Friday, 18/11/2022

Department of Mechanical Enginnering, IIT Jodhpur

ADVISOR

Dr. Prodyut Ranjan Chakraborty
Dr. Anuj Pal Kapoor

STUDENT

Jeevesh Jain
Dhruv Kakadiya

B.Tech Project Presentation

Automated Fundamental Analysis of Mechanical Engineering based organizations

Table of Contents

OBJECTIVES

1. Collect and cleanse the fundamental data of various companies from around the world in the “Industrials” Sector.
2. Create a grading system in order to rank the companies on the basis of their fundamental data.
3. Identify the Key Performance Indicators for the “Industrials Sector” (Sector KPIs)
4. Grade the companies on the basis of conventional fundamental data and identified Sector KPIs and visualize the distribution of the company's overall performance and identify the statistical stakeholders.
5. Package the GUI into an installable, executable file that can be run in any system without hindrances.
6. Create a GUI (Graphical User Interface) to make the process interactive and easy-going for a first-time user.

I Research Background & Motivation

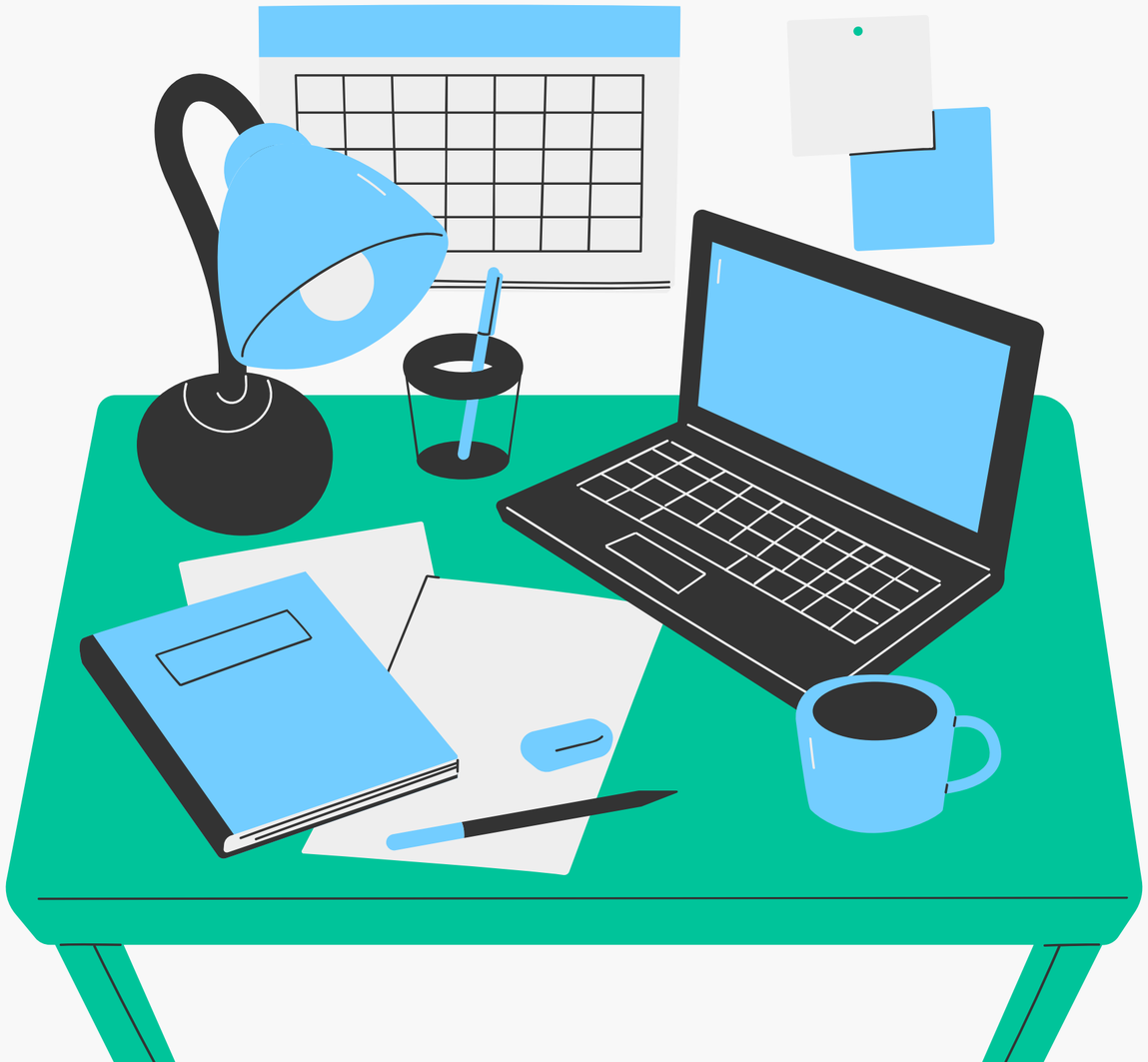
- The purpose of this project is to automate the process of examining the current state of businesses in the mechanical engineering-based industries (which come under the sector of “Industrials”) in order to develop ideas for management enhancement and bolstering of financial performance in these businesses.

