

## Data Analysis Methods and Insights

We Essentially employed three datasets

1. User Behaviour Dataset
2. Users and Revenue Data from Spotify Financials
3. Google Play Store Reviews

EDA - Exploratory Data Analysis of User and Revenue Data with the following variables

Total Monthly Active Users (MAUs)

Premium Subscribers

Ad-Supported MAUs

Premium Revenue

Ad-Supported Revenue

Gross Profit

Gross Margin

MAUs - North America

MAUs - Latin America

MAUs - Rest of the World

MAUs - Europe

Premium Subscribers - North  
America

Premium Subscribers - Latin  
America

Premium Subscribers - Rest of the  
World

Premium Subscribers - Europe

[KPI - ARPU (Average Revenue Per User)]

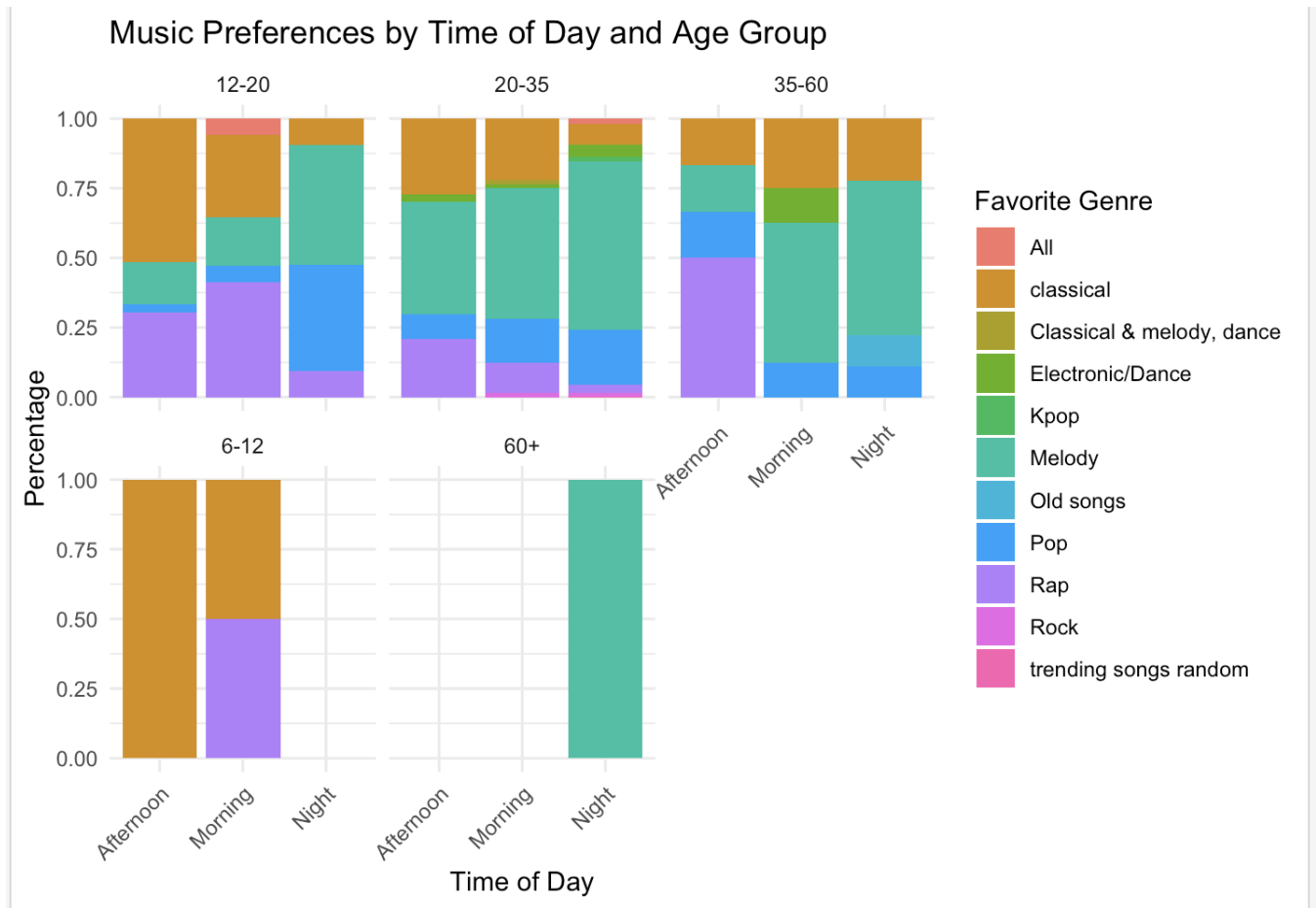
Peak Listening Time Engagement by Age Group

