Technology Mergers and Acquisitions Analytics

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INTRODUCTION:

The dataset "Technology Mergers and Acquisitions" includes detailed information on 36 Tech Giants like Adobe, Amazon, Apple, Google, and Microsoft. It's split into four CSV files: "Acquiring Companies.csv," "Acquired Companies.csv," "Acquisitions.csv," and "Founders and Board Members.csv." Each file offers insights into unique aspects of tech giants. For example, "Acquiring Companies.csv" gives details about the companies themselves, their CrunchBase profiles, market categories, founding years, total funding, and acquisitions. "Acquired Companies.csv" focuses on 1,610 companies acquired by these giants, providing info such as their profiles, markets, founding years, and acquisition specifics. "Acquisitions.csv" dives into transactional data for 1,643 acquisitions, including details like acquired and acquiring companies, announcement years, and deal terms. Lastly, "Founders and Board Members.csv" provides data on the founders and board members of these tech giants. Overall, this dataset serves as a segway into exploring questions related aquisition desirability, willingness, and connections to funding. We will focus on 3 questions.

1. What traits make a company more desirable to be acquired?
2. What traits of the tech giants affect their willingness to acquire other companies?
3. How does the geographical distribution of total funding among the top 5 big tech companies with the highest total funding in the United States correlate with their acquisition activity and number of employees?

Section I: Acquisition Desirability

We aim to investigate the characteristics that render companies more appealing for acquisition, focusing on the market categories of firms acquired by major tech giants: Amazon, Apple, Facebook, Google, and Microsoft.