- In order to automate this process of analyzing the fundamentals we have used techniques like web-scraping, GUI automation, packaging, and data analysis, and combined these with the concepts of finance and industrial engineering.

- In order to assess the firms on a percentile basis, we defined industry KPIs and divided the already-existing fundamental indicators into 5 primary categories.

- For the technical part of the project, we used the programing language Python and its libraries for the purpose of scraping, automation, analysis, GUI building, and packaging.

- The main aim of the project was is to help any person ranging from a rookie to an expert get a sophisticated installable file that can be run to fundamentally analyze the “Industrials” sector stocks using conventional and derived analyses so that they can understand the titbits of the important metrics for fundamental analysis, especially for our sector of choice.



I Research Background & Motivation

Fundamental Analysis

A security's intrinsic value is calculated using fundamental analysis (FA), which looks at relevant economic and financial elements. An investment's intrinsic value is determined by the financial health of the issuing firm, as well as the general market and economic climate.

The chosen sector - “ Industrials”

This economic sector is varied and has a large number of sub-branches. In a market that is saturated and extremely competitive, businesses must develop their firm strategy in order to acquire sustainable work, keep job opportunities, and give stability.

Particularly very tough to assess

I Testimonials

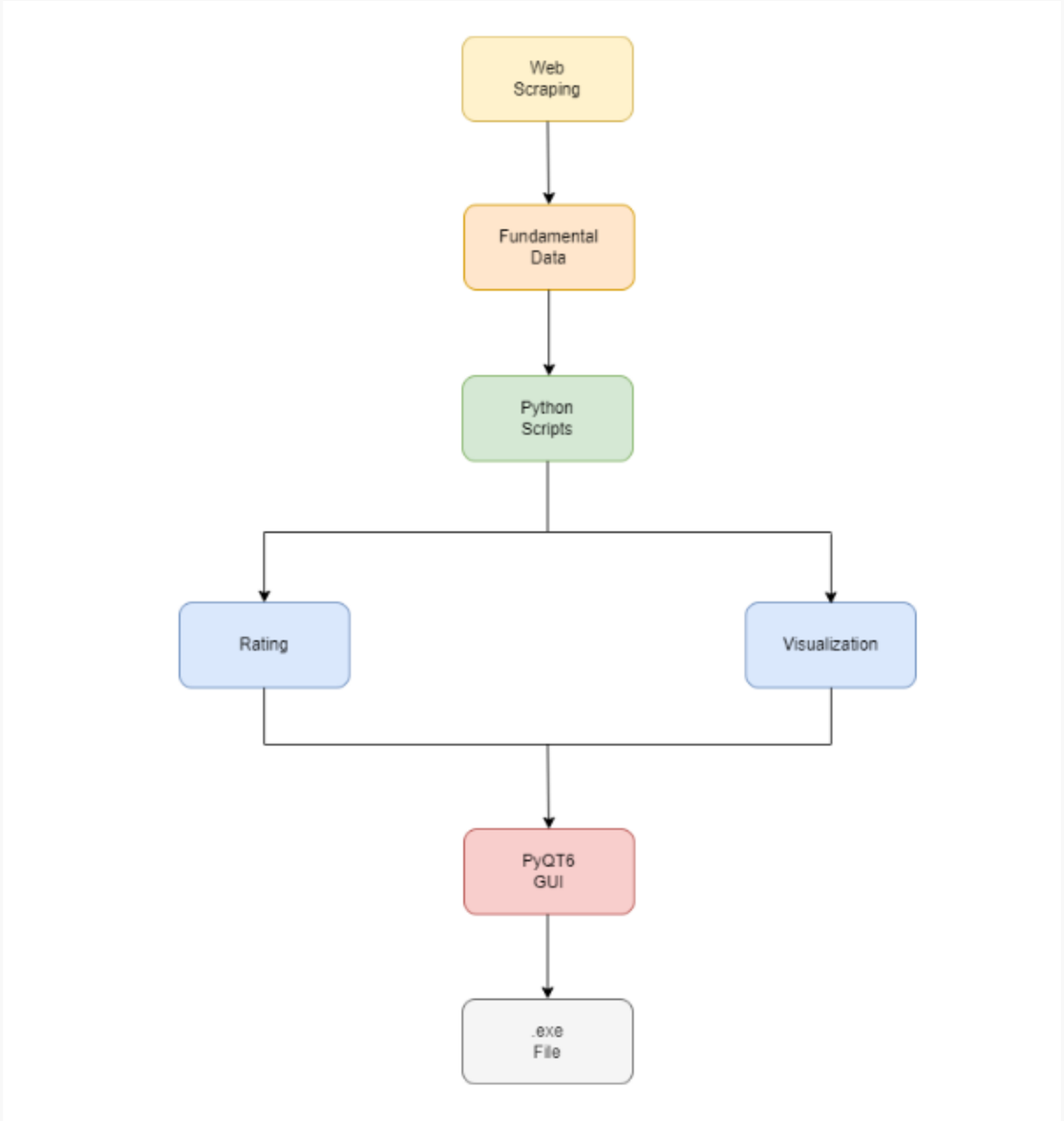
Mr. Abhishek Dhawan - Credit Analyst, Fidelity London

