Executive summary

This project analyzes a telecommunications company's marketing campaign dataset containing 41,180 customer records to understand which customer segments and campaign factors drive higher subscription rates, addressing the business challenge of optimizing marketing ROI through targeted customer outreach.

The analysis employs exploratory data analysis (EDA) techniques to examine customer demographics, campaign execution factors, and timing variables against subscription outcomes. The project systematically investigates univariate distributions, bivariate relationships, and correlation patterns to identify actionable insights for marketing strategy optimization.

Students show highest subscription rate at 31.4%, followed by retirees at 25.2%, while the overall campaign success rate is 11.3%. Campaign effectiveness decreases significantly with multiple contacts - first contact achieves 13.0% conversion versus only 7.5% by the fifth contact. Seasonal timing reveals March (50.6%) and December (48.9%) as peak performance months, with mid-week days (Tuesday-Thursday) outperforming Monday by 2-3 percentage points. Economic indicators show strong correlations, with employment variation rate explaining 29.8% of subscription variance.

The telecom company should prioritize high-propensity segments (students and retirees), focus on quality early contacts rather than excessive follow-ups, and strategically schedule campaigns during peak months (March, December, September) and mid-week days. This targeted approach could potentially double conversion rates from the current 11.3% baseline while reducing campaign costs through more efficient resource allocation.

Key Result 1: Customer Segment Performance

Students show the highest subscription rate at 31.4%

Retirees follow with 25.2% subscription rate

Young customers (18-29) achieve 16.3% conversion

Senior customers (50+) reach 14.5% conversion

Middle-aged customers (30-49) show the lowest rate 9.3%

Key Result 2: Campaign Contact Strategy

First contact achieves 13.0% subscription rate

Second contact drops to 11.4%

Third contact falls to 10.7%

Fourth contact declines to 9.4%

Fifth contact drops to 7.5%

Table of Contents

Table of Figures

Introduction/ project background

Introduction

Problem statement

A telecommunications company conducted a marketing campaign to promote a new subscription plan but needs to understand which customer segments are most responsive and which campaign factors drive success to optimize future marketing efforts.

Rationale

The telecommunications industry is a massive $1.7 trillion global market where companies are desperate to find better ways to reach customers. Right now, telecom companies spend $200-400 just to get one new customer, and most of their marketing campaigns only convert 5-15% of people - which is pretty terrible when you think about it. The problem is that these companies are basically throwing spaghetti at the wall with their marketing - they're contacting everyone the same way, at the same time, without really understanding who's most likely to say yes. This study looks at a real telecom company that just ran a campaign with 41,180 customers and only got 11.3% to subscribe. That's a lot of wasted time and money! What we're doing here is digging into their data to figure out which types of customers are most likely to sign up (maybe students and retirees respond better?), when the best time is to contact people (March vs. May makes a huge difference), and how many times they should call before giving up (because calling someone 5 times instead of 1 actually makes them less likely to buy). The cool thing is that by understanding these patterns, the company could potentially double their success rate from 11.3% to over 20%, which would mean millions more in revenue while actually spending less on marketing. Plus, there's not much research out there specifically about telecom customer behavior, so this analysis could help other companies in the industry figure out how to stop wasting money on ineffective campaigns.

Project aims and objectives

To explore a telecommunications marketing campaign dataset and uncover which types of customers are most likely to subscribe, along with what makes campaigns successful, so the company can make smarter marketing decisions in the future.

To support our project aim, we asked the following questions:

1. Which customer segments show the highest subscription rates?
2. How does the number of campaign contacts affect conversion rates?
3. Which months and days of the week yield the highest subscription rates?
4. What combination of factors creates the highest probability of customer conversion?

To answer these questions we had the following objectives:

1. Customer Segmentation Analysis
2. Campaign Contact Strategy Investigation
3. Temporal Pattern Analysis
4. Customer Relationship Assessment and Predictive Factor Identification

Methodology

Methodology

Methods overview

In this study, we used a telecommunications dataset, which recorded data for their new campaign to understand customer behavioral patterns and also hidden patterns of the market. We studied the customer data to find out which type of customers are likely to subscribe and what conditions incentives them to subscribe.

