Product Orientation - Task 3

1. Main KPI for the Feature: Average Watch Time Per Session for Recommended Videos

Type of KPI: Lagging

a. Why?

The main KPI for evaluating the effectiveness of YouTube's video recommendation engine should be **Average Watch Time Per Session for Recommended Videos**. This KPI is chosen for the following reasons:

- **Quality Indication**: Longer watch time generally signals that users find the content engaging.
- **Hard to Manipulate:** Unlike likes or comments, watch time is difficult to artificially inflate.
- **Monetization**: More watch time allows for more opportunities for ad placements, benefiting both YouTube and content creators.

Average Watch Time Per User Session is a critical KPI because it directly correlates with user engagement and satisfaction.The longer a user stays on the platform during a session, the better the recommendations are likely to be. Furthermore, longer watch time can also lead to increased ad exposure and potential revenue for YouTube.

b. How to Measure

To measure this KPI, you would sum up the total watch time for each user session and then divide it by the number of sessions.

Calculation:

$$\frac{Total\ Watch\ Time\ for\ Recommended\ Videos}{Total\ Number\ of\ Sessions\ Viewing\ Recommended\ Videos}$$

- **Unit of Measure**: Minutes
- **Timeframe**: Calculated daily for the duration of the A/B test.
- **Data Source**: User activity logs

Both the total watch time and the number of sessions would be tracked only for videos that were clicked from the recommended section. To ensure the reliability of this KPI, one could also set a

minimum threshold of watch time that counts as a "view," similar to how YouTube itself doesn't count views of less than a few seconds.

2. Two Other KPIs Worth Considering

KPI 2: Click-Through Rate (CTR) on Recommended Videos

Type of KPI: Leading

a. Why?

- **Initial Interest**: CTR serves as an excellent indicator for initial user engagement, measuring the "first impression" effectiveness of the recommendation model.
- **Immediate Appeal**: It gauges the immediate appeal of the recommended videos to users, helping to understand if the recommendations are relevant and interesting enough for users to click on.
- **Quick Assessment**: CTR can be easily tracked and assessed, providing quick insights that are useful for initial evaluations of the models.

Although CTR doesn't capture the depth of user engagement, it does provide valuable insights into the initial appeal of the recommendations. It tells us whether the recommendations are interesting enough for users to click on in the first place. In essence, it measures the "first impression" effectiveness of the recommendation model. Higher CTR means that the recommendations are likely more aligned with user interests.

Why this was not chosen as the main KPI:

While CTR is an effective measure of initial user interest, it does not fully capture the depth of engagement or enjoyment, which are critical aspects for a platform like YouTube. A high CTR could indicate that the video titles and thumbnails are enticing, but it doesn't guarantee that the video content itself is engaging or enjoyable for the user.

b. How to Measure

Calculation:

$$CTR = \left(\frac{Number\ of\ Clicks\ on\ Recommended\ Videos}{Total\ Number\ of\ Recommended\ Videos\ Displayed}\right) \times 100$$

Note: "Total Number of Recommended Videos Displayed" is commonly referred to as "Impressions".

- **Unit of Measure:** Percentage

- **Timeframe:** Calculated daily for the duration of the A/B test.
- **Data Source:** User activity logs from the YouTube database

KPI 3: User Retention Rate

Type of KPI: Lagging

a. Why?

- **Sustained Engagement:** While Average Watch Time and CTR focus on immediate engagement, User Retention Rate helps you understand the long-term impact of the recommendations. It answers the question: Are users returning to engage with more recommended content?
- **Platform Health:** A high retention rate suggests a healthy platform with content that keeps users coming back, a critical factor for YouTube's continued success.
- **Business Goals:** Retaining users effectively increases the lifetime value of each user for YouTube, leading to more opportunities for monetization.