- Specialized "industrials"
- Suggested having elements of a forward look
- Reinforced our approach by introducing Operating Leverage
- Confirmed our approach to being almost similar to that of large hedge fund strategies

Mr. Ashish Surana - Vice President, Risk Management, HSBC London

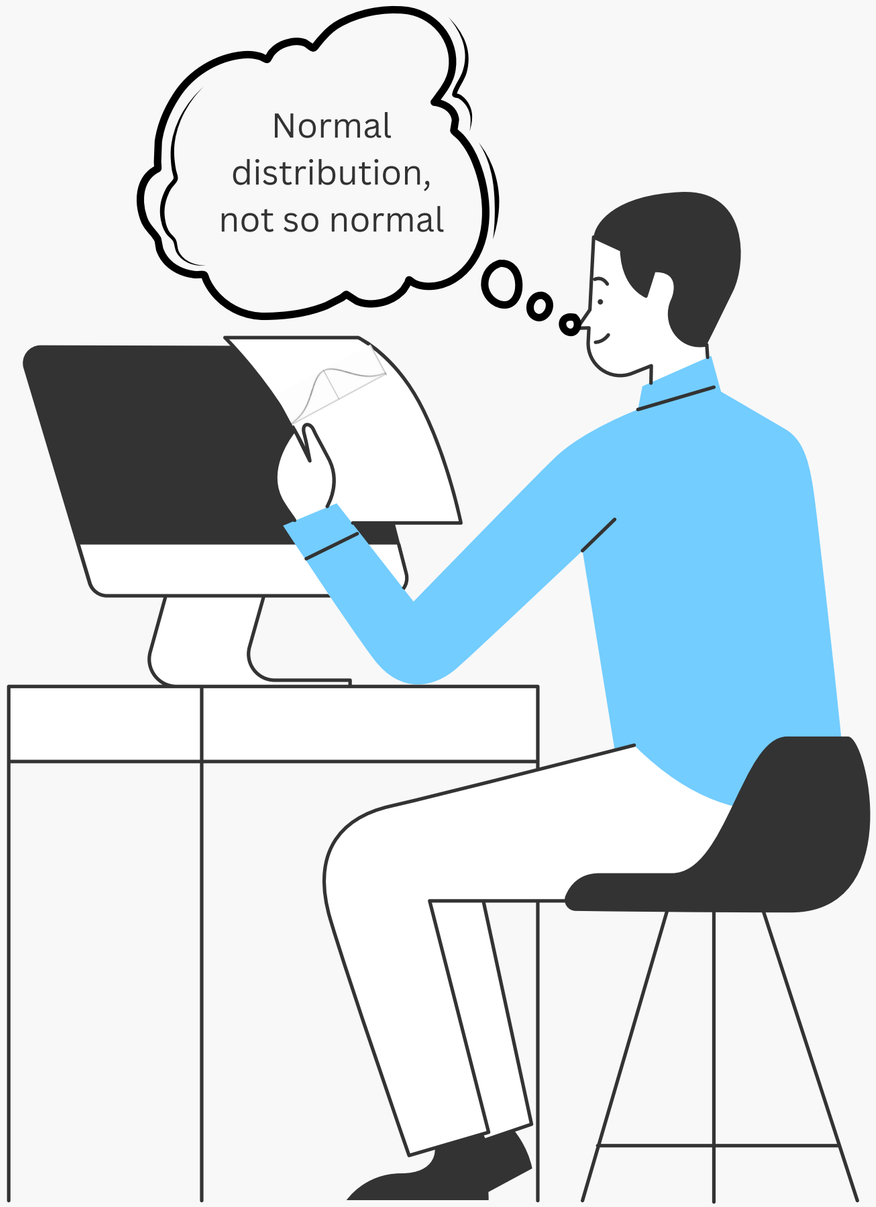
- Specialized risk
- Suggested having elements for risk management
- Suggested having the risk profile of an investor into account
- Stressed by the growing focus on Climate risk,

