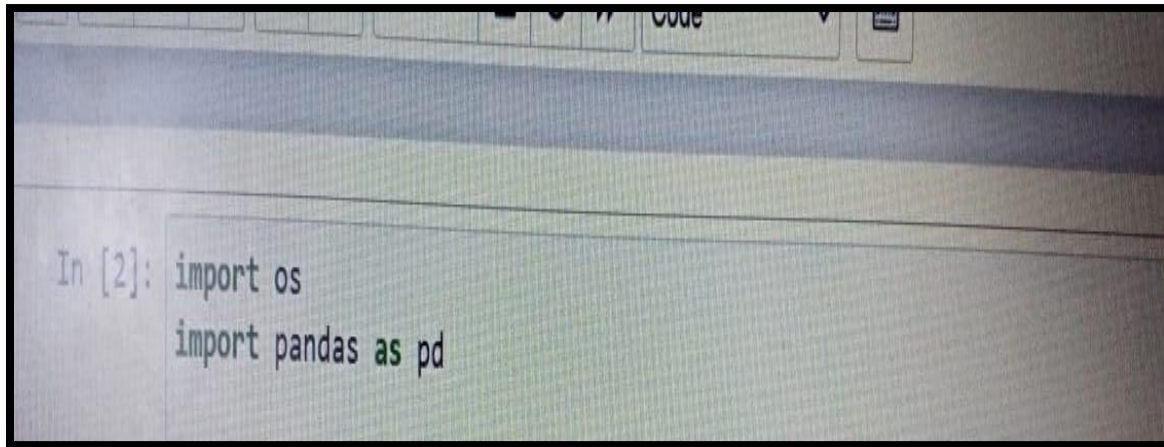

FIG1 IMPORTING IMPORTANT LIBRARY

This figure show that we import OS and pandas libraries .OS libraries help us to interact with file system and PANDAS is help us to analysis data.

- ## STEP 2 PATH

In this step we give path of our file in that program this is the important part of our program because this step we are not able to analysis data.

```
In [1]:  import os
         path = '.\Financial_Keys_of_banks_form(2009_to_2017)'
         os.listdir(path)

Out[1]:  ['Allied_Bank.csv',
          'Askari_Bank.csv',
          'Bank_Alfalah.csv',
          'Bank_Al_Habib.csv',
          'Faysal_Bank.csv',
          'Habib_Bank.csv',
          'Habib_Metropolitan_Bank.csv',
          'JS Bank.csv',
          'MCB_Bank.csv',
          'Meezan Bank.csv',
          'Silk_Bank.csv',
          'Soneri_Bank.csv',
          'Standard_Chartered.csv',
          'Summit_Bank.csv',
          'United_Bank.csv']
```

FIG 2 PATH

This figure show that we make a variable of path and give our file address in it .and then we put path in list directory to see the name of all file present in that address in list

- ## STEP 3 MAKING FILE FOR FILES
  this step we make a single file for these individual file it make program much easy and short because by performing this step we don't have to read our different file each time

```
In [2]:  import pandas as pd

         path = '.\Financial_Keys_of_banks_form(2009_to_2017)'

         files = [file for file in os.listdir(path) if not file.startswith('.')]

         all_banks_data = pd.DataFrame()

         for file in files:
             separate_data = pd.read_csv(path+'/'+file,encoding='latin1')
             all_banks_data = pd.concat([all_banks_data,separate_data],axis=0,ignore_index=True)

         all_banks_data.to_csv("all_data.csv",index=False)
```

FIG 3 MAKING FILE FOR FILES

This fig show that first we give the path of our file than we make a variable and type a loop to pick all file present in our given path accept those file that start from".' Then we want to display our file in data frame .Secondly we type a loop to add all files in one file and then save this file as all_data.csv

- # *STEP 4 READ FILE WE MAKE*

Now we read that file we make above


```
In [43]: all_banks_data.head(10)
```

	Symbol	Year	Year End	Share Capital	Face Value	Shares	Equity	Assets	Sales	Interest Ex.	EBT	Net Income	EPS	Divide
0	ABL	2017	2017-12-31	11450.74	10	1145.07	78643.3	1245712.11	74580.56	0	20878.7	12733.64	11.12	7(
1	ABL	2016	2016-12-31	11450.74	10	1145.07	74474.47	1069614.41	75816.51	0	23831.22	14427.05	12.60	7:
2	ABL	2015	2015-12-31	11450.74	10	1145.07	67968.65	991665.51	81871.37	0	25503.38	15120.31	13.20	7(
3	ABL	2014	2014-12-31	11450.74	10	1145.07	62053.78	842269.13	79737.25	0	22201.76	15015.09	13.11	6!
4	ABL	2013	2013-12-31	10409.76	10	1040.98	53703.49	734195.94	63824.76	0	14760.9	14643.36	14.07	5:
5	ABL	2012	2012-12-31	9463.42	10	946.34	42928.08	631915.5	63296.23	0	15870.35	11675.81	12.34	6!
6	ABL	2011	2011-12-31	8603.11	10	860.31	37620.36	515698.94	58764.09	0	15108.48	10139.68	11.79	5(

FIG 4 READ FILE WE MAKE

This fig show that we read the file of all_data.csv first we use panda's library to read our csv file than we type head to print 10 line of our data.

