✨ Overview

In Sprint #3 my goal was to analysing subscription data for streaming service going through three critical datasets — Cohort, A/B test and CLV. As a final output observations, conclusions on opportunities and recommendations for performace to the Product team for three separate tasks (Task 1: Cohort, Task 2: A/B Testing, Task 3: CLV) are delivered.

Steps were taken:

- **Data Cleaning**

All of the following were handled:

- Dates were properly formatted.
- Missing subscription_end values were treated as "still active" (filled with today's date).
- Duplicates, missing critical values, and rows with negative durations were removed.

- **A/B test 1 scenario tested**: - User behavior (subscription duration) between desktop and mobile users compared. **Goal:** Determine if the mean subscription duration differs between desktop and mobile users? Null Hypothesis (H_0) and Alternative Hypothesis (H_1) tested. Test method: independent T-Test

Hypotheses tested:

- **Null Hypothesis (H_0):** There is no difference in mean subscription duration between desktop and mobile users.
- **Alternative Hypothesis (H_1):** There is a statistically significant difference in mean subscription duration between desktop and mobile users.
- **Test method:** T-test

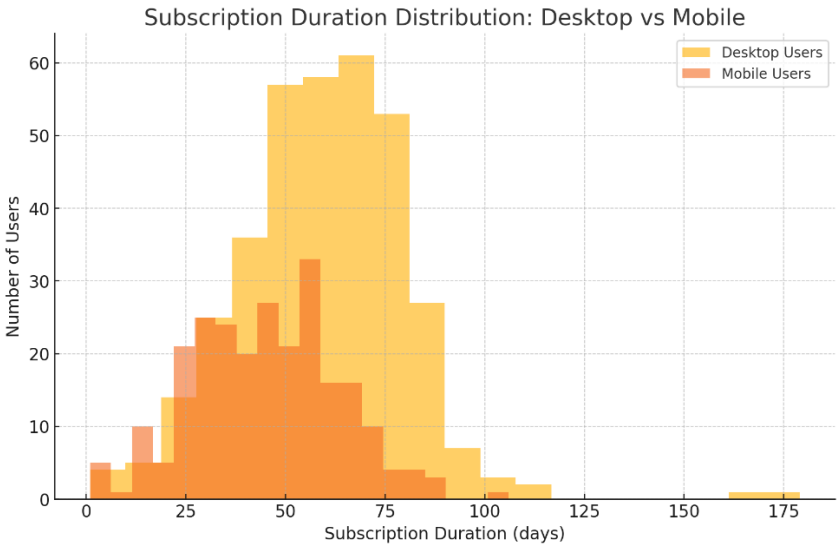
Results:

- **Average subscription duration:**
- **Mean Duration (Desktop):** 59.21 days
- **Mean Duration (Mobile):** 44.96 days
- **Mean Difference** (Desktop − Mobile): +14.25 days
- **Confidence Interval (95%):** [11.05 days, 17.45 days]
- **T-Statistic:** 8.76
- **P-Value:** 0.0000 (close to zero)

Conclusions:

- Since the **P-value is effectively 0**, which is far below the typical threshold of **0.05**, we **reject the null hypothesis**.
- **There is a statistically significant difference** in subscription duration between desktop and mobile users. On average, desktop users stay subscribed about 14 days longer than mobile users.

• Plot histograms for both versions (A and B).
• Compare the shape, center, and spread.



Shape:

- Both distributions are right-skewed (a long tail to the right).
- Most users tend to unsubscribe relatively early, but some remain for much longer.

Center (Mean):

- Desktop users clearly have a higher center, meaning they tend to stay subscribed longer.
- This matches the statistical result showing a ~14-day longer mean duration for desktop users.

Spread:

- Desktop user durations are slightly more spread out, with some users having very long subscriptions.
- Mobile durations are more concentrated in the lower range (shorter subscriptions).

Data-driven marketing recommendations to help guide a reactive strategy.

1. Improve Mobile Retention Experience

- **Audit the mobile onboarding flow**: Simplify signup process, clarify benefits to potential users.
- **Push personalized Notifications**: Use well-timed, personalized notifications with exclusive retention offers (e.g., extended trials, loyalty points) to drive either users to continue, or encourage them back during critical churn-risk periods (e.g. day 3, 7, 14).