KPI Description:

- Measure the distribution of active users across different age groups during specific time slots (morning, afternoon, night).
- Focus on understanding when users are most engaged based on age demographics.

How It Supports Recommendations:

- Identify when different age groups are most likely to be active, allowing Spotify to target **time-specific premium promotions** (e.g., morning promotions for 35–60 age group, evening promotions for 12–20).



Peak Listening Hours by Age Group - tracks listening activity during **morning, afternoon, and night** for different age groups

The **Peak Listening Time Engagement by Age Group KPI** analyzes user activity across age groups during specific time slots (morning, afternoon, night). This insight enables Spotify to identify when each demographic is most active, optimizing time-specific premium promotions. For example, targeting morning promotions for the 35–60 age group and evening promotions for the 12–20 age group can enhance engagement and revenue.

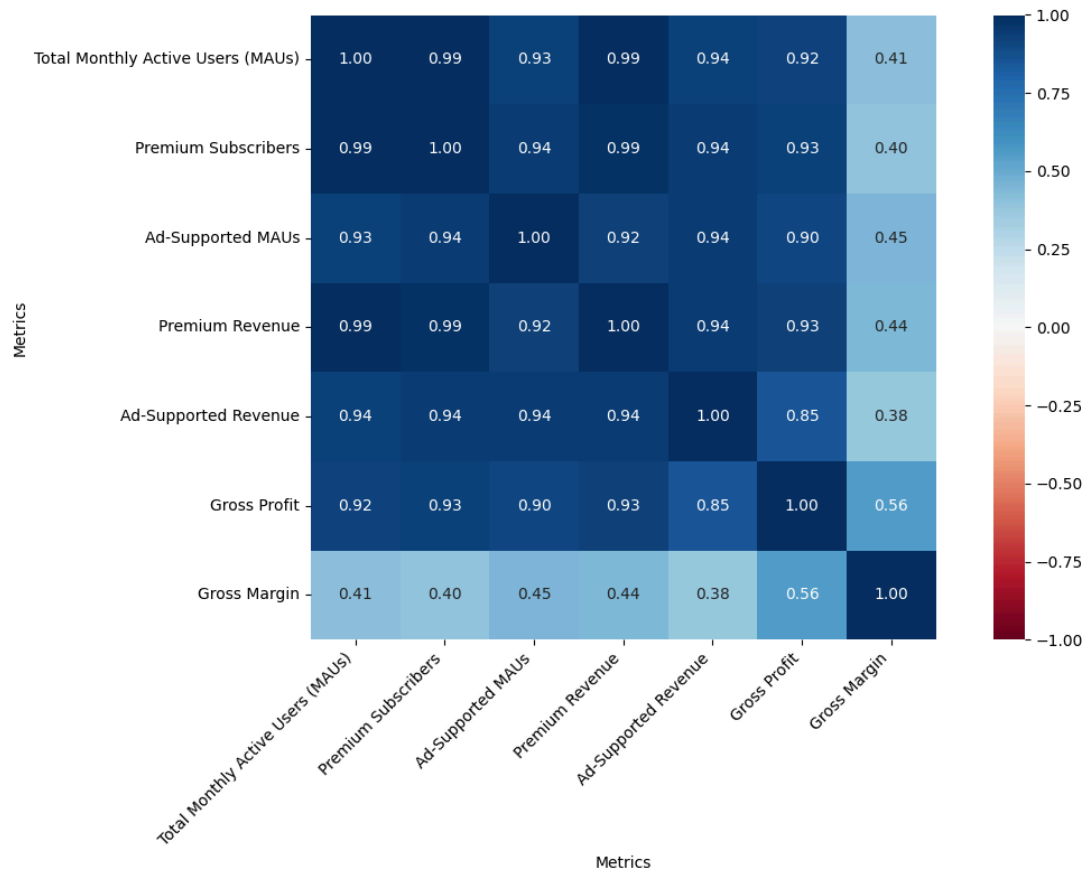
## **KPI — Correlation Matrix**

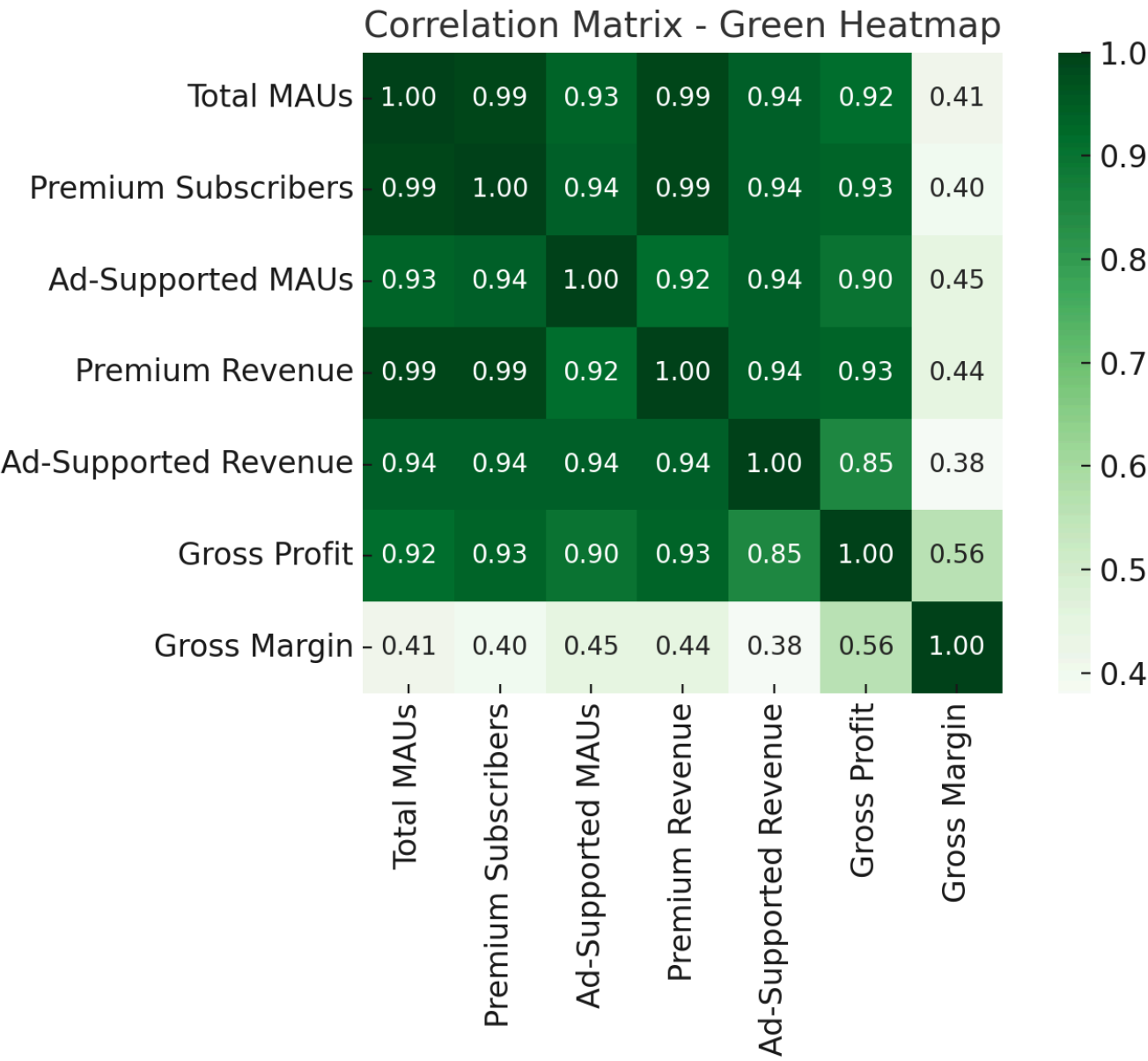
### **Strong Positive Correlations:**

- Total MAUs and Premium Subscribers show a very strong positive correlation, indicating that as the total user base grows, paid subscriptions tend to grow proportionally
- Premium Revenue and Premium Subscribers are highly correlated, which makes sense as more subscribers directly lead to more revenue
- Ad-Supported MAUs and Ad-Supported Revenue show strong positive correlation, demonstrating that more free users generate more advertising revenue

