Project Challenge: E-Commerce Funnel Analysis

🎯 The Scenario

You are a Data Analyst at a new e-commerce company. The website is very simple, consisting of only four pages.

The Head of Product is concerned that conversion rates are not as high as expected and suspects that something may be broken, but doesn't know where.

Your task is to analyze user behavior data to build a conversion funnel, identify where users are dropping off, and provide actionable recommendations to the product and engineering teams.

🗺️ The User Journey (The Funnel)

The website's conversion funnel is defined by four sequential pages:

1. **Home Page (** `/home` **):** The initial landing page. All users must start here.

2. **Search Page (** `/search` **):** From the home page, users can perform a search.

3. **Payment Page (** `/payment` **):** From the search page, users click on a product to buy.

4. **Payment Confirmation Page (** `/confirmation` **):** After providing payment info, users see a "thank you" confirmation page. This is the final conversion.

💾 The Data

You have been provided with five CSV files:

1. `user_table.csv` : Contains user-level information.

   - `user_id` : A unique identifier for the user.

   - `date` : The date the user first signed up.

   - `device` : The user's device (Desktop or Mobile).

   - `sex` : The user's sex (Male or Female).

2. `home_page_table.csv` : A log of all users who visited the home page.

   - `user_id` : The user ID.

   - `page` : Will always be `home_page` .

3. `search_page_table.csv` : A log of all users who visited the search page.

   - `user_id` : The user ID.

   - `page` : Will always be `search_page` .

4. `payment_page_table.csv` : A log of all users who visited the payment page.

   - `user_id` : The user ID.

- `page` : Will always be `payment_page` .

5. `payment_confirmation_table.csv` : A log of all users who successfully converted.

    - `user_id` : The user ID.

    - `page` : Will always be `payment_confirmation_page` .

❓ Key Questions to Answer

Your analysis should answer the following questions:

1. **Overall Conversion:** What is the site's overall conversion rate (from home page to confirmation)?

2. **Funnel Bottlenecks:** Build the 4-step funnel. What is the conversion rate and drop-off rate at *each step*? Where is the biggest bottleneck?

3. **Segmentation Analysis:**

    - How do the conversion funnels differ for **Mobile vs. Desktop** users?

    - How do the funnels differ for **Males vs. Females**?

4. **Time-Series Analysis:**

    - Has the conversion rate changed over time?

    - Are there any specific dates or time periods where performance suddenly changed?

5. **Final Recommendation:** What are your key findings? What specific, actionable recommendations would you give to the engineering and product teams?

🚀 Expected Deliverables

1. A Jupyter Notebook (`.ipynb`) containing all your code, analysis, and visualizations.

2. A clear summary of your findings, answering the key questions above.

3. A set of 2-3 data-driven recommendations for the company.