2. Cross-Device Promotion

- Encourage mobile users to also use the **desktop version** where appropriate (e.g., "Continue your session on desktop for a richer experience").
- Promote **cross-device syncing** to create a seamless experience.

3. Leverage Desktop Strengths

- Invest in desktop-focused campaigns for **high-LTV (lifetime value)** acquisition.
- Promote premium offerings, upgrades, or referrals more heavily on desktop, where users are more engaged long-term.

KPI Tracking Suggestions:

- Churn rate by device
- Average session time by device
- Mobile push notification open rate
- Conversion rate from free to paid (mobile vs. desktop)

- **A/B test 2 scenario tested**: - Test if users who subscribe on weekdays vs. weekends have a different average subscription duration. **Goal:** to find out if there are significant differences in subscription duration between weekdays and weekends subscribers?

Hypothesis Tested:

- **Null Hypothesis (H_0):** No difference in mean subscription duration between weekday and weekend subscribers.
- **Alternative Hypothesis (H_1):** There is a significant difference in means.
- **Test method:** T-test

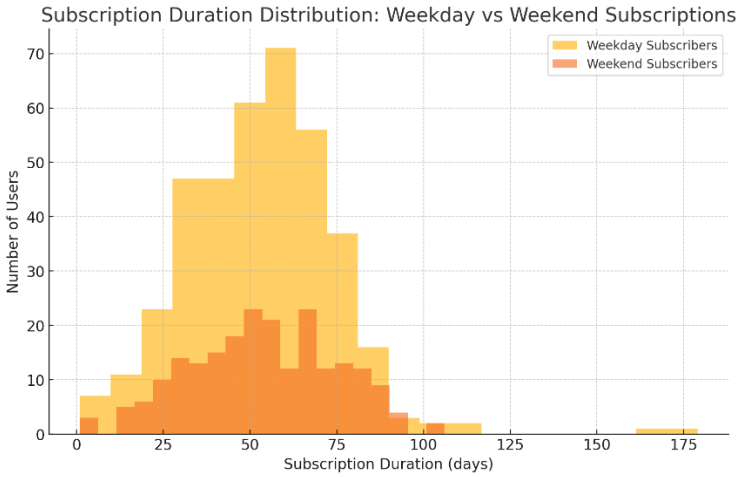
Results:

- **Average subscription duration:**
- **Weekday Mean Duration:** 53.12 days
- **Weekend Mean Duration:** 53.81 days
- **Mean Difference (Weekday - Weekend):** -0.70 days
- **95% Confidence Interval:** (-4.24, 2.84)
- **P-Value:** 0.6982

Conclusions:

- With a **P-value of 0.6982**, which is much higher than the standard threshold of 0.05, we **fail to reject the null hypothesis**.
- **There is no statistically significant difference** in subscription durations between users who subscribe on weekdays vs. weekends.

• Plot histograms for both versions (A and B).
• Compare the shape, center, and spread.



- **Shape:**
  - Both distributions are right-skewed with a concentration of users unsubscribing relatively early.
  - The overall shape for both groups is very similar.
- **Center (Mean):**
  - The means are nearly identical (53.1 vs. 53.8 days).
  - This visual similarity reinforces the statistical result of no significant difference.
- **Spread:**
  - Both groups have similar variability.
  - There are a few long-duration users in each group, but these outliers appear balanced.

Conclusion:

- The visual analysis supports the statistical test:
- There is no notable difference in user behavior between weekday and weekend subscribers in terms of subscription duration.

Data-driven marketing recommendations to help guide a reactive strategy following **Key Insight:**
Subscribing on a **weekday vs. weekend** does **not impact** how long users stay subscribed.

1. Focus Campaigns on Content & Context, Not Calendar

- Since subscription timing doesn't influence retention, shift marketing focus from **when** people subscribe to **why** and **how**:
  - Highlight clear **value propositions** in all channels, regardless of day.
  - Personalize messaging based on user **intent signals** rather than just weekday/weekend patterns.

2. Distribute Campaigns Evenly Across the Week

- Continue running promotions and outreach **every day** — no need to focus budgets or efforts toward weekends or weekdays.
- Test sending communications (emails, ads, push notifications) across different days to optimize **engagement**, not just conversion.

