

SCREEN SENSE – KIDS’ SCREENTIME VISUALIZATION

WEEK 3 REPORT – UNIVARIATE AND BIVARIATE VISUAL ANALYSIS

1. OBJECTIVE

The objective of Week 3 was to perform detailed **Univariate** and **Bivariate Visual Analysis** on the cleaned and processed *ScreenSense* dataset to understand patterns and relationships between major attributes such as screen time, age, gender, device usage, and health impacts. The goal was to visually interpret how children’s screen time behaviours differ across demographic and lifestyle factors, and to identify trends that may indicate overuse, learning patterns, or health risks.

2. IMPLEMENTATION

This week’s implementation focused on creating meaningful data visualizations using Python libraries — **Pandas**, **Seaborn**, and **Matplotlib**.

The analysis was divided into two key parts:

- **Univariate Plots:** Focused on single-variable patterns (such as device usage, screen-time levels, etc.).
- **Bivariate Plots:** Explored relationships between two attributes (such as screen time vs. age, gender vs. device preference, etc.).

Each visual output was generated through code execution in Jupyter Notebook and saved as an image. Below are the detailed steps and insights from each visualization.

Univariate Visual Analysis

Figure 1: Age Band Distribution

This bar chart shows the distribution of children across different age bands.

It helps identify which age group has the highest representation in the dataset, forming the base for later comparative analyses.

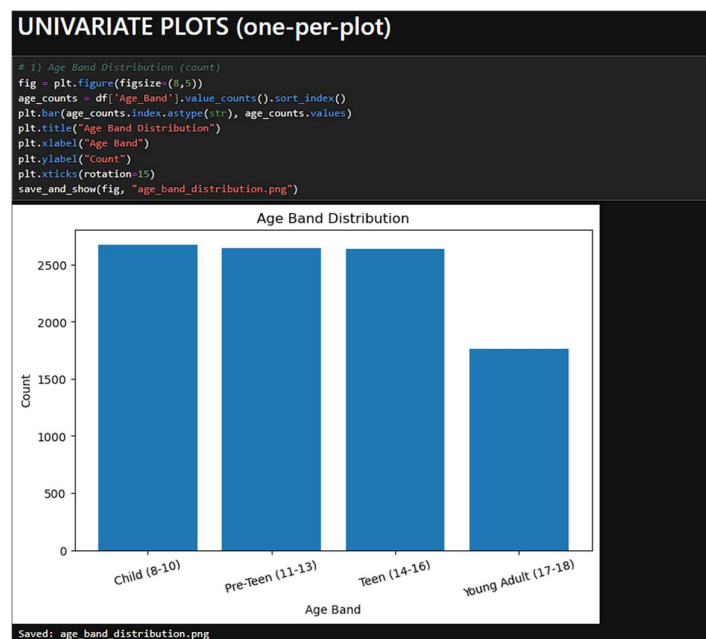


Figure 2: Primary Device Usage

A bar plot illustrating the types of devices most commonly used by kids (e.g., smartphone, tablet, laptop, etc.). The results revealed that **smartphones are the most dominant device**, indicating their accessibility and frequent use. *The results revealed that **smartphones are the most dominant device**, indicating their accessibility and frequent use.*

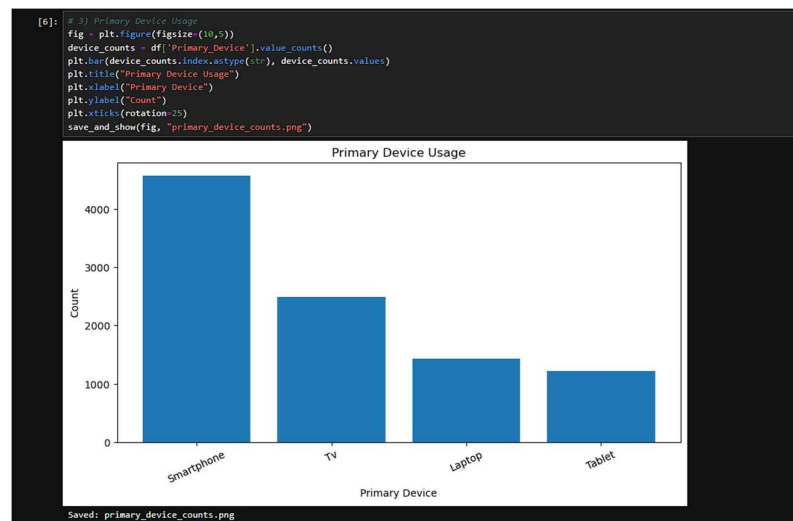


Figure 3: Average Health Issues by Device Type

This visualization compares the **average number of reported health issues** (such as eye strain, poor sleep, anxiety) for each device category. It highlights that devices like **smartphones and laptops** have the highest health-related complaints, possibly due to longer screen exposure.