I The process



I Grading system

- The grading system for this programme is based on the normal distribution of values for a certain statistic for a particular sector. When assessing a firm's net margin, for example, we would consider the net margins of all the other companies in the sector and give the stock a percentile depending on where it lies in the range of values.
- The program's grading system takes into consideration the standard deviation of the set of values after eliminating outliers. Each metric for each stock is given a grade based on this value. Following the evaluation of all the criteria for each area of valuation, profitability, growth, KPIs and price performance, the grades are converted into numbers, and the average of the values is computed. The sum of these numerical ratings for each category is multiplied by 100 to provide a score out of 100, which is used to calculate a stock's overall rating.
- When a lower number is preferable, such as with P/E ratios, the algorithm will evaluate metrics using the 10th percentile. So if a company in the Industrials sector has a P/E ratio of 6.494, which is in the top 10% of all P/E ratios for companies in the sector, it will be given an A+ grade.



II Theoretical work

The identified buckets are

Profitability

- The amount by which a company's total revenue exceeds its total outlays for any particular time period is known as profitability. The accounting concept of profitability is often known as net profit or net income.
  a. Profit Margin
  b. Operation Margin
  c. Gross Margin
  d. Return-on-Equity
  e. Return-on-Assets

Growth

- Financial measures like revenue or book value per share are examples of growth.
  a. Earnings-per-Shares this Year
  b. Earnings-per-shares of Next Year
  c. Earnings-per-shares of the next 5 Years
  d. Sales Quarter-to-Quarter
  e. Earnings-per-shares Quarter-to-Quarter

Valuation

- Calculating the fair worth of an asset, an investment, or a company through valuation is a quantitative procedure. In general, a company's worth can be determined either on an absolute basis, in relation to other similar firms or assets, or on a relative basis.
  a. Forward Price-to-Earnings (Fwd P/E)
  b. Price/Earning-to-Growth Ratio (PEG)
  c. Price-to-Sales Ratio (P/S)
  d. Price-to-Book Value (P/B)
  e. Put-Call Ratio (P/C)
  f. Price to Free Cash Flow Ratio (P/FCF)

II Theoretical work

The identified buckets are

Core Sector KPIs

- A sector KPI is a KPI that is regarded as being more significant than the standard indicators and is pertinent to a certain sector. These are deduced by us and are derived from theoretical notions
  a. Scale
  b. Labor Cost
  c. Operating Leverage
  d. C-Suite Diversity
  e. Technological Enabler
  f. ESG Score

Performance

- A measure of an organization's ability to use both material and human resources to accomplish its goals is called "firm performance." The effectiveness of employing business tools during the production and consumption processes is taken into account when evaluating a firm's success.
  a. Performance Month
  b. Performance Quarter
  c. Performance Half Month
  d. Performance Year
  e. Performance Year-to-Date
  f. Volatility M

II Sector KPIs

The identified sector KPIs are

Scale

- Economies of scale are the cost advantages a business achieves as production levels rise. This is possible because production expenses may now be divided across several different products.

Labor Cost/Market Cap

- The sum of all employee salaries, benefits, and payroll taxes is referred to as the labor cost. It is split into two groups:
  1. Direct Labor Costs: are the salaries and benefits given to the workers who create goods or services.
  2. Indirect Labor Costs: are costs that facilitate that production.

Operating Leverage (Degree of Operating Leverage)

- A cost-accounting method called operational leverage assesses how much a company or project can raise operating income by raising revenue. A company with significant operating leverage creates revenues with a high gross margin and low variable expenses.