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## (‘stat_ydensity()‘).
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## Warning: Removed 50 rows containing non-finite outside the scale range
## (‘stat_boxplot()‘).
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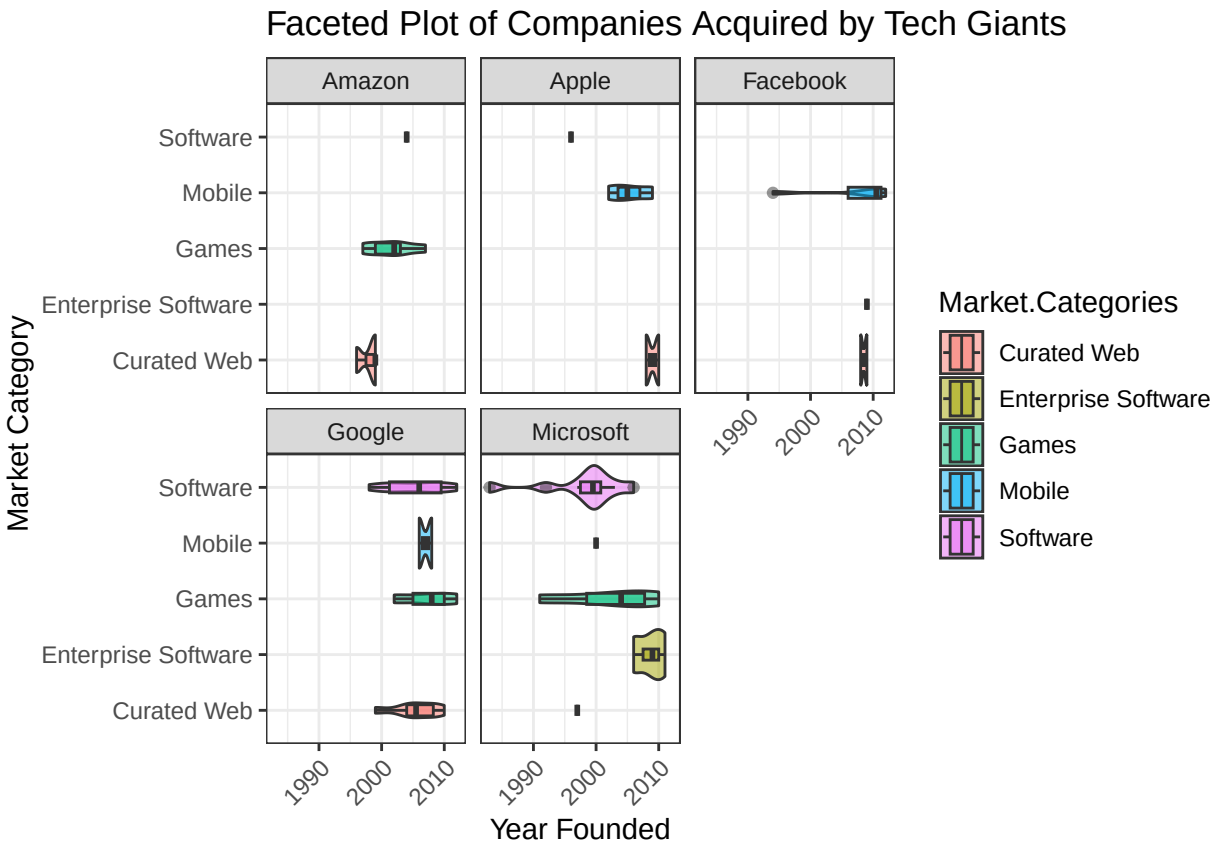
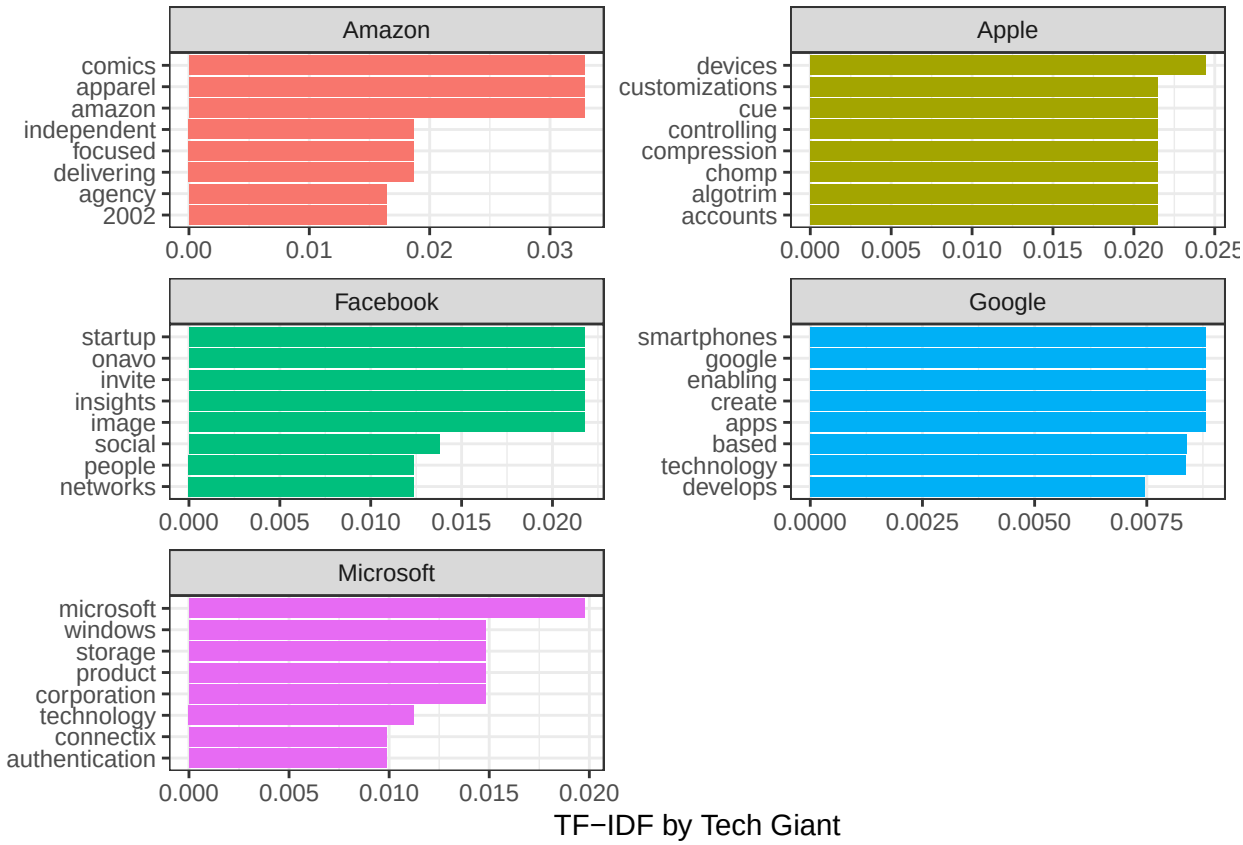