- # *STEP 4 DISPLAY NAN DATA*

Our data is like a trash it have so many Nan value which can cause error in our program so we have to see our data that our data consist that Nan value in it


```
In [4]: nan_df =all_banks_data[all_banks_data.isna().any(axis=1)]
        display(nan_df.head())
```
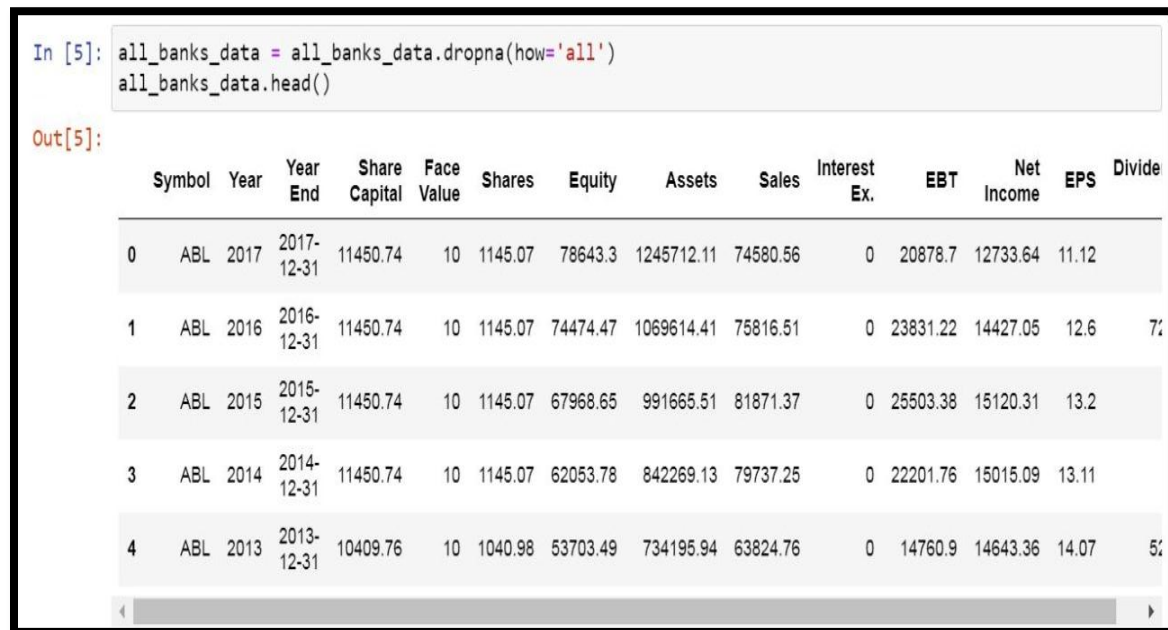
Symbol	Year	Year End	Share Capital	Face Value	Shares	Equity	Assets	Sales	Interest Ex.	EBT	Net Income	EPS	Dividend %

FIG 5 DISPLAY NAN DATA

This fig we make a variable of Nan_def than make program that if out data has Nan value in any axis but our data doesn't consist any Nan value.

- ## *STEP 5 DROP NAN DATA*

In this step we type a program to drop Nan data


```
In [5]: all_banks_data = all_banks_data.dropna(how='all')
        all_banks_data.head()
```
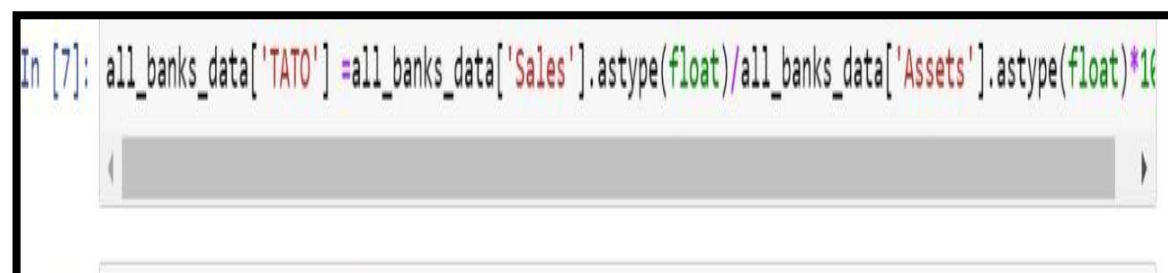
Out[5]:

	Symbol	Year	Year End	Share Capital	Face Value	Shares	Equity	Assets	Sales	Interest Ex.	EBT	Net Income	EPS	Divide
0	ABL	2017	2017-12-31	11450.74	10	1145.07	78643.3	1245712.11	74580.56	0	20878.7	12733.64	11.12	
1	ABL	2016	2016-12-31	11450.74	10	1145.07	74474.47	1069614.41	75816.51	0	23831.22	14427.05	12.6	7.
2	ABL	2015	2015-12-31	11450.74	10	1145.07	67968.65	991665.51	81871.37	0	25503.38	15120.31	13.2	
3	ABL	2014	2014-12-31	11450.74	10	1145.07	62053.78	842269.13	79737.25	0	22201.76	15015.09	13.11	
4	ABL	2013	2013-12-31	10409.76	10	1040.98	53703.49	734195.94	63824.76	0	14760.9	14643.36	14.07	5.

FIG 6 DROP NAN DATA

So in this fig show how to drop Nan data from file and also we print our data for confirmation

- ## *STEP 6 MAKE A NEW COLUMN FOR TATO*

Now we make a new column of total asset turnover


```
In [7]: all_banks_data['TATO'] =all_banks_data['Sales'].astype(float)/all_banks_data['Assets'].astype(float)*1(
```

FIG

7 MAKE A NEW COLUMN FOR TATO

This fig show first we add new column of TATO in our data frame with the help of two column sales and asset .and also define the data type of these column .

- ## *STEP 7 GROUPBY*

In this step we want to see our new column that we make above with the symbol of all banks.
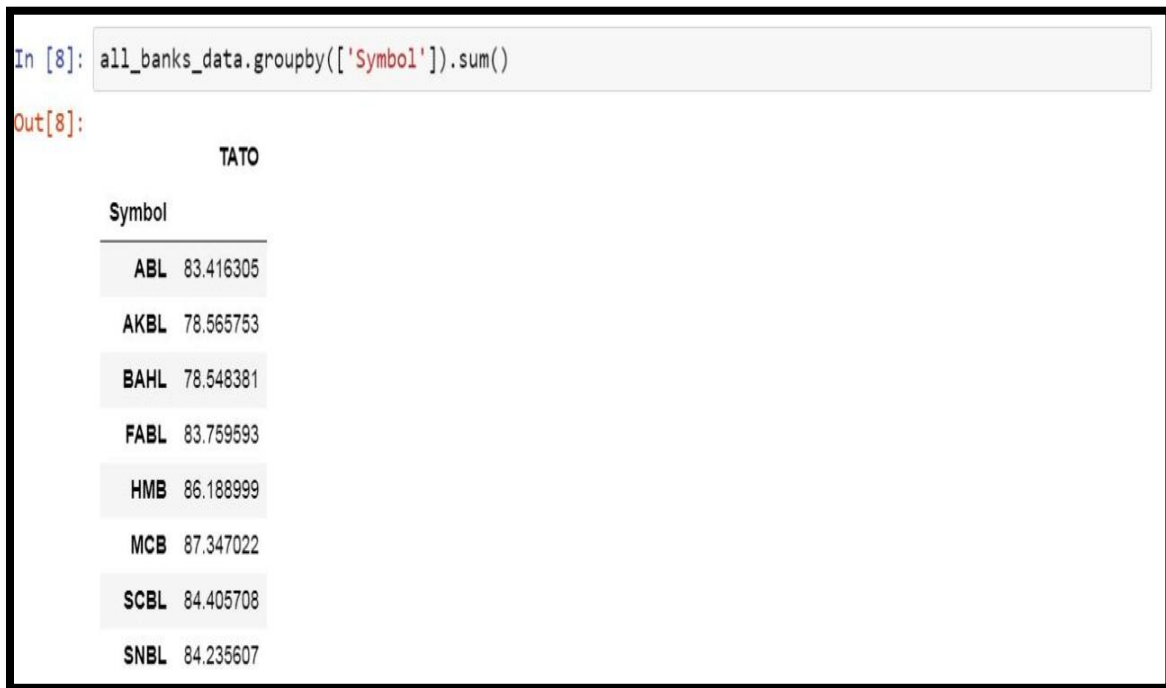


```
In [8]: all_banks_data.groupby(['Symbol']).sum()

Out[8]:
                 TATO
        Symbol
           ABL  83.416305
          AKBL  78.565753
          BAHL  78.548381
          FABL  83.759593
           HMB  86.188999
           MCB  87.347022
          SCBL  84.405708
          SNBL  84.235607
```

FIG 8 GROUPBY

This fig show how we show our data .python built-in function (group by) help us to make this possible.