Methods details

- Data Acquisition and Structure:-

We analyzed 41,180 customer records from the telecom company's marketing campaign, which was stored in a ".csv" file format. The data included customer details (age, job, marital status, education), it also included their economic status such as (housing loan, personal loan), campaign details (month, duration, number of contacts), and some economic indicators of the current market back then. The main variable was the subscription variable marked as 'y' in the dataset.

- Data Preprocessing and Quality Assessment

We converted the target variable to numeric format (1 for yes, 0 for no) and handled special codes like 'pdays' where 999 meant no prior contact. We created new variables to better understand customer contact history. Quality checks showed no missing data, though some categories contained 'unknown' values that we kept for transparency.

- Exploratory Data Analysis

Here we tackled customer segmentation analysis where we group customers by their age and then calculate subscription against each demographic. Next comes campaign execution analysis where we compare how the number of contacts has affected the campaign subscription rates. After that we compare how the timing of the campaign like week, day, month affect the campaign. At last we check how prior campaign interactions influenced current success rates.

- Correlation Analysis & Visualization

Here we identify correlations and relations between all the variables and how they affect the subscription rate. We then create charts and graphs using matplotlib and seaborn to clearly show patterns in customer behavior and campaign performance.

Results

Results

Key findings

- One of the most interesting findings is that campaign effectiveness drops with every contact, first contact achieves 13% but by the fifth contact the effectiveness drops down to just 7.5%, that's a 42% drop.

- Analyzing campaign timing also revealed something interesting, campaigns conducted in March achieve 50.6% conversion rate where campaigns conducted in May achieve only 6.4% conversion rate.

In-depth results

Does the marital status/education/job/age of a individual make a difference in the subscription rate ?

Yes the marital status/education/job/age of an individual make a difference in the subscription rate, in the job category there are huge differences between the categories, students show the highest subscription rate 31.4% followed by the retirees at 25.2%. This suggests that younger audience is more susceptible to the marketing campaign. In the Age group analysis, it shows that younger audience is at a subscription rate of 16.3% and senior citizens are at 14.5% while middle age people are at the lowest subscription rate of 9.3%, which is consistent with the job categories result where the marketing campaign shows a susceptibility towards the younger audience. In education category the highest subscription rate goes to illiterates 22.2% followed by high school diploma holders with 10.8%, This suggests that higher education levels may correlate with greater openness to new service offerings. Marital status shows smaller but consistent results, where single customers have a subscription rate of 14.0% and married customers have a subscription rate of 10.2%, this could be a cause of joint decisions when it comes to a partner.

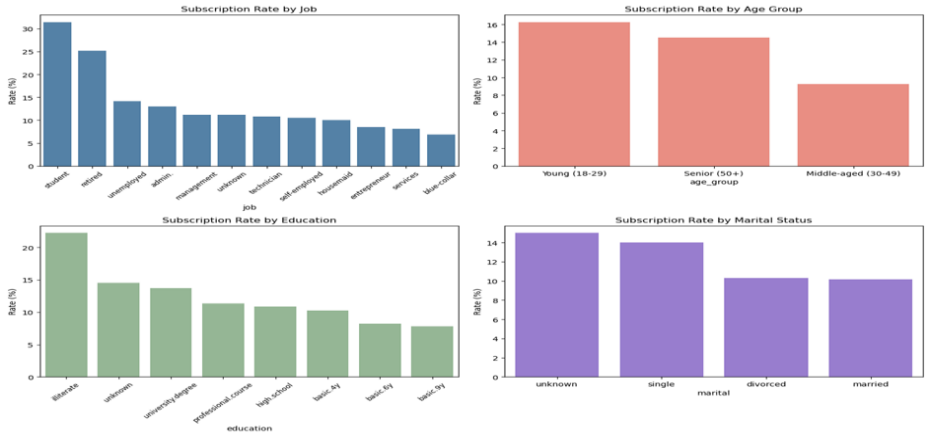

Figure 1.Subscription rate by Job, Education, Age Group and Marital status

Does the financial condition of an individual make a difference on the subscription when including economic factors?