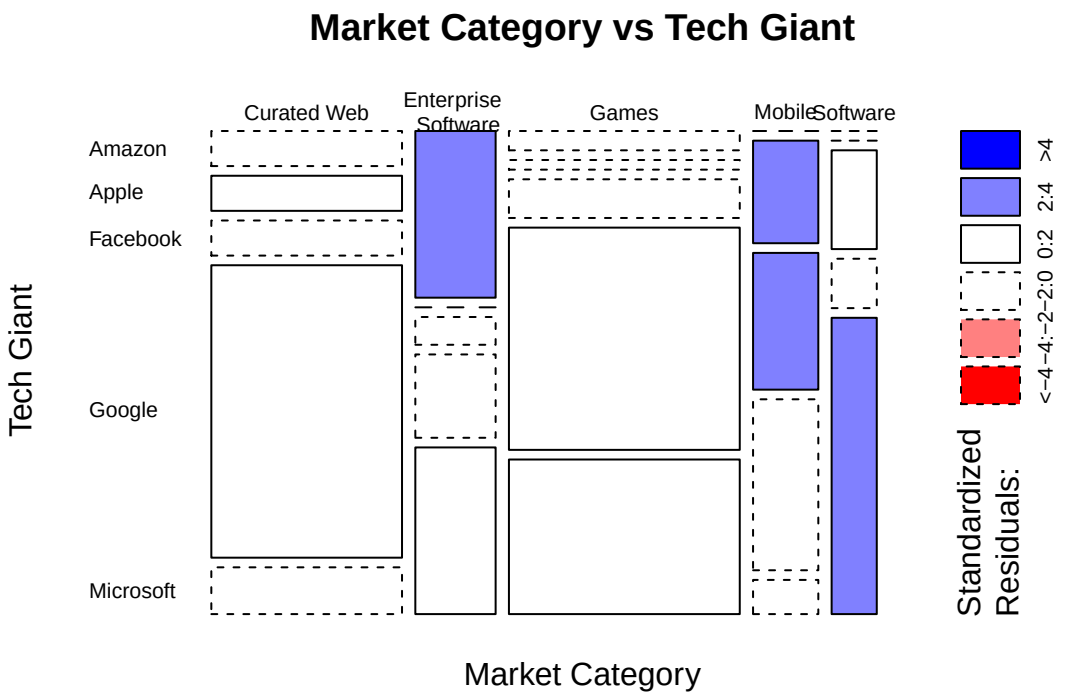
The first major insight from this plot is that the tech giants seem interested in acquiring from different industries: Google and Microsoft dominate in Software acquisitions; Microsoft dominates Enterprise Software; and Amazon, Google, and Microsoft acquire many game companies. For the Year Founded, Apple and Facebook seem to acquire newer companies, Amazon acquires older companies, and Google and Microsoft acquire a mix, on average. This plot can help us address questions about how major tech companies plan to dominate their industry by buying similar competitors or expanding to new services.

We also wanted to consider an analysis of the vocabulary used by acquired companies for the 5 tech giants.


application
games
enterprise
digital
users
technology
products
offers
social
data
platform
develops
mobile
media
service
software
game
information
share
solutions
company
based
video
app
enables
online
web
technologies
services
devices



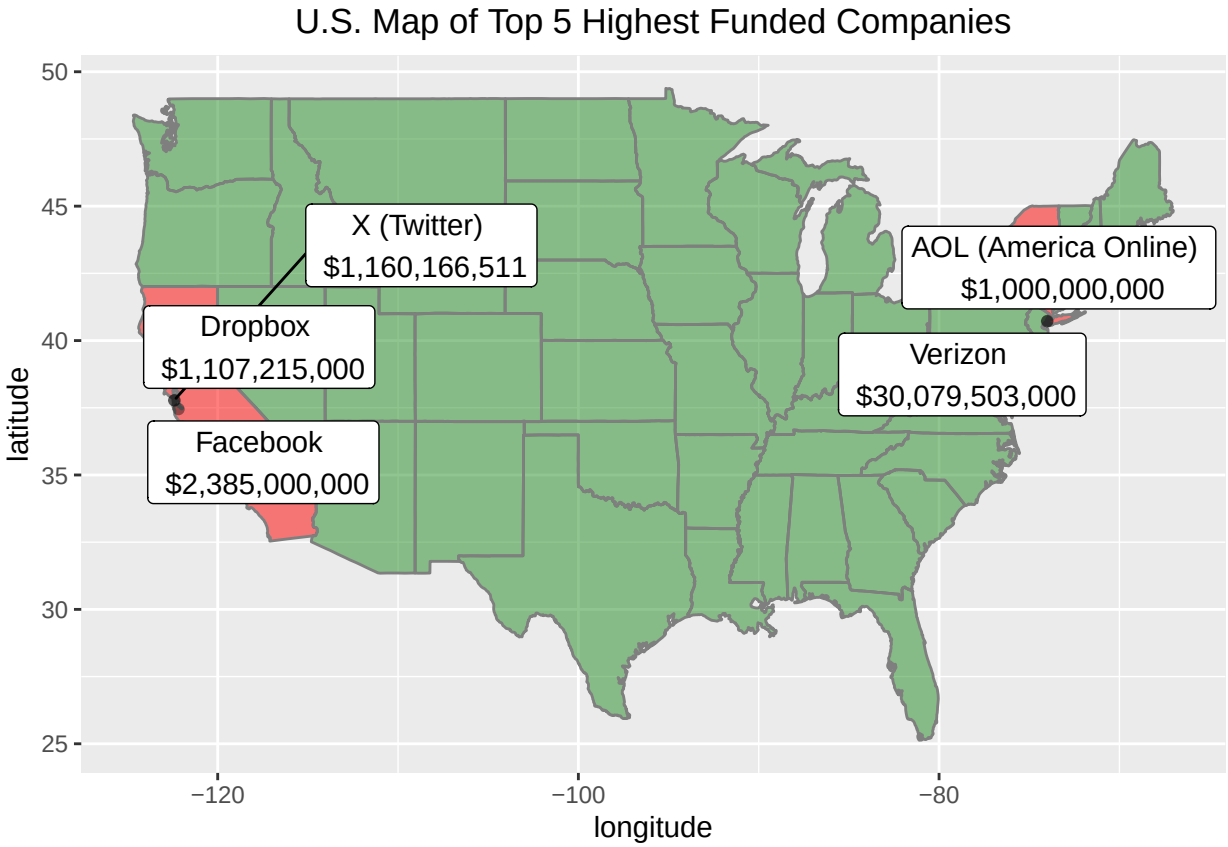
From this TF-IDF chart, we see the specific words that companies acquired by the tech giants prefer to see in the company's tagline. Amazon seems to acquire companies that market themselves with consumer goods through words like "comics", "apparel", and "delivering". Apple seems to prefer companies that market themselves as personalizable with words like "customizations" and "controlling". Facebook seems to prefer companies that market themselves as user platforms with words like "social", "people", and "networks". Google seems to broadly prefer tech-based companies with words like "technology" and "apps". Microsoft seems to like companies that are business focused with words like "product" and "corporation". Additionally, companies seem to like other companies that use their name such as "amazon", "google", and "microsoft" appearing in taglines for companies acquired by that respective company. This may suggest that these companies use tools developed by their eventual acquired company, and it is easier for tech giants to acquire companies that use their software. Now we will consider a Mosaic Plot for market categories of these acquired companies.