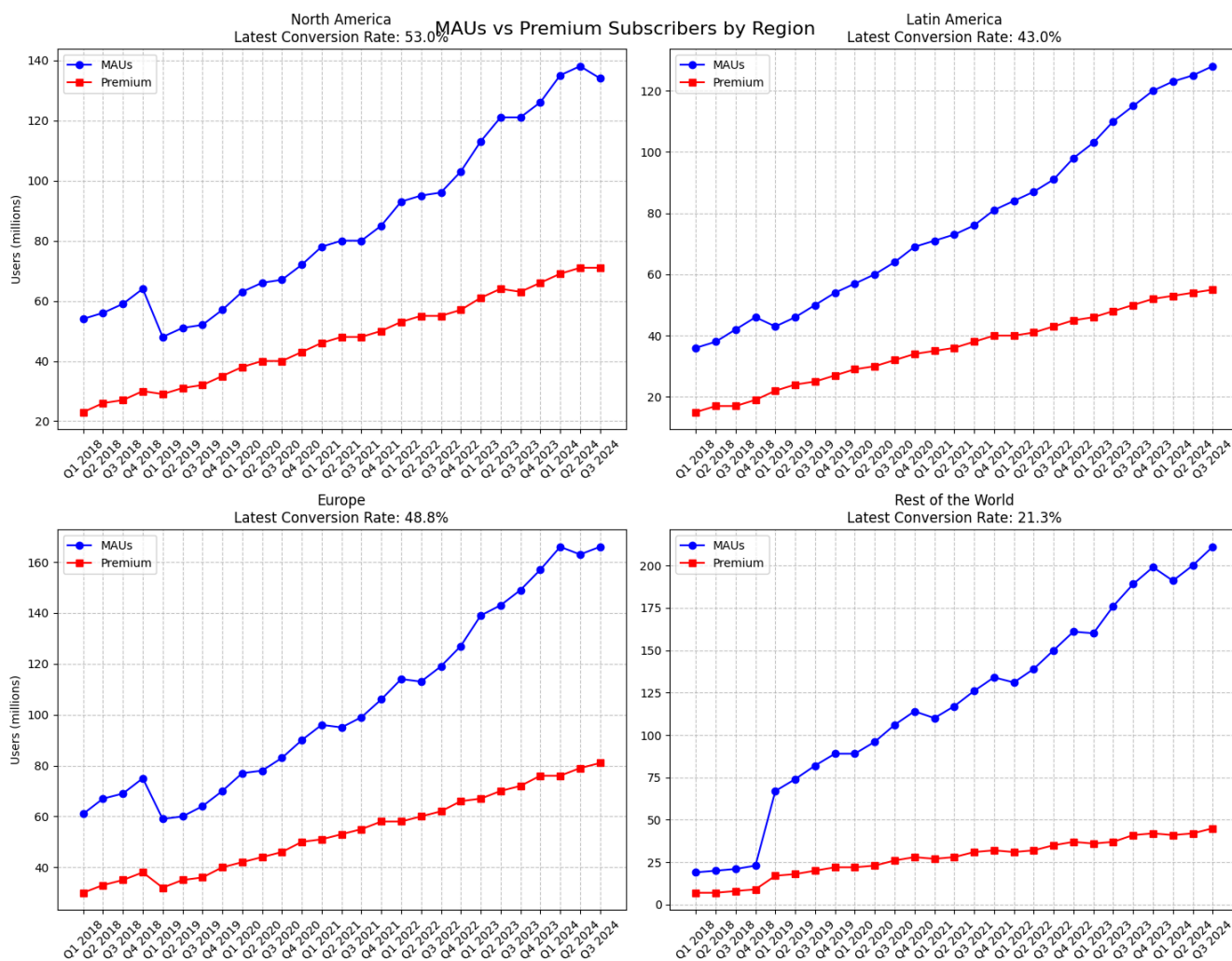
### **Interesting Relationships:**

- **Gross Profit shows strong positive correlations with both Premium Revenue and Total MAUs, suggesting that user growth translates effectively into profitability**