Yes, financial condition and economic factors affect the subscription rate, when individuals have a house loan then the subscription rate drops to 10.8% while when there is no house loan then subscription rate is 11.8%. Similar results were observed with personal loan, where individuals with personal loan have a subscription rate of 10.2% and without 11.5%. It is observed that when a person has financial burden his/her willingness to add financial burden is decreased. Data related to economic factors also revealed surprising results, where higher unemployment correlate with higher subscription while other factors showed expected results, lower interest rates correlated with higher subscription rate similar case with lower inflation rates, though Employment variation rate doesn't follow the trend.

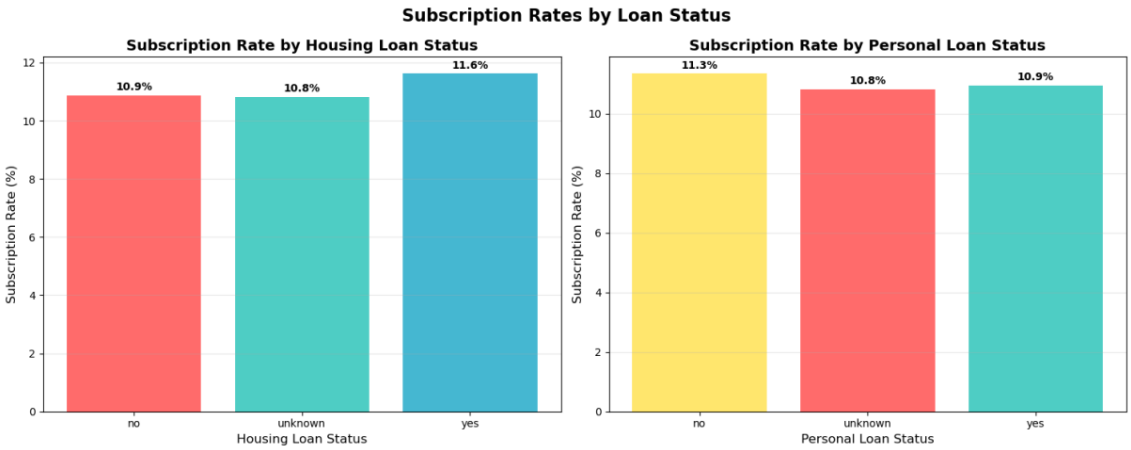

Figure 2.Loan Status

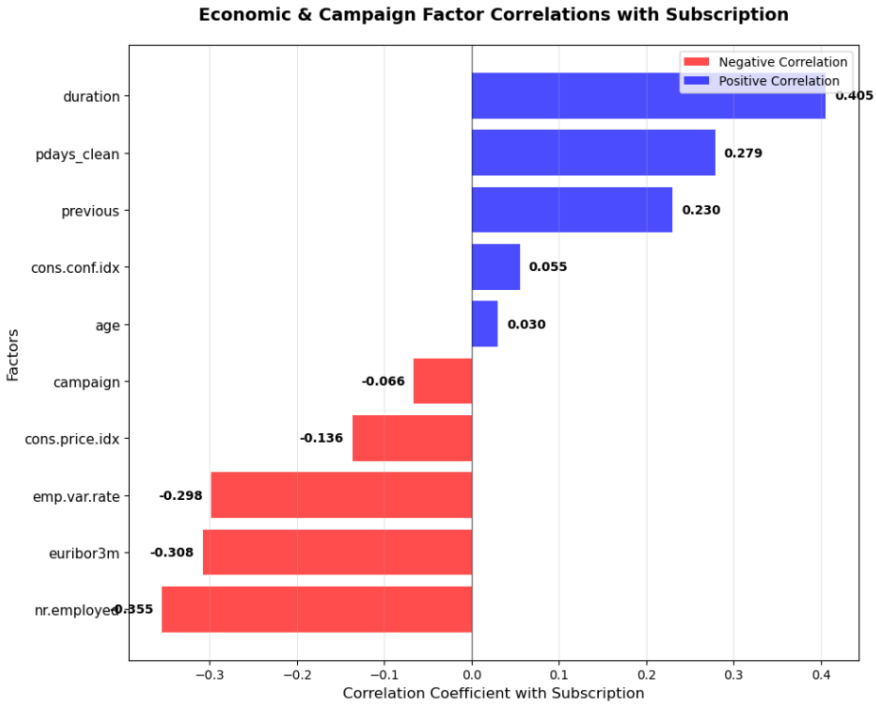

Figure 3.Economic Factors

Does the channel of communication matter?