- ## ***STEP 8 GRAPHICALLY REPRESENTATION OF TATO WITH SYMBOL***

In this step we import the best library of visualization in python MATPLOTLIB.PYPLOT
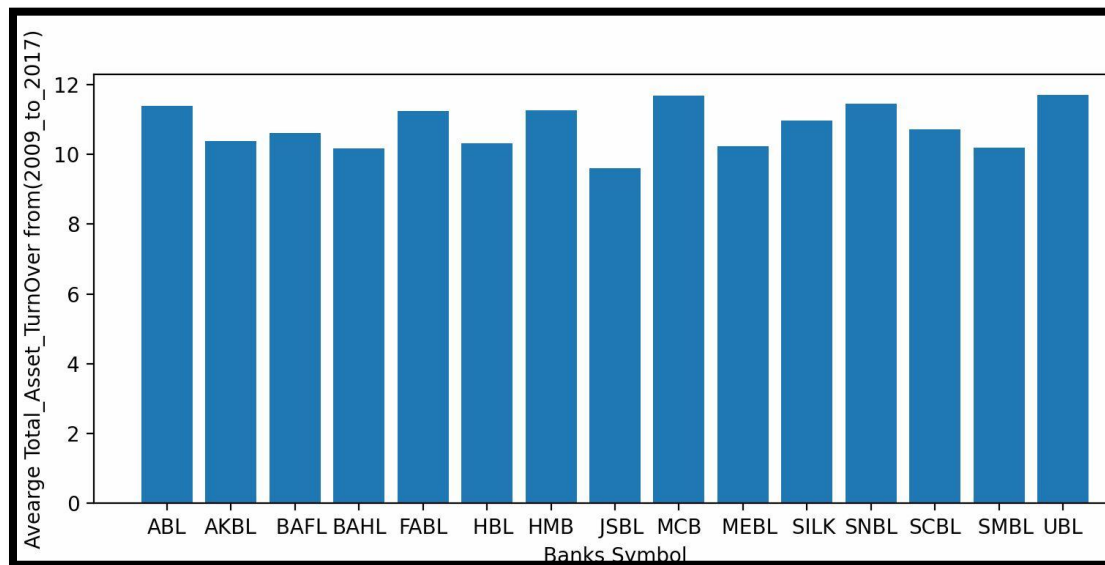
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```
In [9]: import matplotlib.pyplot as plt

        x='Symbol'
        y='TATO'
        plt.bar(x,y,data=all_banks_data)

        plt.xlabel('Banks Symbol')
        plt.ylabel('Avearge Total_Asset_TurnOver from(2009_to_2017)')
        plt.show()
```

Fig 23 graphical representation of TATO and symbol

On x axis we take symbols and on Y axis we take TATO .then we make a bar plot and also put label on x and y-axis.

Graph1: GRAPHICALLY REPRESENTATION OF TATO WITH SYMBOL

This graph show that UBL bank has a highest total assets turnover as compare to other bank. And the lowest total asset turnover is BAHL .higher no to TATO is that the UBL bank use its assets effectively from the period of 2009 to 2017.

• *STEP 9 MAKE NEW COLUMN OF ROA(RETURN ON ASSET*

Now we make a new column of return on asset


```
In [10]: all_banks_data['ROA'] =all_banks_data['Net Income'].astype(float)/all_banks_data['Assets'].astype(floa
         all_banks_data.head()
```

Out[10]:

ar nd	Share Capital	Face Value	Shares	Equity	Assets	Sales	Interest Ex.	EBT	Net Income	EPS	Dividend %	TATO	ROA
7-31	11450.74	10	1145.07	78643.3	1245712.11	74580.56	0	20878.7	12733.64	11.12	70	5.986982	1.022198
6-31	11450.74	10	1145.07	74474.47	1069614.41	75816.51	0	23831.22	14427.05	12.6	72.5	7.088209	1.348808
5-31	11450.74	10	1145.07	67968.65	991665.51	81871.37	0	25503.38	15120.31	13.2	70	8.255946	1.524739
4-31	11450.74	10	1145.07	62053.78	842269.13	79737.25	0	22201.76	15015.09	13.11	65	9.466956	1.782695
3-31	10409.76	10	1040.98	53703.49	734195.94	63824.76	0	14760.9	14643.36	14.07	52.5	8.693151	1.994476

FIG 9 MAKE NEW COLUMN OF ROA(RETURN ON ASSET

This fig show first we add new column of ROA in our data frame with the help of two column Net income and asset and also define the data type of these column .Also group by this column .

• *STEP 10 GRAPHICALLY REPRESENTATION OF ROA WITH SYMBOL*
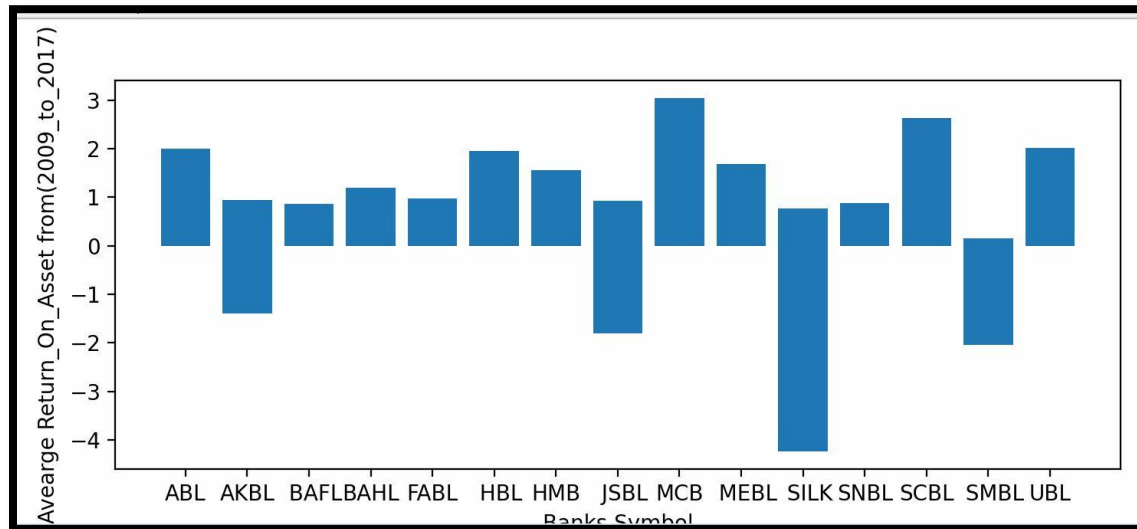
Similar as step 8 we make a graph of ROA and symbols with the help of matplotlib's library