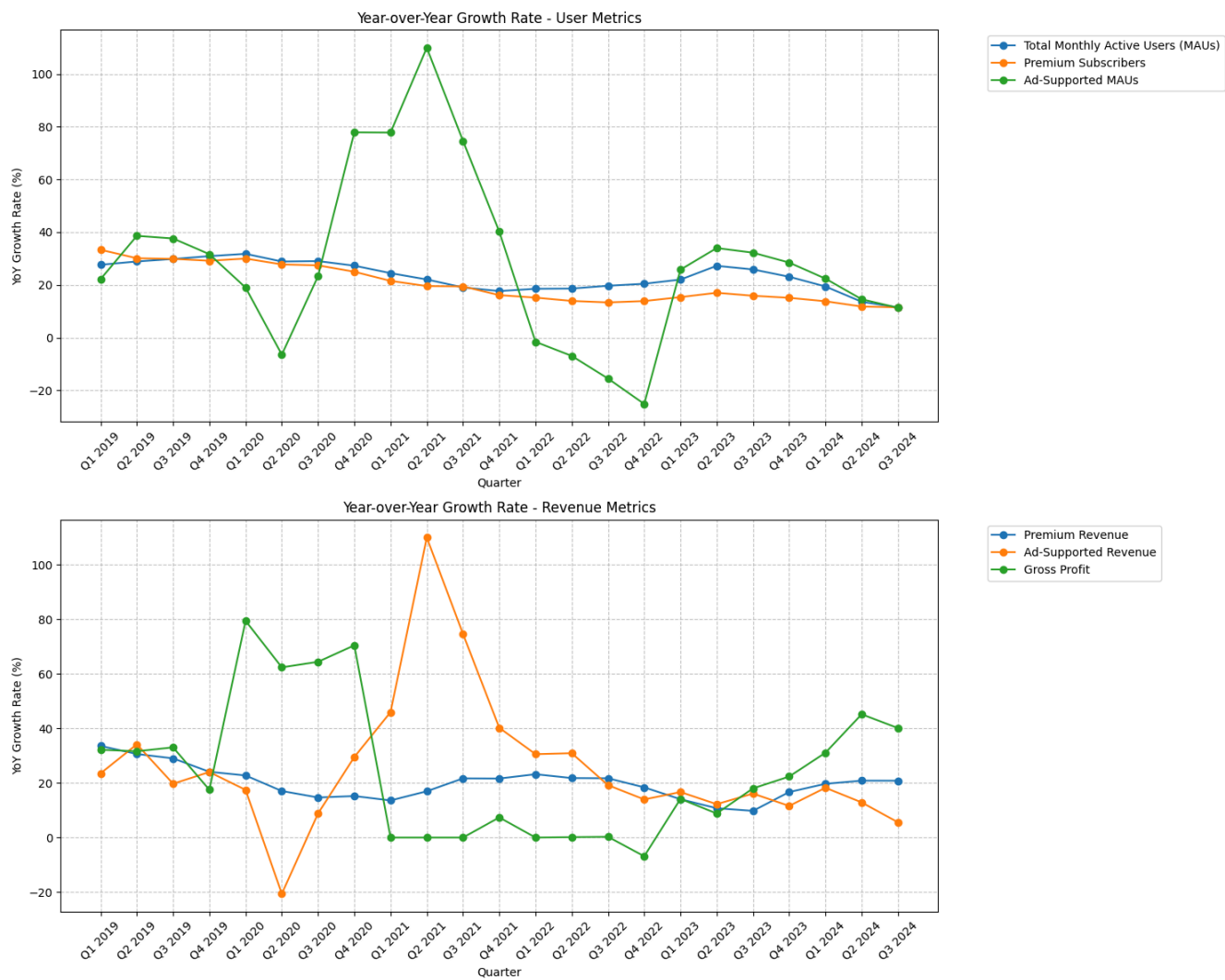
## 1. Premium Conversion by Region



North America, with a premium conversion rate of ~53%, demonstrates the most mature market characteristics, while Europe, at ~49%, holds the largest premium subscriber base with consistent growth. Latin America shows promising improvement with a ~43% conversion rate. The Rest of World, despite having the highest MAUs, has the lowest conversion (~21%), indicating significant potential for premium growth. Notably, the Rest of World exhibits the fastest growth in both MAUs and premium subscribers, while North America and Europe show slower but steady growth. The widest gap between

MAUs and premium subscribers in the Rest of World underscores an opportunity for targeted expansion efforts, as premium subscriber growth outpaces MAU growth across all regions.