Yes, the cannel of communication certainly does matter, cellular channel has drastically more subscription rate than telephone, cellular (14.7%),telephone(5.2%).People prefer cellular over telephone.

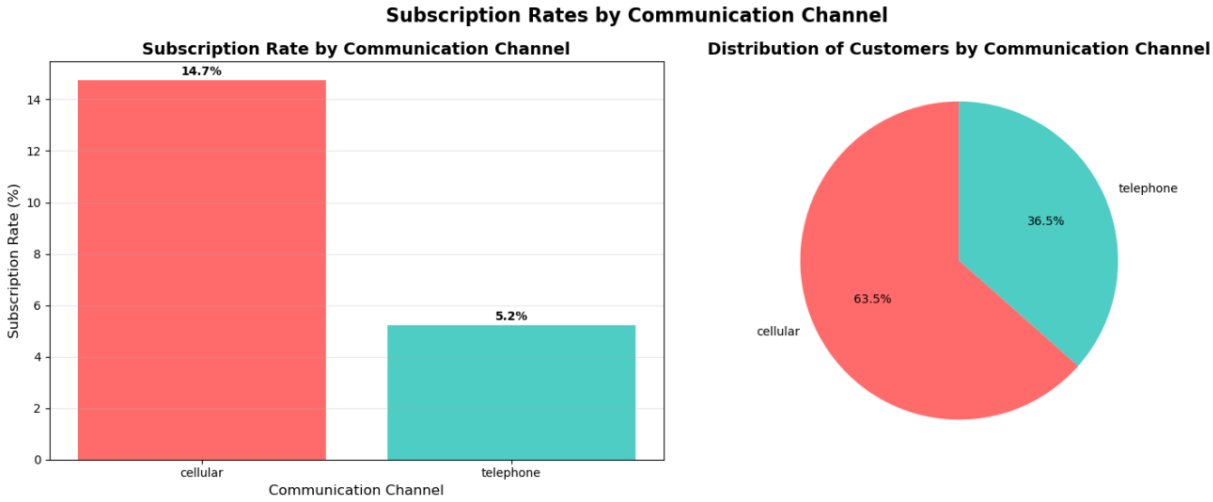

Figure 4.Communication Channel

Does the day and month of the campaign matter?

Yes, the analysis shows that the month and day significantly influence the subscription rate, March is the highest performing month (50.6% Subscription rate), which is significant increase from its previous month Jun(10.5 Subscription rate) .While there are small difference in the day segment but they are consistent ,Thursday id the highest performing day(12.1% Subscription rate).

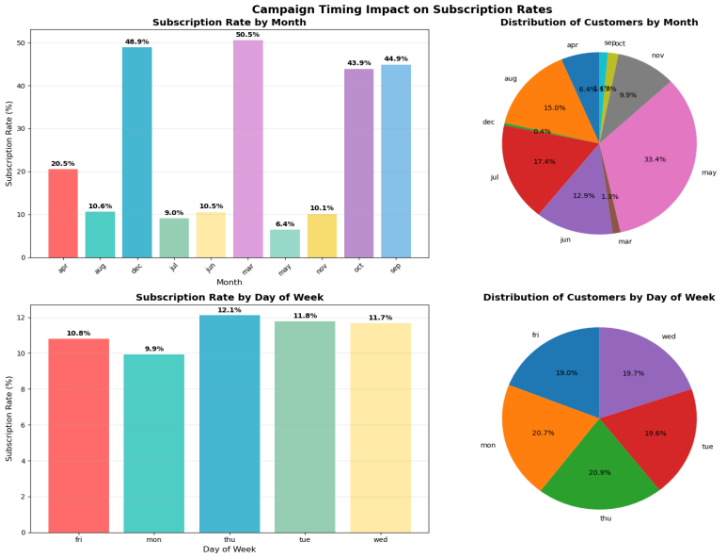

Figure 5.Month_day

Conclusion

Conclusion

Take home message

The most crucial element in marketing success is campaign timing; the difference between 50.5% and 6.4% conversion rates is an 8x performance gap that has the potential to completely change the company's marketing ROI.The company's marketing calendar should be reorganized around peak months (March, December, September, and October) and midweek execution as a result of this finding. It should also spur further research into the behavioral and economic factors that underlie these sharp seasonal variations in customer responsiveness.