```
In [11]: x='Symbol'
         y='ROA'
         plt.bar(x,y,data=all_banks_data)

         plt.xlabel('Banks Symbol')
         plt.ylabel('Avearge Return_On_Asset from(2009_to_2017)')
         plt.show()
```

FIG 10 GRAPHICALLY REPRESENTATION OF ROA WITH SYMBOL

This fig show we add symbols on x axis and ROA in y axis. Also enter label on x and y axis.

Graph2: GRAPHICALLY REPRESENTATION OF ROA WITH SYMBOL

This graph show that the highest return on asset is of MCB bank as compare to other bank meanwhile AKBL bank shows negative return on asset. The rises on ROA indicate that MCB bank is doing a good job of increasing its profit with each investment. A negative ROA show that the AKBL bank loses more money that it bring in experience in a net loss.

• *STEP 11 MAKE NEW COLUMN OF ROE(RETURN ON EQUITY)*

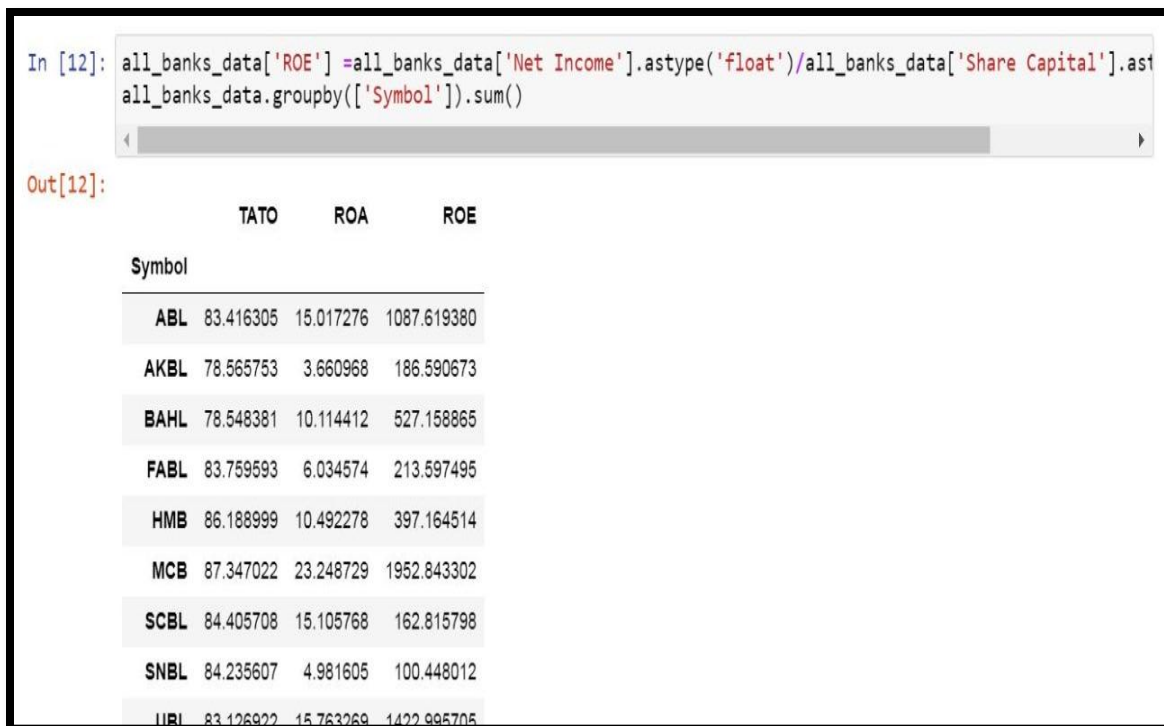Now we make a new column of return on equity

```
In [12]: all_banks_data['ROE'] =all_banks_data['Net Income'].astype('float')/all_banks_data['Share Capital'].ast
         all_banks_data.groupby(['Symbol']).sum()
```

Out[12]:

	TATO	ROA	ROE
Symbol			
ABL	83.416305	15.017276	1087.619380
AKBL	78.565753	3.660968	186.590673
BAHL	78.548381	10.114412	527.158865
FABL	83.759593	6.034574	213.597495
HMB	86.188999	10.492278	397.164514
MCB	87.347022	23.248729	1952.843302
SCBL	84.405708	15.105768	162.815798
SNBL	84.235607	4.981605	100.448012
UBL	83.126922	15.763269	1422.995705

FIG 11 MAKE NEW COLUMN OF ROE(RETURN ON EQUITY)

This fig show first we add new column of ROE in our data frame with the help of two column Net income and share capital and also define the data type of these column .Also group by this column .

- ## ***STEP 12 GRAPHICALLY REPRESENTATION OF ROE WITH SYMBOL***

In this step we make a bar graph of roe of all banks
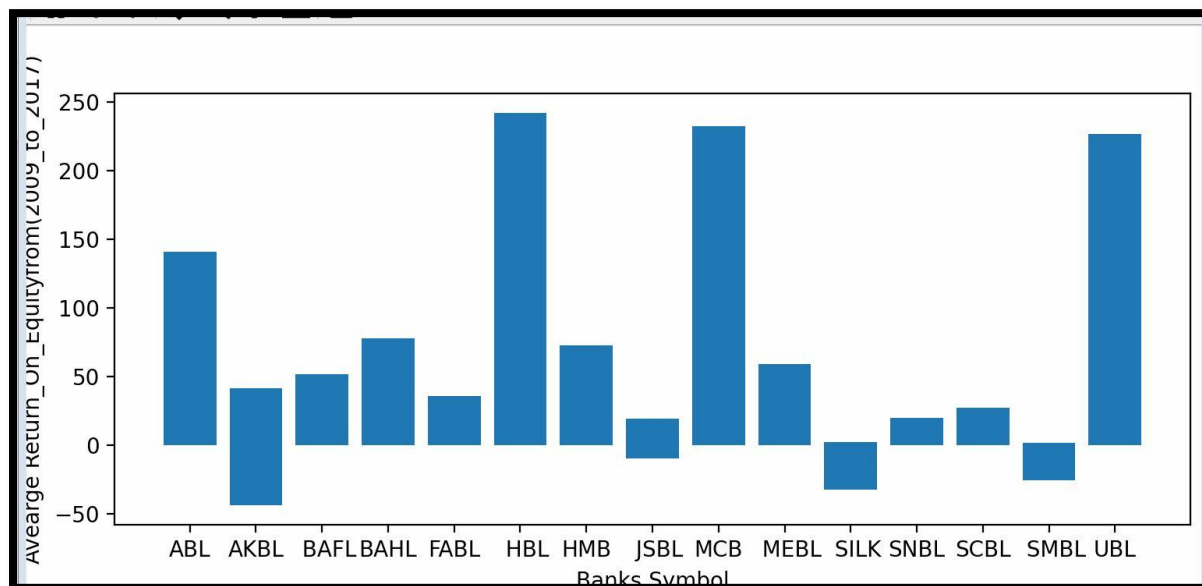
25