From the mosaic plot similar to our faceted plot, we see that there are some tech giants that acquire more companies from specific market categories than expected if the variables were independent. Specifically, Amazon appears to acquire more "Enterprise Software" companies than expected. Apple appears to acquire more "Mobile" companies than expected. Facebook appears to acquire more "Mobile" companies than expected. Microsoft appears to acquire more "Software" companies than expected. All of these are based on the observation that their corresponding boxes in the mosaic plot are light blue, which suggest Pearson residuals from 2 to 4. For Apple and Microsoft, they appear to be acquiring companies that directly compete in their markets. Apple is known in the "Mobile" market for their mobile phones and the app store while Microsoft is known in the "Enterprise Software" market for the Microsoft Office software. On the other hand, Amazon and Facebook appear to acquire companies that expand into newer markets.

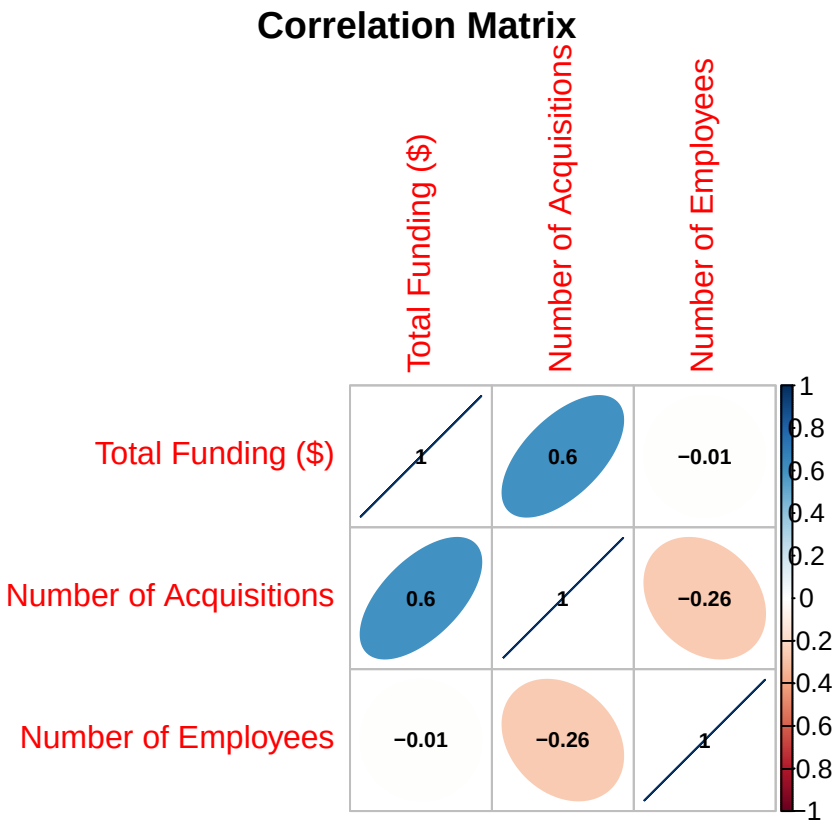
Section II: Funding

We sought to understand how the total funding of the top 5 big tech companies, which have the highest funding, varies across different regions of the United States. This involves examining the geographical locations of funding among these companies. Additionally, we were interested in exploring the correlation between total funding (excluding companies with zero funding) and both the number of acquisitions and the number of employees within these companies. This suggests an investigation into the relationships between funding levels and both acquisition activity and employee counts.