Discussion

The main goal was to figure out which types of customers were most likely to subscribe and what made campaigns successful. **We definitely achieved this** - the data clearly shows that students (31.4%) and retirees (25.2%) are way more likely to sign up than middle-aged customers (9.3%), and March campaigns hit 50.5% conversion while May only managed 6.4%. That's an 8x difference! These insights go way beyond just telecom companies - they show that **when you run campaigns might actually matter more than what you say or who you target**. The huge gap between March and May success rates completely upends the usual marketing thinking that focuses on message content and customer targeting.The biggest shocker was the massive seasonal swings - March hitting 50.5% while May barely scraped 6.4%. This goes against everything we usually assume about customer behavior being consistent. It probably comes down to **when people are actually in the mood to make decisions** - March seems to be when people are planning their finances, while May might be when they're feeling the pinch. Plus, we found that calling someone once gets you 13.0% success, but calling them five times drops you down to 7.5%. This backs up research showing that bugging people too much actually makes them less likely to buy. These discoveries suggest that **getting the timing right might be the next big breakthrough in marketing**, potentially more powerful than the old-school approaches used across retail, banking, and subscription businesses. The fact that timing alone can create an 8x performance difference means companies need to completely rethink how they plan their marketing - it's not just about who you target anymore, it's about when you reach out to them.

Project limitations and caveats

Our analysis only covers telecom marketing campaigns, so the dramatic seasonal variations (8x gap between March and May) might not apply to other industries. However, the basic principle that timing matters should hold across similar subscription-based businesses. We also found correlations but can't prove causation - just because students show 31.4% subscription rates doesn't mean being a student causes higher likelihood. Our recommendations should be treated as hypotheses for testing.

Project outcomes

- Customer Segmentation Performance Matrix
  Outcome: Identified subscription rates across demographic segments showing students (31.4%), retirees (25.2%), and middle-aged customers (9.3%)

- Seasonal Campaign Timing Optimization Framework
  Outcome: Discovered 8x performance variation between peak months (March: 50.5%) and low months (May: 6.4%)
- Contact Frequency Diminishing Returns Model
  Outcome: Quantified conversion decline from first contact (13.0%) to fifth contact (7.5%) - 42% effectiveness drop
- Communication Channel Performance Analysis
  Outcome: Identified cellular communication (14.7%) outperforming telephone (5.2%) by