2. Growth Analysis

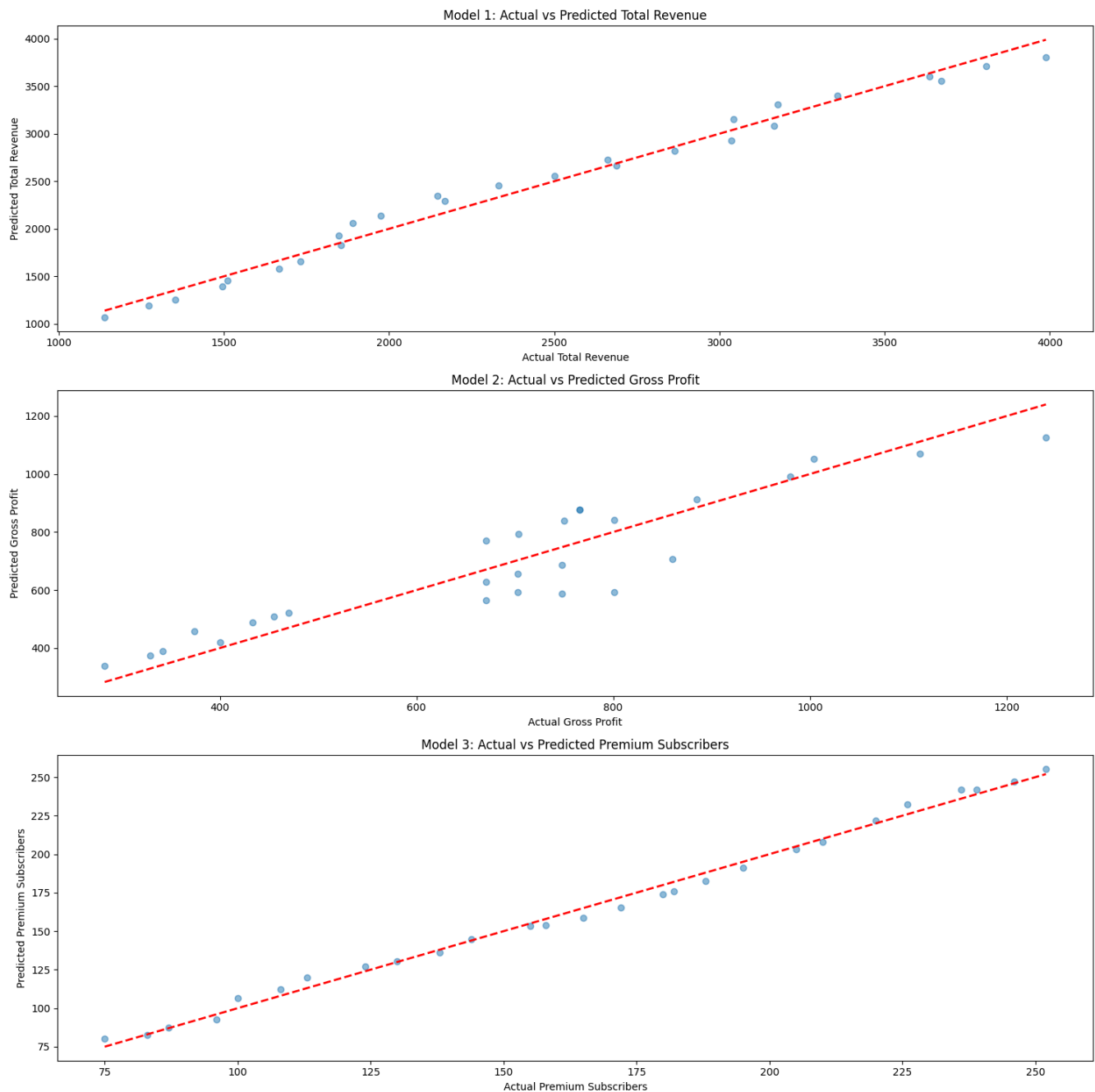


The analysis reveals consistent growth in key metrics, with Total Monthly Active Users (MAUs) showing the most stable increase, while Premium Subscribers maintain steady but slowing growth. Ad-supported MAUs and revenues demonstrate higher volatility, influenced by seasonal factors, economic conditions, and user behavior. Premium metrics exhibit more stability compared to ad-supported metrics, and revenue metrics generally lag user metrics in growth rates. Seasonal patterns, particularly strong Q4 holiday advertising and

weaker Q1 performance, contribute to fluctuations, alongside macroeconomic shifts and competitive market dynamics. Key periods of volatility, such as during the 2020 pandemic, highlight the sensitivity of ad-supported revenue to external factors. Recent years show improved monetization strategies, more pronounced seasonal effects, and a maturing business model, with revenue per user becoming more stable, reflecting enhanced targeting and pricing strategies. **While user growth often outpaces revenue, the data suggests strategic adjustments are improving monetization efficiency over time.**

### **3. Regression**





**Model 1: The model predicts total revenue using Premium Subscribers and Ad-Supported MAUs**  
**Premium Subscribers** have a much stronger impact on total revenue than Ad-Supported MAUs  
 This confirms that premium users are the primary revenue drivers