II Sector KPIs

The identified sector KPIs are

C-suite Diversity:

- The phrase "C-level," often known as the "C-suite," refers to high-ranking executive positions in a corporation. The word "chief" is represented by the letter C in this sentence, as in chief operating officer and chief executive officer. Diversity of gender, color, and ethnicity in the C-suites of a corporation is referred to as C-suite diversity.

Technological Enabler:

- Many businesses have started transitioning to the concept of smart production and manufacturing with the advent of Industry 4.0*. Since some businesses are still finding it difficult to transition from Industry 3.0 to Industry 4.0, it is determined that the swift movers have solid underpinnings.

ESG Score

- A corporation, fund, or security's performance with regard to Environmental, Social, and Governance (ESG) concerns is measured or evaluated objectively using an ESG score.

Technical Work

- Step 1 - Performed scraping of financial data from the Finviz screener using beautiful soup to obtain the conventional fundamental analyses
- Step 2 - Gathered the sector KPI data through self-analysis, market research, reverse engineering, and analysis of individual companies

- Step 3 - Created a Python script to rank these stocks on the basis of the Grading System (explained above). Divided the metrics into 5 buckets and graded the buckets as well

- Step 4 - Created python scripts for analyzing the grades, and visualizing the results
- Step 5 - Wrapped the Python scripts around PyQt6 to create an interactive GUI to make the process easier for a first-time user.

- Step 6 - Packaged the PyQt6 wrapped scripts using Pyinstaller to generate an executable file

V Results, Conclusion & Discussions

Sector KPIs

The identified sector KPIs are

- Scale
- Labor Cost
- Operating Leverage (Degree of Operating Leverage):
- C-suit Diversity:
- Technological Enabler:
- ESG Score (Environmental, Social, and Governance Score):

Buckets

Identified buckets -

- Profitability (conventional)
- Performance(conventional)
- Valuation(conventional)
- Growth (conventional)
- Core Sector KPIs

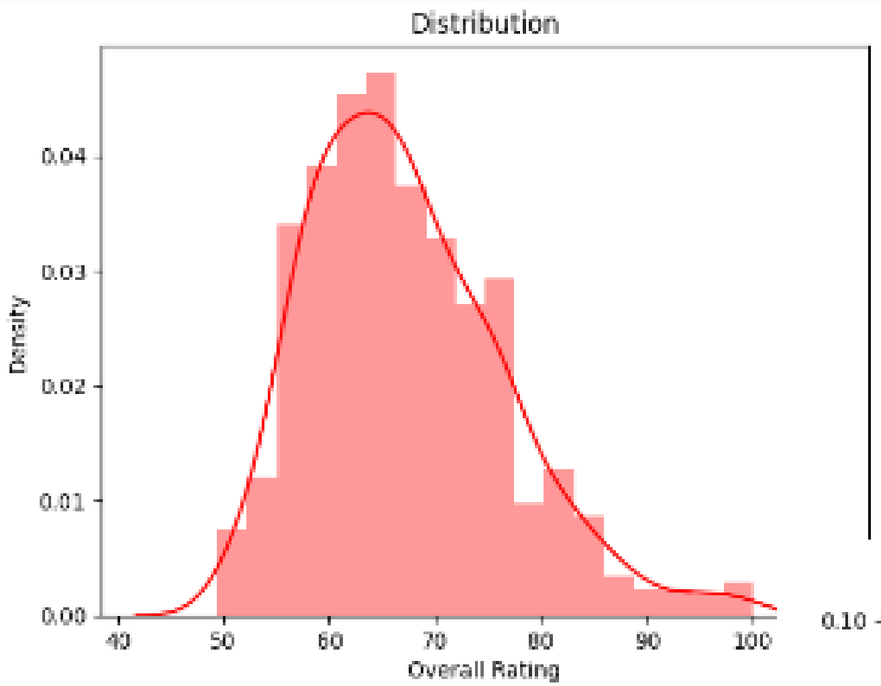
Automation and Visualization

Successfully automated the process of fundamental analysis of mechanical engineering-based organizations using Python, PyQt5, Pyinstaller, Beautiful Soup, orthodox finance concepts, and newly identified sector KPIs and visualized the results