Appendices

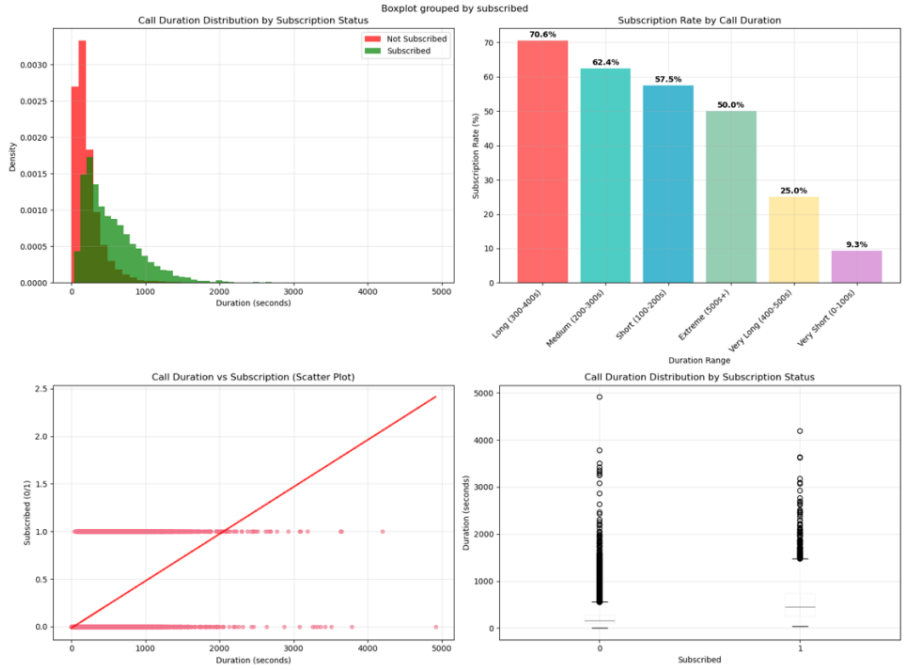

Figure 6.Call Duration

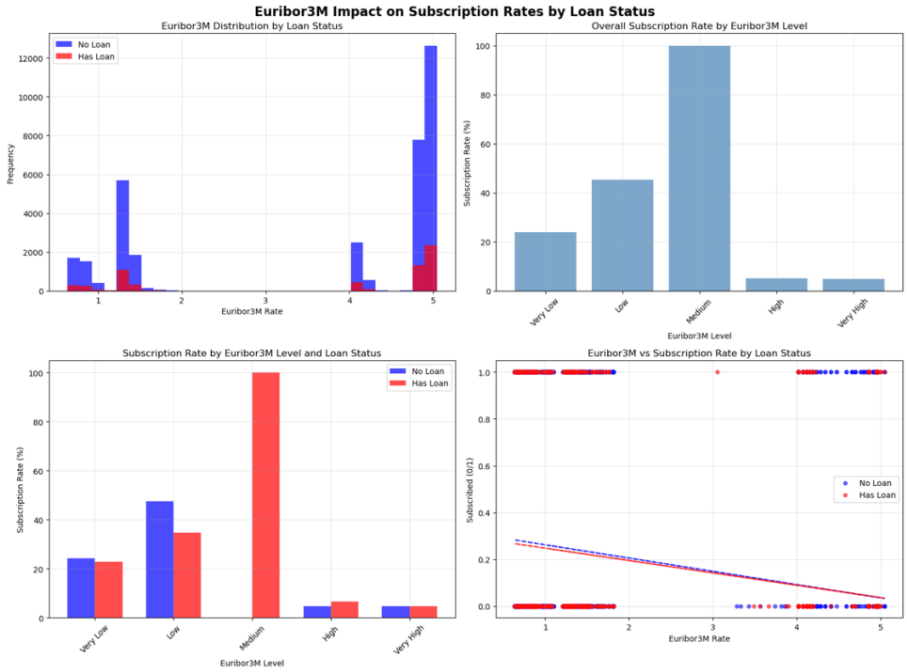

Figure 7.Euribor3M affect on loan holders