It's interesting that the top five most funded companies are split between just two states, California and New York. Additionally, we see that there is a surprisingly massive funding gap between Verizon and the second highest funded company, approximately $27.7B.This may be due to the fact that Verizon is a monopoly over cell phone and data services especially with the rise of 5G. We see that certain companies, such as Dropbox and AOL, have accumulated more funding than bigger name companies like Google and Amazon.

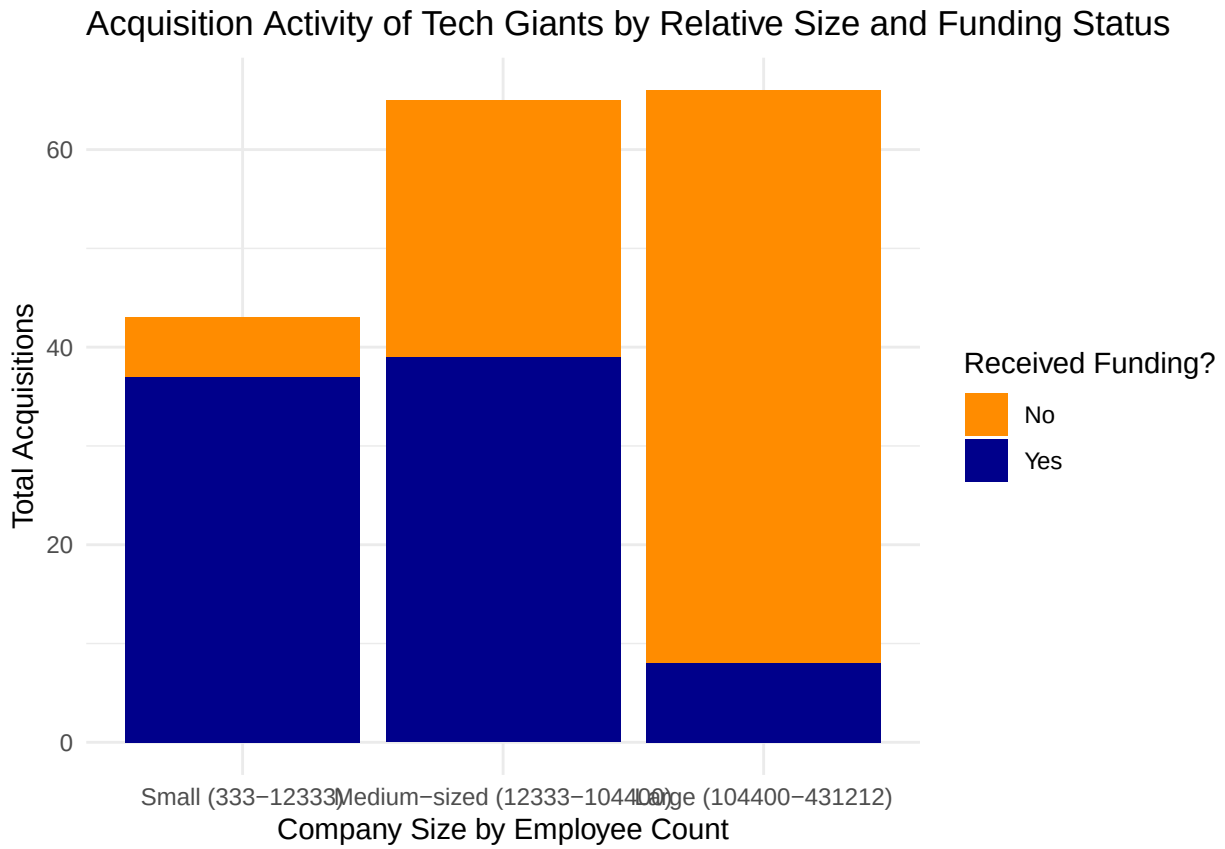
After seeing the locations of the companies with larger funding levels, we want to look into the correlation between funding, acquisitions and number of employees.