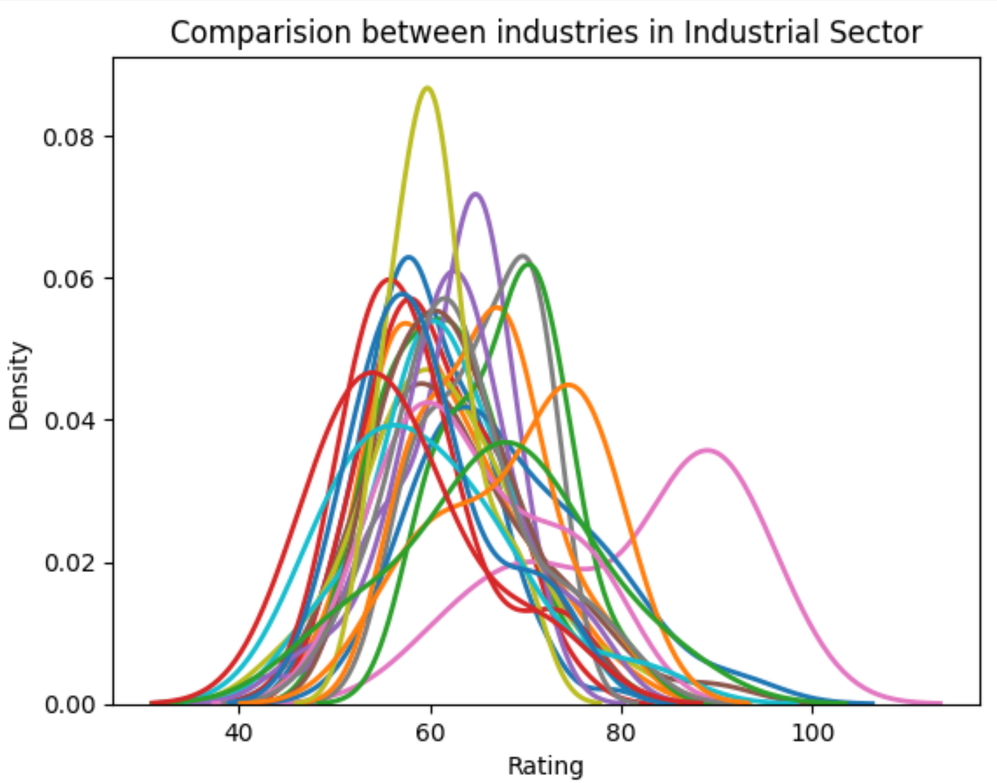
Future Prospects

- Age of Inventory
- Age of Investor
- Risk Profile of investor
- Include more forward-looking data
- Combine with technical/Sentimental analysis
- Account Risk / Value at Risk
- Country wise analysis can generate new sector KPI

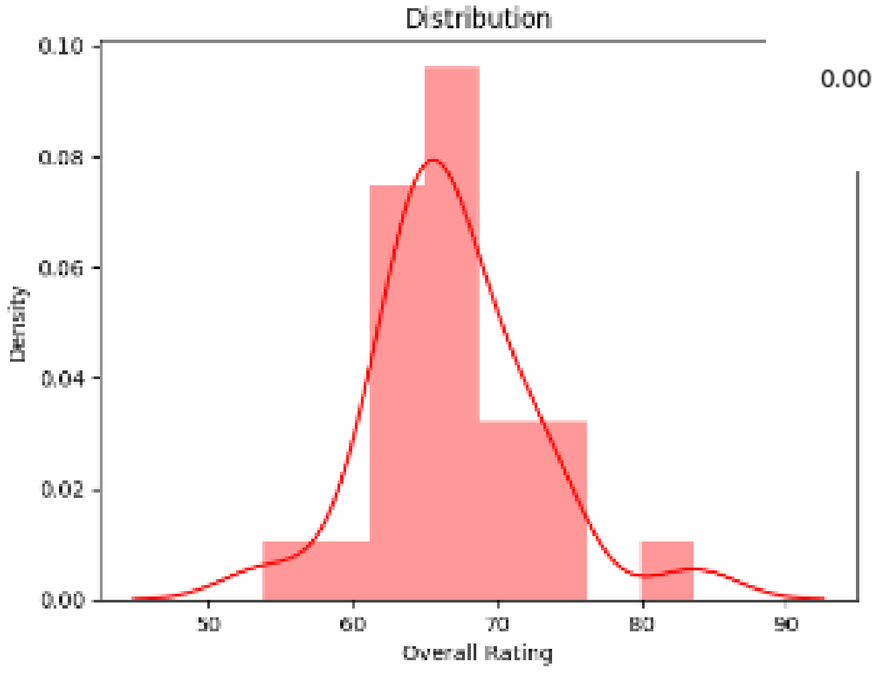
V Conclusion & Discussions



Grouped by Industry



Grouped by Companies



Various Industries in the sector

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Thank you for listening!