ɨvious Contact Impact

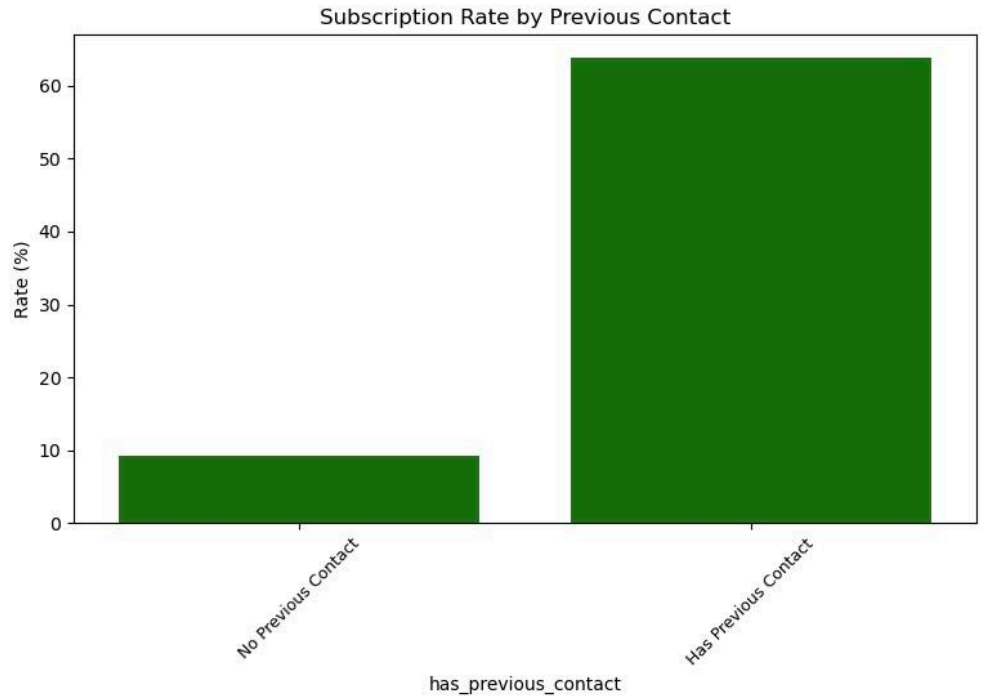

Figure 8.Previous contact vs Subscription Rate

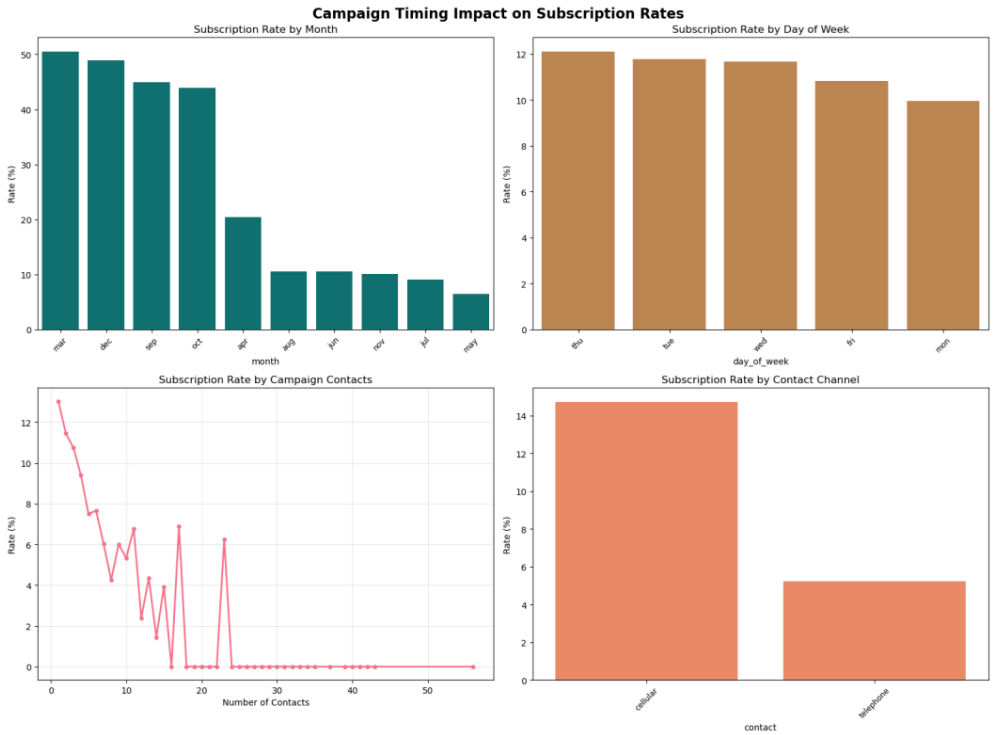