This KPI is specifically tailored to measure retention related to the recommended videos. The aim of this A/B test is to evaluate the effectiveness of different recommendation models. While overall platform retention is also important, focusing on the recommended videos allows for a more direct assessment of the models being tested. Finally, it captures a different facet of user behavior compared to the first two KPIs. User Retention Rate provides a longer-term perspective on effectiveness, complementing the more immediate insights from Average Watch Time and CTR.

b. How to Measure

Calculation:

$$\left(\frac{Number\ of\ Users\ who\ Watched\ Another\ Recommended\ Video\ within\ 7\ Days\ of\ Initial\ Engagement}{Total\ Number\ of\ Users\ who\ Clicked\ on\ a\ Recommended\ Video\ and\ Watched\ for\ at\ Least\ X\ Minutes}\right) \times 100$$

Notes:

- "Initial Engagement" is defined as clicking on a recommended video and watching it for at least X minutes.
- The timeframe of "within 7 days" can be adjusted based on the specific objectives of the analysis.

- **Unit of Measure**: Percentage
- **Timeframe**: Calculated weekly for the duration of the A/B test, given the 7-day engagement window.
- **Data Source**: User activity logs

Other KPIs Considered

In addition to the three main KPIs selected, several other metrics were considered:

1. Overall Platform Retention
   - **Why Considered**: Provides insights into the overall health of the platform.
   - **Why Not Chosen**: Too broad for assessing the impact of changes in the recommendation algorithm.

2. Subscription Rate for Displayed Channels
   - **Why Considered**: Measures long-term user engagement and community building.
   - **Why Not Chosen**: Focuses on channel-level metrics rather than video-level engagement, which is the focus of this A/B test.

3. Customer Satisfaction Metric
   - **Why Considered**: Gauges overall user satisfaction with the recommended videos.
   - **Why Not Chosen**: Subjective and requires additional data collection efforts like surveys.

4. User Engagement Score
   - **Why Considered**: Composite metric including likes, shares, and comments.
   - **Why Not Chosen**: Easily manipulated or faked, reducing its reliability.

5. Video Share Rate
   - **Why Considered**: Indicates user enthusiasm for sharing content.
   - **Why Not Chosen**: Doesn't necessarily correlate with the quality or relevance of recommendations.

6. Dislike Rate
   - **Why Considered**: Counterpoint to positive engagement metrics.
   - **Why Not Chosen**: Provides limited context and could be influenced by factors unrelated to the recommendation quality.

7. User Feedback Rate
   - **Why Considered**: Gathers direct user feedback on recommended videos.
   - **Why Not Chosen**: Requires additional mechanisms for feedback collection, complicating the A/B test setup.

8. Revenue Per User (RPU)

- **Why Considered**: Measures average revenue generated from each user.
- **Why Not Chosen**: Financial metrics may be influenced by multiple factors, making it difficult to isolate the impact of the recommendation model.

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3. Analyses to Determine Model Superiority Based on Main KPI

To understand why one model outperforms the other in terms of "Average Watch Time Per Session for Recommended Videos," the following analyses could be conducted:

1. Statistical Tests

- **T-test for Average Watch Time:** To compare the means of the average watch time between the two models and determine if the differences are statistically significant.
- **Regression Analysis:** To understand the impact of various variables (e.g., CTR, User Retention Rate) on the average watch time.

2. Segmentation Analysis

- **User Demographics**: Analyze average watch time across different demographic groups like age, gender, and location to see if one model is particularly effective for a certain demographic.
- **Device Type**: Evaluate the average watch time for users accessing YouTube via different devices (e.g., mobile, desktop, tablet) to identify any device-specific trends.
- **Content Categories**: Break down the average watch time by the category of the video to see if certain types of content are more effectively recommended by one model.

3. Time-Series Analysis

Line Graph:
- **X-Axis**: Time (Days) over the course of the A/B test
- **Y-Axis**: Average Watch Time Per Session for Recommended Videos

The reason for choosing these axes is to observe how the Average Watch Time fluctuates over time for both models. This could help identify any seasonal patterns or trends that may be affecting the KPI.

4. Cohort Analysis

- Track user groups who started using YouTube at the same time and observe their average watch time over different periods. This can help in understanding if one model is more effective in retaining users' interest over time.

6. Correlation with Other KPIs

- Analyze how Average Watch Time correlates with CTR and User Retention Rate for each model. Understanding these relationships can provide insights into why one model might be leading in average watch time.

5. Qualitative Feedback

- **User Surveys**: Conduct user surveys to gather feedback on why they find certain recommendations more engaging.

By conducting these analyses, we can have a multifaceted understanding of why one model might be outperforming the other, going beyond the surface-level KPI comparison.