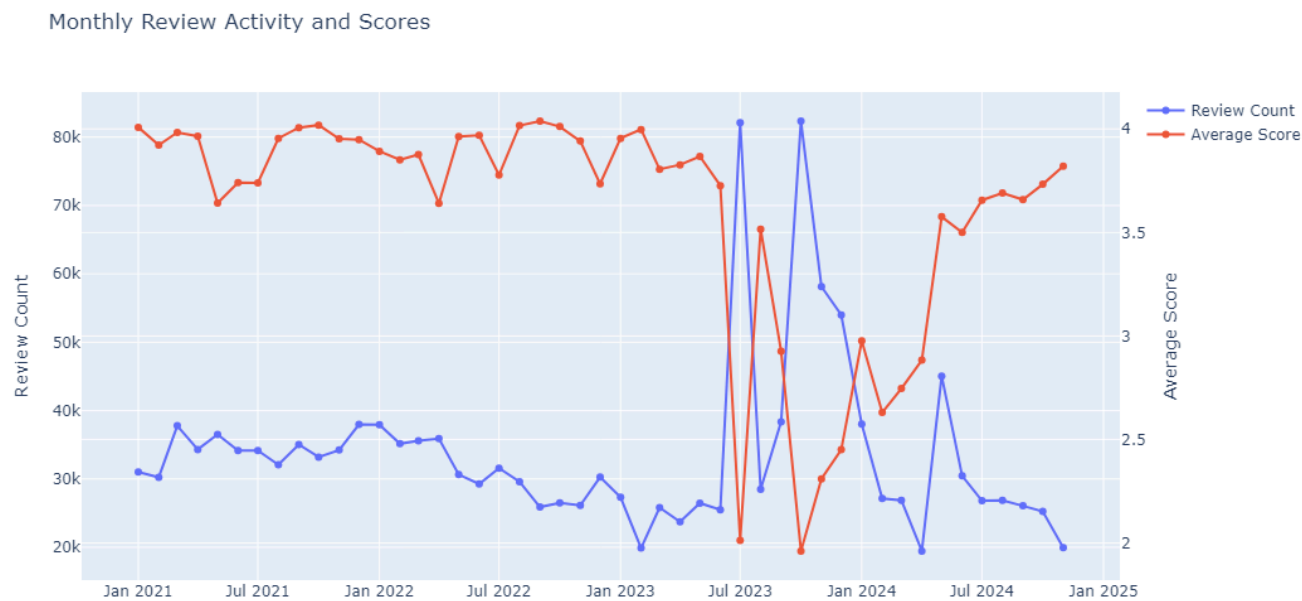
**Model 2: The model predicts gross profit using Premium Revenue and Ad-Supported Revenue**  
 Strong relationship between revenue and gross profit  
 Premium Revenue has a higher coefficient than Ad-Supported Revenue  
 This suggests better profit margins from premium subscriptions

Regional MAUs show different conversion rates to premium  
North America and Europe show higher coefficients, indicating better premium conversion rates  
Rest of World shows lower coefficients, suggesting lower premium adoption rates

Over 3.4M Reviews were scraped, of which 1.4M recent reviews between 2021-2024 were selected, First we classified positive and negative reviews and plotted word clouds for the same



Review volume



Longer reviews often have lower ratings, with support prioritizing detailed, negative feedback. Satisfied users offer little feedback, while detailed reviews highlight improvement areas but signal churn risk.

User ratings show clear temporal patterns: late-night and early-morning hours receive higher ratings, while evenings see more critical feedback. Weekend ratings are generally higher, with Friday consistently lower. Long-term trends reveal high satisfaction in 2021-2022, a sharp decline in mid-2023, and a recovery by late 2024

On July 24, 2023, Spotify announced price increases for its Premium subscription plans across multiple markets, including the United States. The individual Premium plan rose from \$9.99 to \$10.99 per month, with corresponding increases for Duo and Family plans

The sentiment analysis shows users are most positive about the app's **content** (0.247), highlighting strengths in music library quality, recommendations, and availability. The **UI** (0.127) is moderately positive, indicating a satisfactory but improvable user experience. Sentiments for **premium features**

and **technical performance** are low but slightly positive (both 0.055), suggesting issues with value perception and app stability. Key takeaways: content is a strong selling point and could drive marketing efforts, while technical performance and premium value need improvement to boost user satisfaction and conversions.

The app's overall sentiment is positive, with strong opinions on quality and mixed reactions to changes. Premium features are widely discussed, presenting an opportunity to enhance their value. Ads provoke strong negative reactions, suggesting they could drive premium conversions if managed well. Development should focus on usability, performance, and carefully managed updates to maintain user satisfaction.\

Reviews about premium subscription

Distribution of Scores for Premium-Related Reviews