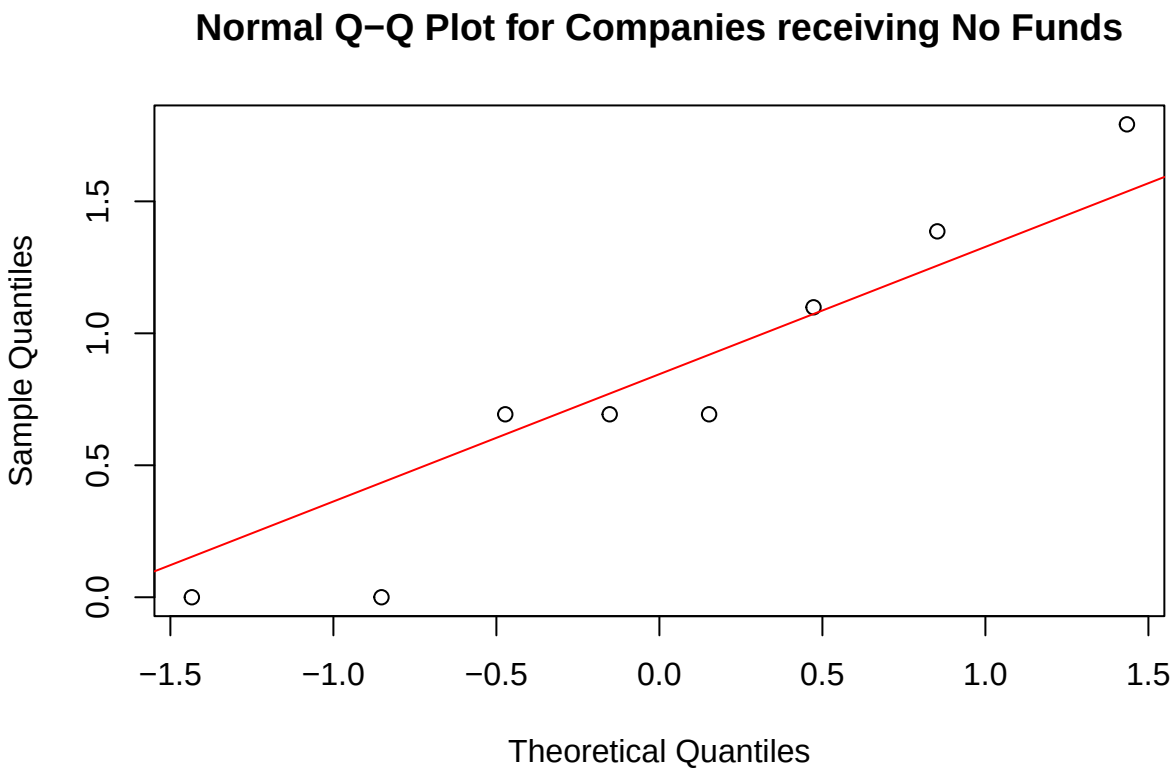
From the correlation matrix, across all Tech Giants with nonzero total funding, we notice a moderately strong and positive relationship between the number of acquisitions and total funding. This means that as the number of total acquisitions increases, there tends to be a corresponding increase in their total funding, on average. Conversely, there is a minimal (very weak) and negative relationship between the number of employees and total funding.