Figure 9.Campaign Timing and contacts

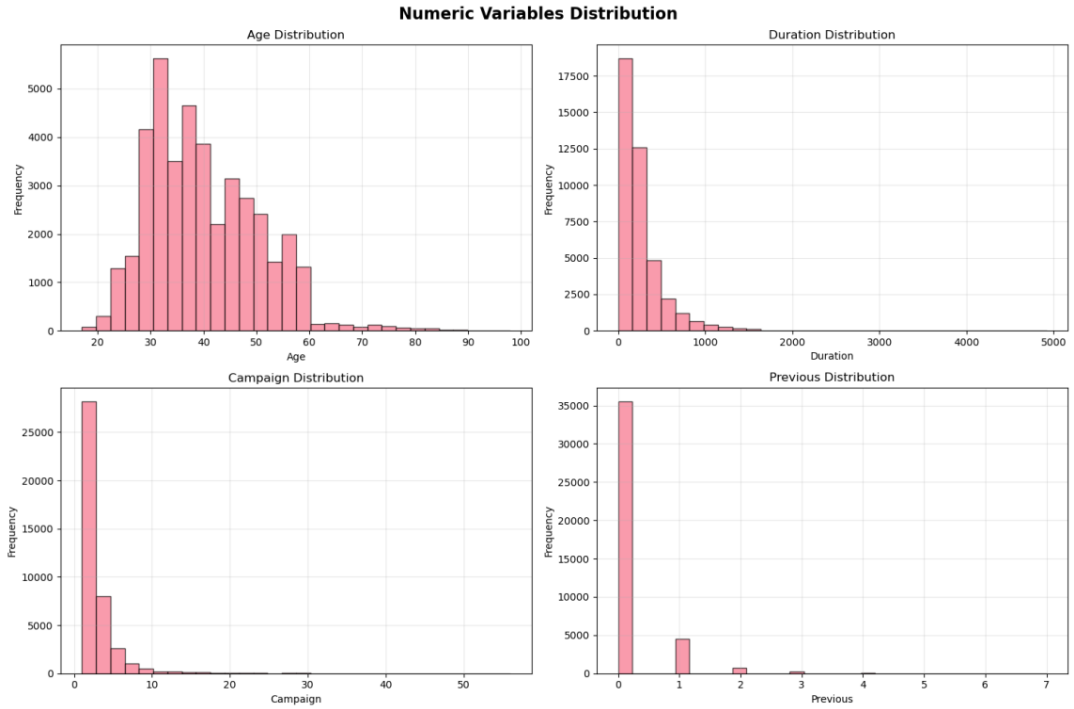

Figure 10.Univariate Analysis-1

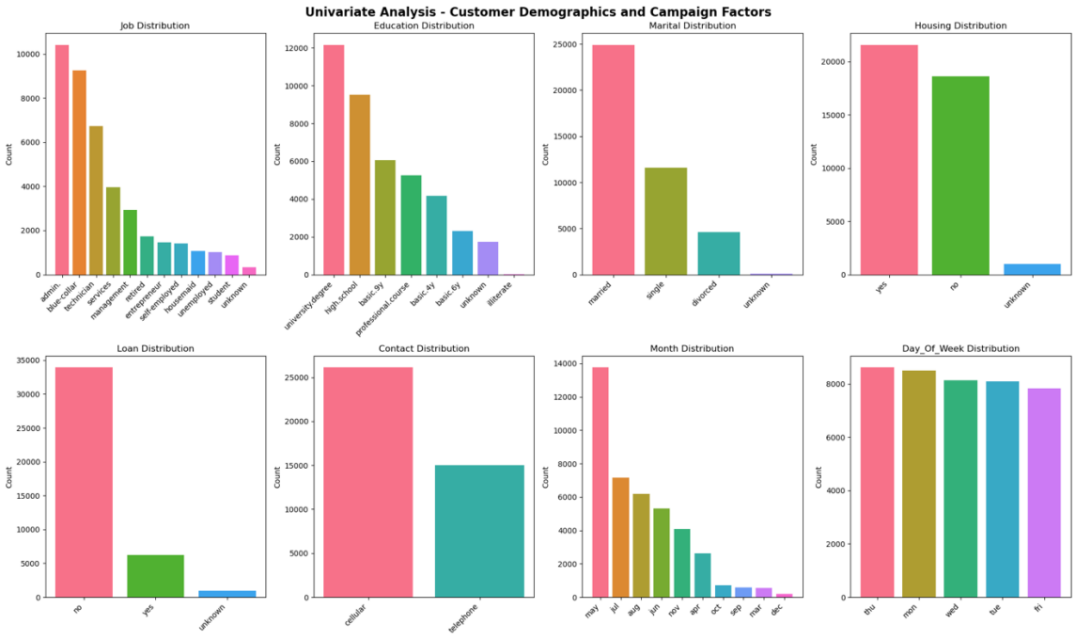

Figure 11.Univariate Analysis-2