```
In [13]: x='Symbol'
         y='ROE'
         plt.bar(x,y,data=all_banks_data)

         plt.xlabel('Banks Symbol')
         plt.ylabel('Avearge Return_On_Equityfrom(2009_to_2017)')
         plt.show()
```

FIG 12 GRAPHICALLY REPRESENTATION OF ROE WITH SYMBOL

This figure show that on x axis we take symbols and on Y axis we take ROE .then we make a bar plot and also put label on x and y axis.

Graph3: GRAPHICALLY REPRESENTATION OF ROE WITH SYMBOL

This graph show that the highest ROE is of MCB and UBL bank meanwhile AKBL bank show negative return on equity. The rises in return of equity show good sign for the bank as it is showing that a rate of return on shareholder equity raising. When ROE have a negative value means the bank is of financial distress, thus its not a favorable investment opportunity at that moment.

- # ***STEP 13 MAKE NEW COLUMN OF PROFIT MARGIN***

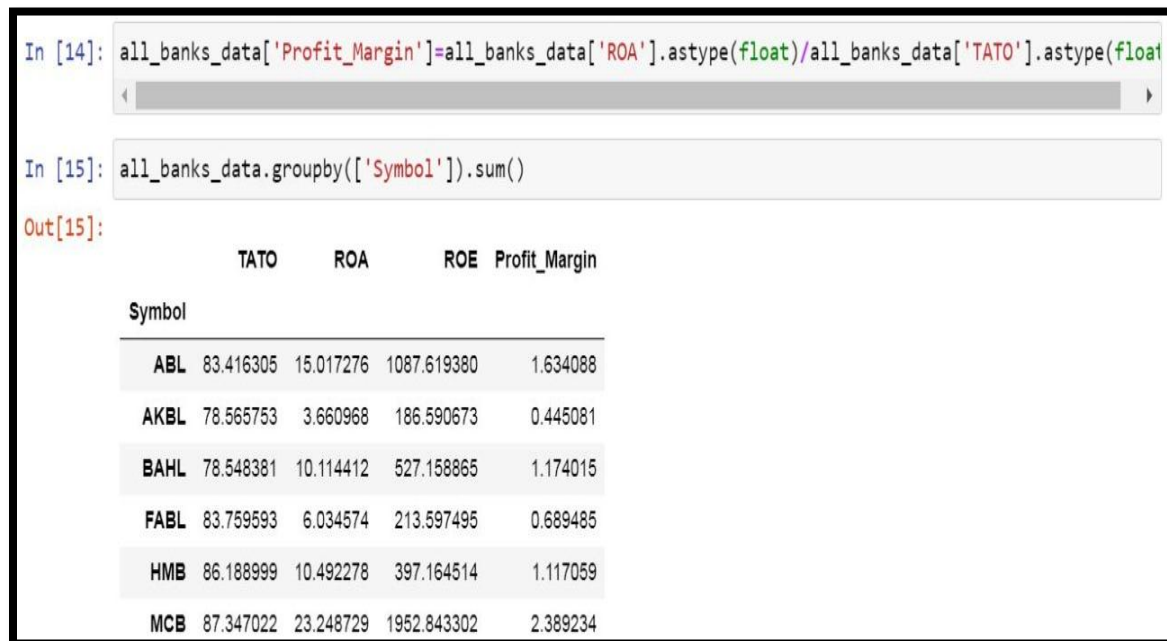Now we make a new column of profit margin

FIG 13 MAKE NEW COLUMN OF PROFIT MARGIN

This fig show first we add new column of ROE in our data frame with the help of two column ROA and TATO and also define the data type of these column .also group by this column.

- # ***STEP 12 GRAPHICALLY REPRESENTATION OF PROFIT MARGINWITH SYMBOL***

In this step we make a graph of profit margin

```
In [16]: x='Symbol'
         y='Profit_Margin'
         plt.bar(x,y,data=all_banks_data)