3. Test Messaging by Time of Day, Not Day of Week

- While day of week isn't a differentiator, **time of day** might be. *Usually The best time to **messaging** is between 11am and 4pm, ensuring maximum revenue per send. Meanwhile the best time to **send promotional emails** is during the morning hours (around 9-11 am) or early afternoon (1-3 pm) when people are likely to check their emails during work breaks.*
- Run A/B tests on **email send times**, push notification timing, and in-app prompts to identify optimal hours for engagement.

4. Refocus A/B Testing on More Impactful Segments

- Rather than segmenting by subscription day, consider testing:
    - By **user device** (as seen in Scenario 1).
    - By **acquisition channel** (e.g., organic vs. paid).
    - By **demographics** (country, language).
    - By **initial engagement behavior** (how much content a user interacts with in the first session).

- **A/B test 3 scenario tested**: - Test if subscription duration does not depend on regions. **Goal:** to find out if there are significant differences in subscription duration between subscribers from different regions?

Hypothesis Tested:

- **Null Hypothesis (H_0):** There is no difference in average subscription duration across regions.
- **Alternative Hypothesis (H_1):** At least one region has a significantly different mean duration.
- **Test method:** ANOVA

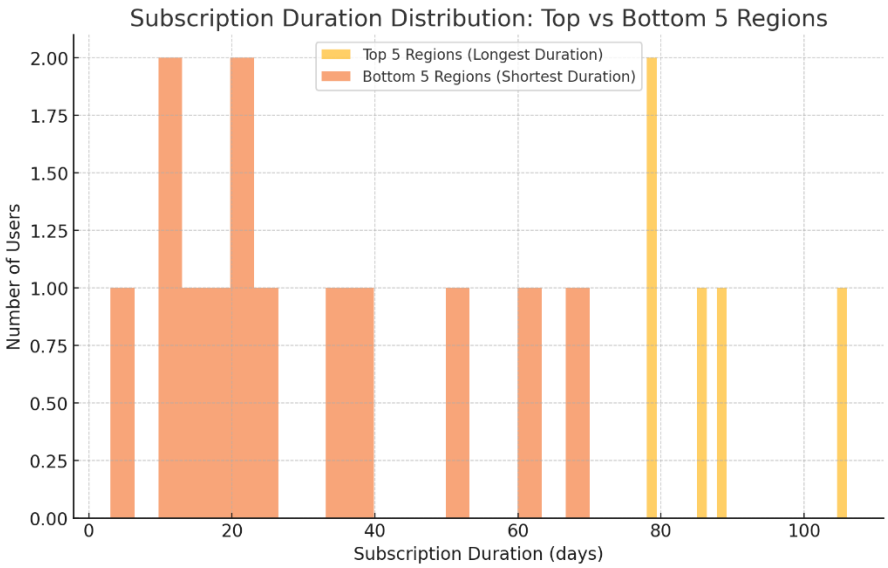
Results:

- **Number of Regions Analyzed:** 65
- **Highest Average Duration:**
    - HN Honduras – 106 days
    - MA Morocco – 88 days
    - TN Tunisia – 86 days
- **Lowest Average Duration:**
    - RS Serbia – 16 days
    - LK Sri Lanka – 23 days
    - TH Thailand – 24 days
- **ANOVA F-Statistic:** 1.0111
- **P-Value:** 0.4569

Conclusion:

- The **P-value is 0.4569**, which is **much greater than 0.05**.
- We **fail to reject the null hypothesis**.
- **There is no statistically significant difference** in subscription durations across the 65 countries analyzed, despite some visible variation in average values

• Plot histograms for both versions (A and B).
• Compare the shape, center, and spread.



- **Shape**:
  - Both distributions are **right-skewed**, meaning most users unsubscribe early, but a few stay much longer.
  - The skew is more noticeable in the bottom 5 regions, suggesting earlier churn.
- **Center (Mean)**:
  - The **top 5 regions** (e.g., Honduras, Morocco, Tunisia) have visibly longer average durations.
  - The **bottom 5 regions** (e.g., Serbia, Sri Lanka, Thailand) cluster more tightly around shorter durations (under ~40 days).
- **Spread**:
  - **Top 5** regions have a broader spread, with more users staying for long durations.
  - **Bottom 5** regions have a **narrower spread** — most users churn quickly, with fewer outliers.