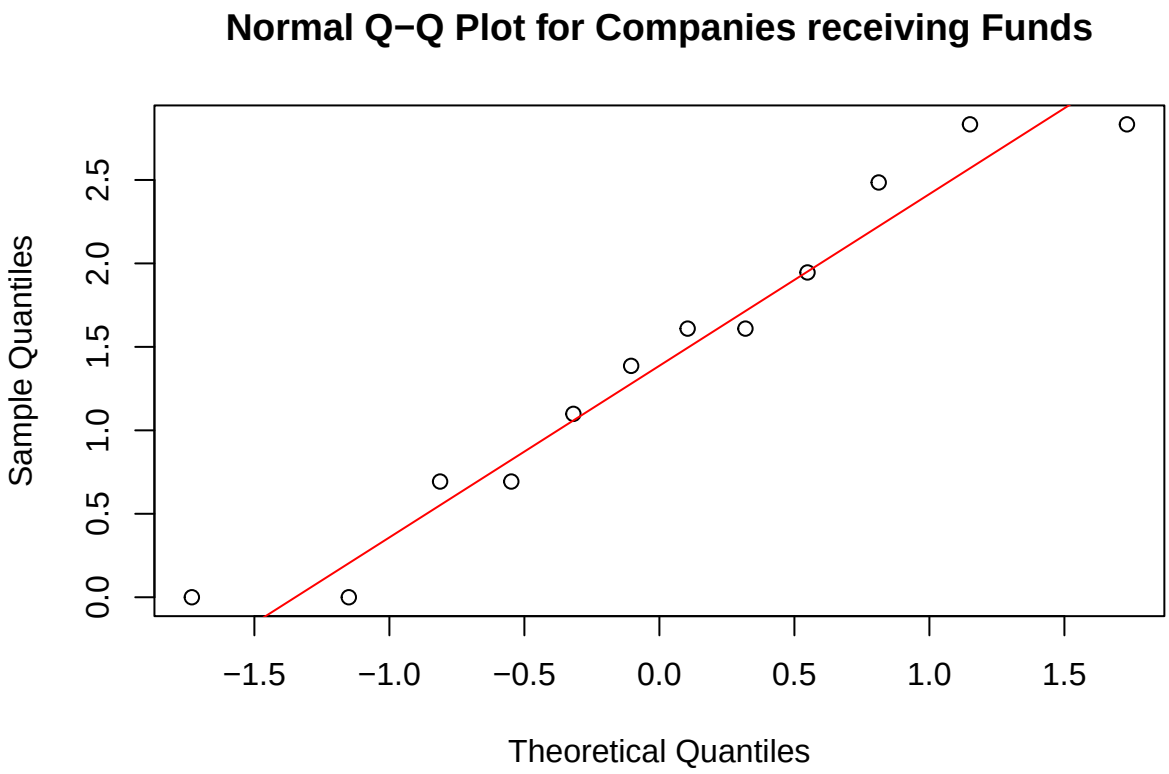
SECTION III: Willingness to Acquire

We want to understand what traits of the tech giants affect their willingness to acquire other companies. To answer this question, we begin by exploring relevant variables within an existing dataset. We will focus on two variables that are intuitively significant: funding status and employment status. The rationale for selecting these variables is twofold. Firstly, financial capacity, as reflected by a company's funding status, is conventionally posited as a foundational element enabling the pursuit and successful acquisition of other entities. Adequate financial resources can determine a company's ability to strategize and execute corporate acquisitions. Secondly, the relative size of a company, typically indicated by its employee count, is presumed to reflect its operational scale and market stature. It is commonly observed in the corporate world that larger companies are more inclined to acquire smaller firms as part of their growth strategy, rather than vice versa, which is comparatively rare and often strategically complex.



On the x-axis, the bar graph categorizes technology giants within the dataset based on their relative size determined by employee count, into three groups: 'Small', 'Medium-sized', and 'Large'. The y-axis represents the number of acquisitions made by companies within each size classification. Additionally, the graph distinguishes companies based on their funding status, whether they receive any funds. Initial inspection reveals a disparity in acquisition activity across company sizes. Specifically, 'Small' companies engage in fewer acquisitions relative to 'Medium-sized' and 'Large' companies, with the latter two categories exhibiting similar levels of acquisition activity. This suggests some positive relationship between company size and acquisition activity, where increases in employee counts are associated with increased acquisitions up to a certain point, beyond which company size no longer affects acquisition decisions. Furthermore, when examining the funding variable, the data suggests a potential correlation between funding status and acquisition activity within the 'Small' and 'Medium-sized' company groups. In these groups, companies that have received funding report more acquisitions than those that have not. Conversely, this pattern is not as evident within the 'Large' company group, which suggests that the influence of funding on acquisitions diminishes as companies reach a certain threshold size.


Normal Q−Q Plot for Companies receiving No Funds
Sample Quantiles
Theoretical Quantiles
0.0
0.5
1.0
1.5
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

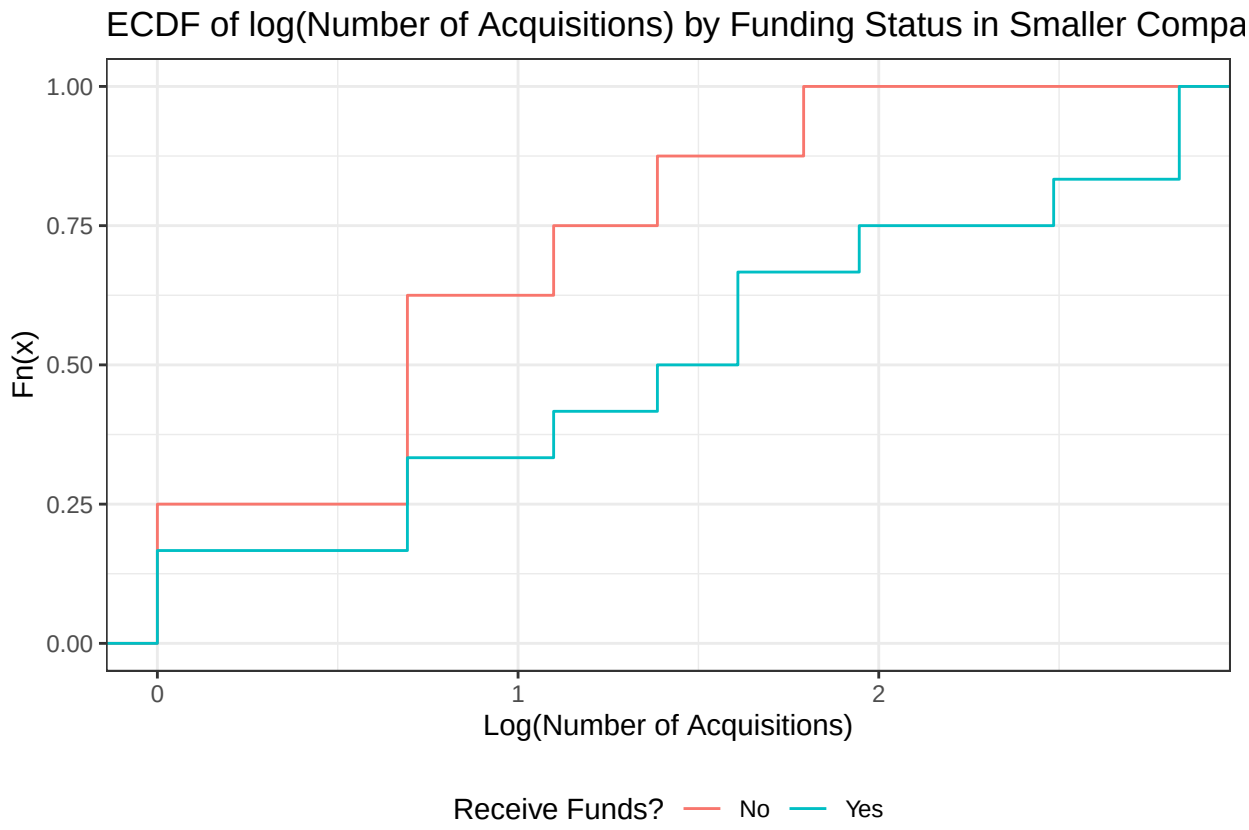



```
##
##  Shapiro-Wilk normality test
##
## data:  group_noFund
## W = 0.93008, p-value = 0.5168

##
##  Shapiro-Wilk normality test
##
## data:  group_Fund
## W = 0.93982, p-value = 0.4957

##
##  Welch Two Sample t-test
##
## data:  group_Fund and group_noFund
## t = 1.7717, df = 17.988, p-value = 0.04669
## alternative hypothesis: true difference in means is greater than 0
## 95 percent confidence interval:
##  0.01351835        Inf
## sample estimates:
## mean of x mean of y
## 1.4322767 0.7945135
```