         plt.xlabel('Banks Symbol')
         plt.ylabel('Avearge Profit_Margin from(2009_to_2017)')
         plt.show()
```

FIG 14 GRAPHICALLY REPRESENTATION OF PROFIT MARGINWITH SYMBOL

This fig show that on x axis we take symbols and on Y axis we take profit margin .then we make a bar plot and also put label on x and y axis.
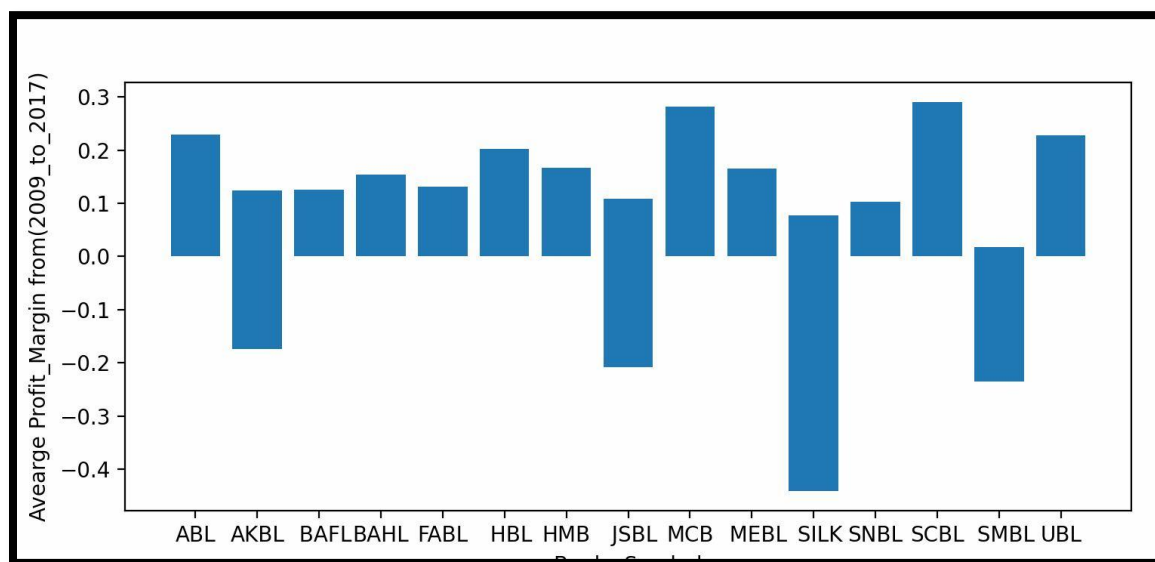
Graph4: GRAPHICALLY REPRESENTATION OF PROFIT MARGIN WITH SYMBOL

This graph show that highest profit margin is of SCBL bank meanwhile AKBL bank. A high net profit margin means that a bank is able to effectively control its cost and \provide good and services at a price significantly higher than it cost .A negative profit margin can be an indication of a bank in ability to control cost.

- ## *STEP 13 CHANGE COLUMN TYPE OF EPS AND DIVIDENF %*

Now we change the data type of our columns such as earning per share EPS, dividend% **.**

FIG 16 CHANGE COLUMN TYPE OF EPS AND DIVIDENF %

This fig show we change the data type of earning per share EPS

FIG 17 CHANGE COLUMN TYPE OF EPS AND DIVIDENF %

This fig show we change the data type of dividend column

• *STEP 14 GRAPHICALLY REPRESENTATION OF EARNING PER SHARE WITH SYMBOL*

In this step we make a graph of EPS
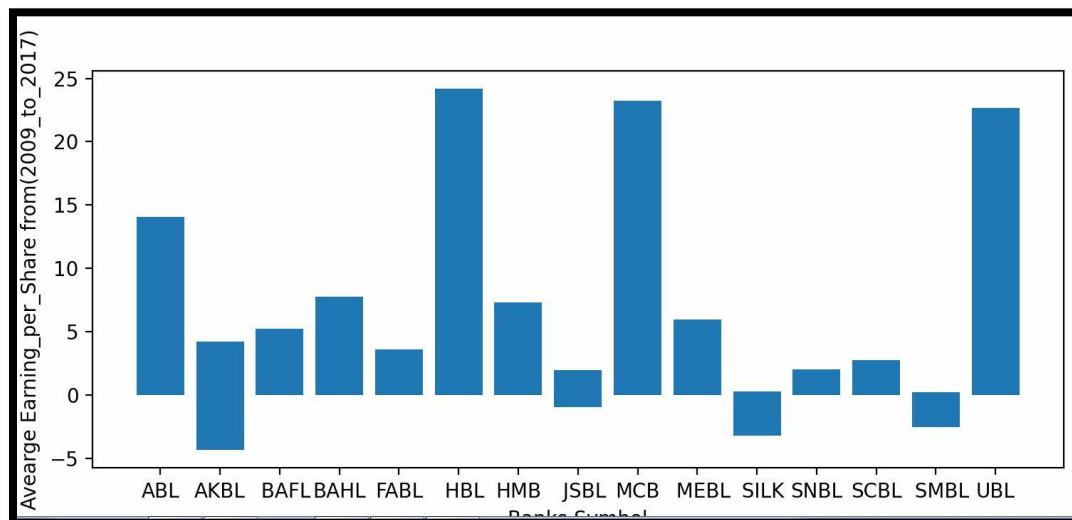
```
In [18]: x='Symbol'
         y='EPS'
         plt.bar(x,y,data=all_banks_data)


         plt.xlabel('Banks Symbol')
         plt.ylabel('Avearge Earning_per_Share from(2009_to_2017)')
         plt.show()
```

FIG 18 GRAPHICALLY REPRESENTATION OF EARNING PER SHARE WITH SYMBOL

This fig show that on x axis we take symbols and on Y axis we take earning per share .then we make a bar plot and also put label on x and y axis.

Graph5: *GRAPHICALLY REPRESENTATION OF EARNING PER SHARE WITH SYMBOL*

This graph show that the highest EPS is of MCB AND UBL bank meanwhile AKBL show negative EPS .raising EPS show that bank making good consistence growth whereas negative EPS means the AKBL losing money

• *STEP 15 GRAPHICALLY REPRESENTATION OF DIVIDEND % WITH SYMBOL*

In this step we make a graph of dividend %
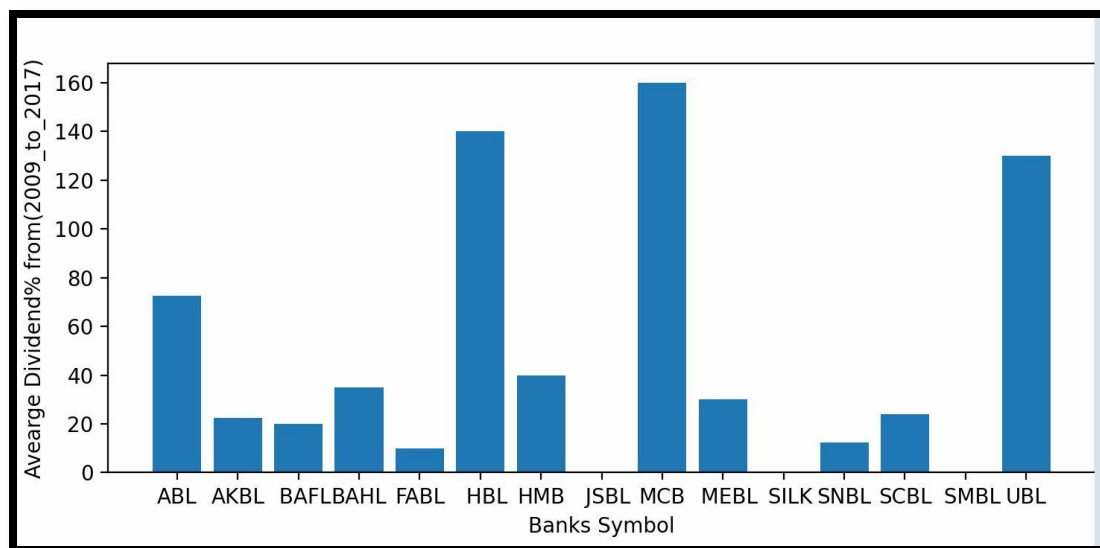
```
In [20]: x='Symbol'
         y='Dividend %'

         plt.bar(x,y,data=all_banks_data)

         plt.xlabel('Banks Symbol')
         plt.ylabel('Avearge Dividend% from(2009_to_2017)')
         plt.show()
```

FIG 19GRAPHICALLY REPRESENTATION OF DIVIDEND % WITH SYMBOL

This fig show that on x axis we take symbols and on Y axis we take dividend % from 2009 to 2017 .then we make a bar plot and also put label on x and y axis.

Graph6: **GRAPHICALLY REPRESENTATION OF DIVIDEND % WITH SYMBOL**

This graph show that the MCB bank has the highest dividend % as compared to other bank .And FABL bank show the lowest dividend %. A bank with the highest payout ratio is generally on the CUSP of declaring most or all the money it make as dividend. A low payout ratio can signal data that a company re investing the bulk of its earning into extending operation .

- # ***STEP 16 MAKE NEW COLUMN OFCAPITAL INTENSITY***

Now we make a new column of capital intensity