Conclusion:

- While the **ANOVA test showed no statistically significant difference** across all 65 regions, there are still **practical differences** between high- and low-performing regions that might warrant targeted attention.

While the overall difference across regions isn't statistically significant, but practical differences were observed between top and bottom performing countries (e.g., Honduras, Morocco) consistently have longer user retention, while others (e.g., Serbia, Sri Lanka) see quicker churn. **Data-driven marketing recommendations:**

1. Segment Markets by Performance Tier

- Group countries into **High**, **Medium**, and **Low Retention** groups based on average subscription duration:
- Target **High Retention Countries** for **upsell campaigns**, loyalty programs, and referral incentives.
- Prioritize **Low Retention Countries** for churn prevention strategies and onboarding improvements.

2. Test Localized Retention Offers

- Offer **region-specific promotions**, e.g. discounts or extended trials in countries with lower average durations.
- Evaluate pricing sensitivity in low-performing markets—users might churn faster if the perceived value is too low.

3. Leverage Top Regions for Advocacy

- Create case studies, testimonials, or user stories from **high-retention countries**.
- Use these as social proof or community-building material for similar markets.

4. Cultural & Behavioral Analysis

- Investigate **cultural factors or app usage patterns** in low-performing countries (e.g. mobile connectivity, payment methods, app fatigue).
- Conduct qualitative user research or feedback collection to uncover blockers.

Suggested KPIs to Track:

- Retention curve by country
- Churn rate in first 7/30/60 days by region
- ROI of geo-targeted offers
- Onboarding completion rate per country

- **Key takeaways** from the all 3 A/B test scenarios, focusing on user behavior, statistical results, and actionable business implications:

🔍 **Scenario 1: Desktop vs Mobile Users**

- **Test**: Independent T-Test
- **Result**: ✅ Statistically significant difference (P-value = 0.0000)
- **Takeaway**:
  - **Desktop users** stay subscribed significantly longer than mobile users (~14 days more on average).
  - The experience on desktop is likely more engaging or easier to use long-term.
- **Marketing Implication**:
  - **Invest in improving the mobile experience** to reduce churn.
  - Implement **mobile-specific retention features** (e.g., in-app messaging, gamification, simplified onboarding).
  - Encourage **cross-device usage** to leverage higher retention from desktop.

🔍 **Scenario 2: Weekday vs Weekend Subscriptions**

- **Test**: Independent T-Test
- **Result**: ❌ No statistically significant difference (P-value = 0.6982)
- **Takeaway**:
  - Subscription day (weekday vs weekend) has **no meaningful effect** on how long users stay subscribed.
  - User intent or content relevance likely matters more than timing.
- **Marketing Implication**:
  - **Spread acquisition campaigns evenly** across all days.
  - Shift focus to **content quality, onboarding strategy, and user segmentation** over timing.
  - Consider A/B testing **time-of-day** messaging instead of day-of-week strategies.

🔍 **Scenario 3: Regional Differences**

- **Test**: One-Way ANOVA (65 regions)
- **Result**: ❌ No statistically significant difference (P-value = 0.4569)
- **Takeaway**:
  - While the **overall variation by country is not statistically significant**, there are **practical differences** (e.g., Honduras vs Serbia).
  - Some regions consistently outperform others in retention, hinting at local behavior patterns.
- **Marketing Implication**:
  - **Segment countries by performance** and apply **localized strategies**.
  - Customize onboarding, pricing, and promotions for **low-retention countries**.
  - Use **top-performing countries** for referrals, testimonials, and regional growth models.

🧠 **Overall Strategic Insight:**

While **not all user characteristics lead to statistically significant differences**, practical performance variations still offer room for **targeted, data-driven marketing improvements**. Use this insight to:

- Enhance mobile retention.
- Simplify global strategy where appropriate.
- Focus attention where it matters most: device experience, user segmentation, and cultural localization

Link to conversation with ChatGPT
https://chatgpt.com/c/6841bd59-796c-8011-afd8-a731c9851e6d