Our observations from the previous graph prompted an investigation into whether there is a difference in acquisition decisions between small to medium-sized tech giants with and without funding. A t-test

was conducted on the hypothesis that tech giants (Small to Medium-sized) with funding tend to acquire more companies than those without. Before proceeding with the t-test, the data were subjected to a log transformation to ensure normality—a fundamental assumption of the test.The resulting QQ-plots indicated that the log-transformed data approximated a normal distribution, as evidenced by the alignment of data points with the reference line. This visual assessment was corroborated by the Shapiro-Wilk normality tests, which returned p-values greater than 0.05, supporting the normality of both groups' data.Through multiple testing, a significant difference in the mean number of acquisitions was detected among the first 58% of companies, ranked by employee count. Specifically, the t-test yielded a p-value of 0.04669, which falls below the alpha threshold of 0.05. This indicates that the mean number of acquisitions for companies with funding is significantly higher than that for companies without funding. This shows that funding does indeed influence the decision to acquire another company among smaller and medium-sized tech companies.

We also want to consider an analysis of smaller companies, as we focused a lot on the tech giants throughout our analysis.



The ECDF graph acts as a visual supplement to the previous t-test outcomes for smaller and medium-sized tech giants. From inspecting the ECDF lines, we note that the line representing companies without funding ('No Funds') is positioned above the line for those that have received funding ('Yes Funds') throughout the entire range of the logarithm of the number of acquisitions. This observation implies that, generally, a higher proportion of non-funded tech giants have a lower number of acquisitions compared to funded tech giants of similar size. Further validation of this inference comes from examining the 50th percentile (median): companies that receive funding reach a median at an approximate value of 1.4 on the logarithmic scale, whereas the median for companies without funding is around 0.7. This significant disparity in medians lends additional support to the t-test results, which indicate that the average number of acquisitions is significantly greater for funded tech giants. The ECDF graph aligns with the t-test findings, and further support the conclusion that funding status is a significant factor in deciding acquisition activities of smaller and medium-sized tech giants.

Conclusion:

Our analysis of technology mergers and acquisitions among tech giants in the industry offers meaningful insights into the strategies and dynamics of the technology industry. Through our analysis we have uncovered several key findings:

Acquisition Desirability: Tech giants exhibit preferences for acquiring companies from specific market categories, seen among the top 5 tech giants like Google, Microsoft, Apple, and Amazon. Furthermore, analysis of tagline vocabulary sheds light on the language used by acquired companies, providing insight into unique marketing strategies as well as technological focus of these acquisitions.

Funding and Acquisition Activity: A positive correlation exists between funding and a number of acquisitions among tech giants. Though larger funding levels allows more acquisition activity, the relationship between funding and employee count is small. This indicates that other factors may influence hiring decisions.

Willingness to Acquire: Our investigation into the relationship between company size, funding status, and acquisitions reveals that funding plays a significant role in acquisition decisions, particularly among smaller and medium-sized tech companies.

Future Directions: Despite the insights we gained from our analysis, We still have unanswered questions and avenues for potential further research. For instance, with the exponential rise of AI, we wonder if that changes the market categories and tagline vocabulary to include features of AI.