```
In [21]: all_banks_data["Capital_intensity"]=all_banks_data['Assets'].astype(float)/all_banks_data['Sales'].asty

In [22]: all_banks_data.groupby(['Symbol']).sum()

Out[22]:
```

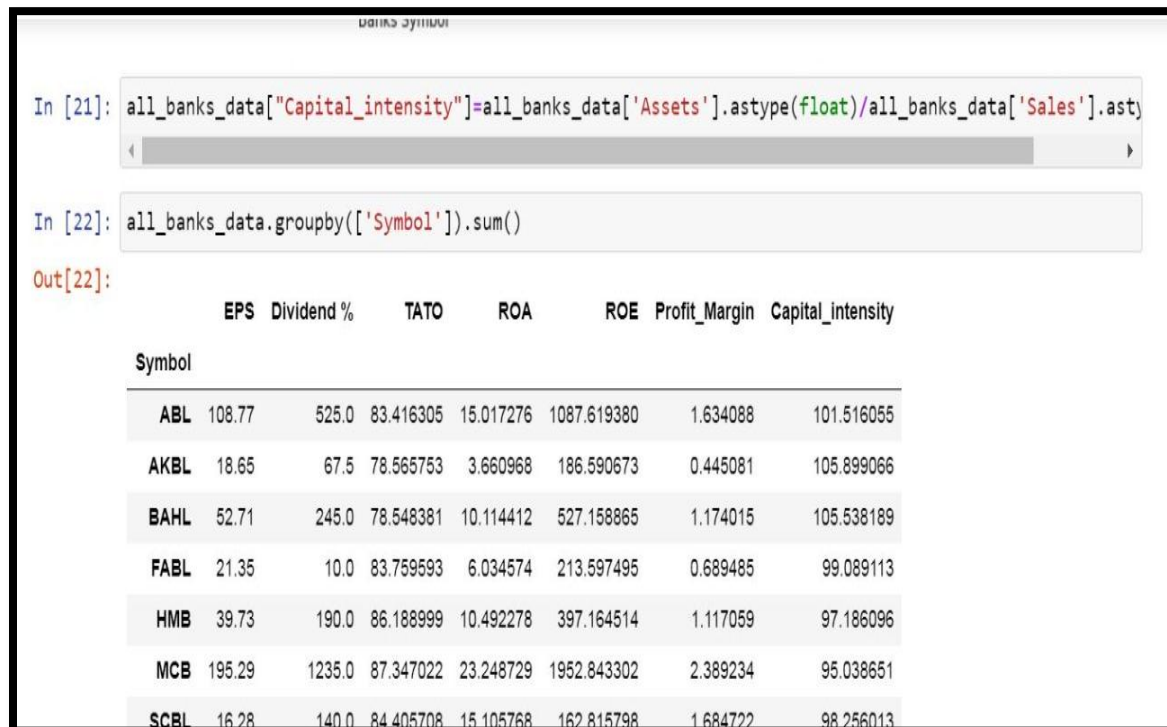| Symbol	EPS	Dividend %	TATO	ROA	ROE	Profit_Margin	Capital_intensity
ABL	108.77	525.0	83.416305	15.017276	1087.619380	1.634088	101.516055
AKBL	18.65	67.5	78.565753	3.660968	186.590673	0.445081	105.899066
BAHL	52.71	245.0	78.548381	10.114412	527.158865	1.174015	105.538189
FABL	21.35	10.0	83.759593	6.034574	213.597495	0.689485	99.089113
HMB	39.73	190.0	86.188999	10.492278	397.164514	1.117059	97.186096
MCB	195.29	1235.0	87.347022	23.248729	1952.843302	2.389234	95.038651
SCBL	16.28	140.0	84.405708	15.105768	162.815798	1.684722	98.256013

FIG 20 MAKE NEW COLUMN OFCAPITAL INTENSITY

This fig show first we add new column of capital intensity in our data frame with the help of two column asset and sales and also define the data type of these column.

• *STEP 17 GRAPHICALLY REPRESENTATION OF CAPITAL INTENSITY WITH SYMBOL*

In this step we make a graph of capital intensity



```
In [23]: x='Symbol'
         y='Capital_intensity'

         plt.bar(x,y,data=all_banks_data)

         plt.xlabel('Banks Symbol')
         plt.ylabel('Avearge Capital intensity from(2009_to_2017)')
         plt.axis('tight')
         plt.show()
```

FIG 21 GRAPHICALLY REPRESENTATION OF CAPITAL INTENSITY WITH SYMBOL

This fig show that on x axis we take symbols and on Y axis we take capital intensity from 2009 to 2017 .then we make a bar plot and also put label on x and y axis.
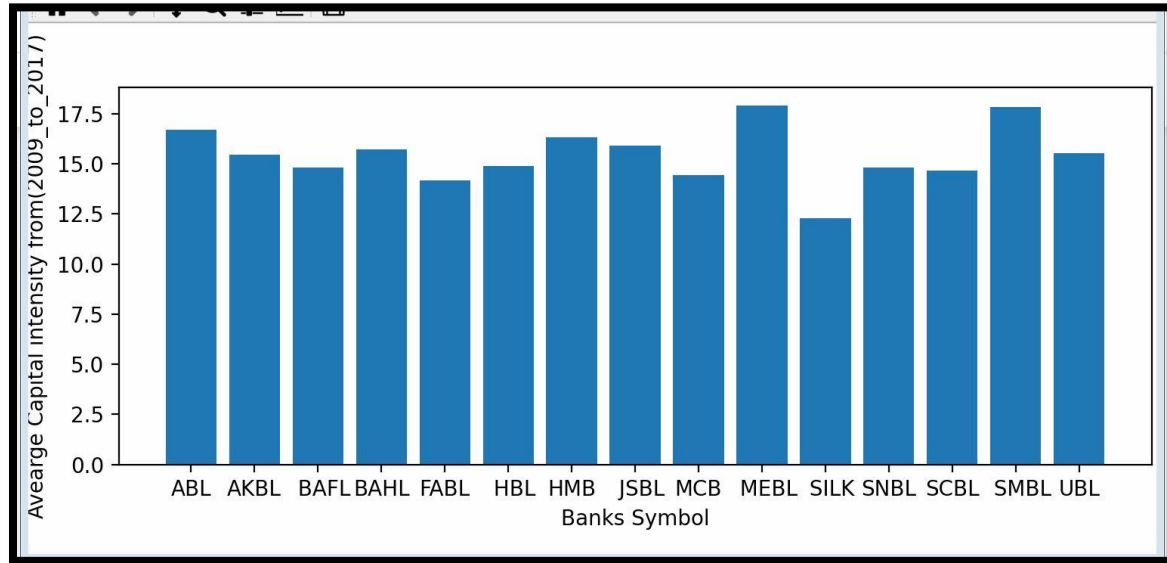
Graph7: GRAPHICALLY REPRESENTATION OF CAPITAL INTENSITY WITH SYMBOL

This graph show that ABL bank show the highest capital intensity meanwhile FABL bank show lowest capital intensity. A higher capital intensity ratio mean that a bank need more assets that a bank with the lower ratio to generate the equal amount of sales. The bank with lower capital intensity show that is better because it generate more revenue using less assets.

STEP 18 PLOT MULTIPLE COLUMN IN ONE GRAPH

In this step we make a graph of multiple column in single graph

```
In [42]: return_on_asset = all_banks_data.groupby('Symbol').mean()['ROA']
         return_on_equity = all_banks_data.groupby('Symbol').mean()['ROE']
         add_symbol=all_banks_data.groupby('Symbol')


         keys=[symbol for symbol,df in add_symbol]
         fig, ax1 = plt.subplots()

         ax2 = ax1.twinx()
         ax1.bar(keys,return_on_equity,color='g')
         ax2.plot(keys,return_on_asset,color='b')
         ax1.set_xlabel('Bank Sumbols')
         ax1.set_ylabel('Return_on_Equity',color='g')
         ax2.set_ylabel('Return_on_Asset',color='b')
         ax1.set_xticklabels(keys,rotation='vertical',size=8)
         fig.show()
```
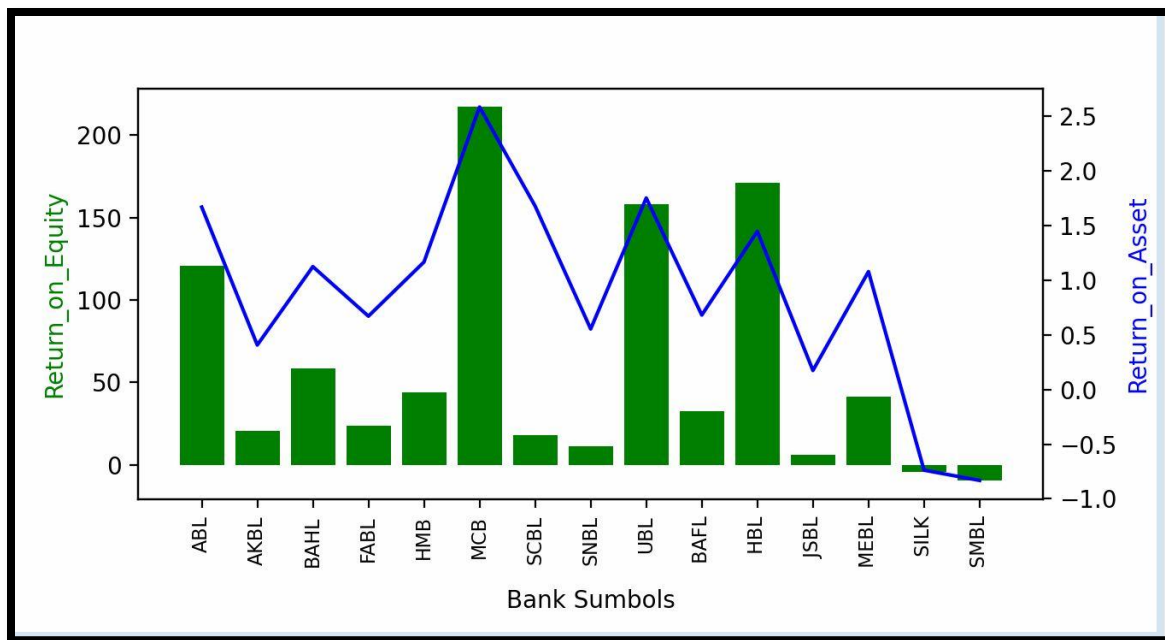
FIG 22 PLOT MULTIPLE COLUMN IN ONE GRAPH

This fig show that we make first variable of return_on_asset and group by symbol and ROA .Then make send variable of return_on_eqiuty than group symbol and ROE .then we define our symbols .Now on ax1 we plot a bar plot of symbol and ROE similarly on ax2 we make a simple plot of symbol and ROE. Secondly add label on each side and set rotation as vertical

Graph8: PLOT MULTIPLE COLUMN IN ONE GRAPH

e green bar show ROE Of each bank. This graph show that the highest ROE is of MCB and UBL bank meanwhile AKBL bank show negative return on equity. The rises in return of equity show good sign for the bank as it is showing that a rate of return on shareholder equity raising. When ROE have a negative value means the bank is of financial distress, thus it's not a favorable investment opportunity at that moment.

The blue line show the ROA of each banks .This graph show that the highest return on asset is of MCB bank as compare to other bank meanwhile AKBL bank shows negative return on asset. The rises on ROA indicate that MCB bank is doing a good job of increasing its profit with each investment. A negative ROA show that the AKBL bank loses more money that it bring in experience in a net loss.

14-WHAT WE GET FROM THIS PROGRAM

All the about analysis make us able to decide which bank performing there duties and responsibilities well. And also the main purpose of all these analysis is to find out on which bank we invest our money so that we can earn profit. So as all above the MCB (Muslim commercial bank) and UBL (United bank limited) perform their duty very well and earn so much profit on the given period as compared to other

bank .we should invest our money in these bank in order to gain profit. Meanwhile AKBL(Askari bank limited) performing their duties not well it show negative result which mean that AKBL is not suitable to invest money because it cannot produce any profit also going in lost.

15-CONCLUSION

Python empower data research to accomplish more in less time .python is a adaptable programming language that can be effectively comprehended and is usually ground break in as well. Python is extremely adaptable and can work in any condition effectively .LIKEWISE with inconsequential change, it can be run in any working frame work and can be coordinate with other programming language . every one of these quantities has descended on python the best option for data research and design .