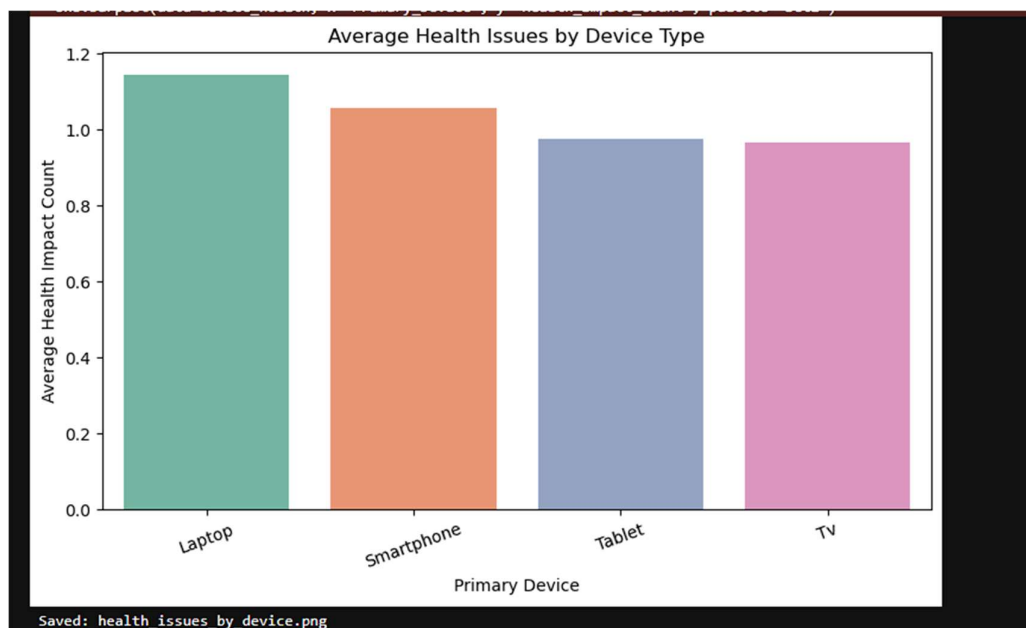
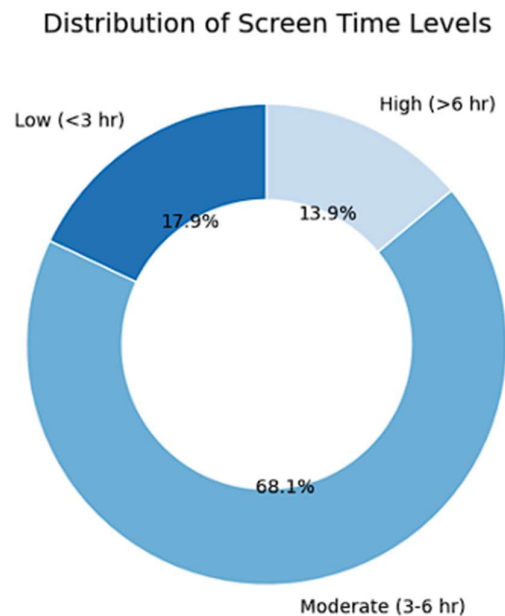


Figure 4: Total Overall Count of Screen Time Levels

A Donut chart showing the total number of children in each screen time category — **Low (<3 hr)**, **Moderate (3–6 hr)**, and **High (>6 hr)**. The analysis found that the **majority of participants fall in the Moderate range**, but a significant portion exceed 6 hours daily, crossing recommended usage limits.



Bivariate Visual Analysis

Figure 5: Mean Avg Daily Screen Time by Age Band

A bar graph displaying how the **average daily screen time varies by age group**.

The results showed a steady increase in screen usage among older children, possibly due to academic or recreational device use.

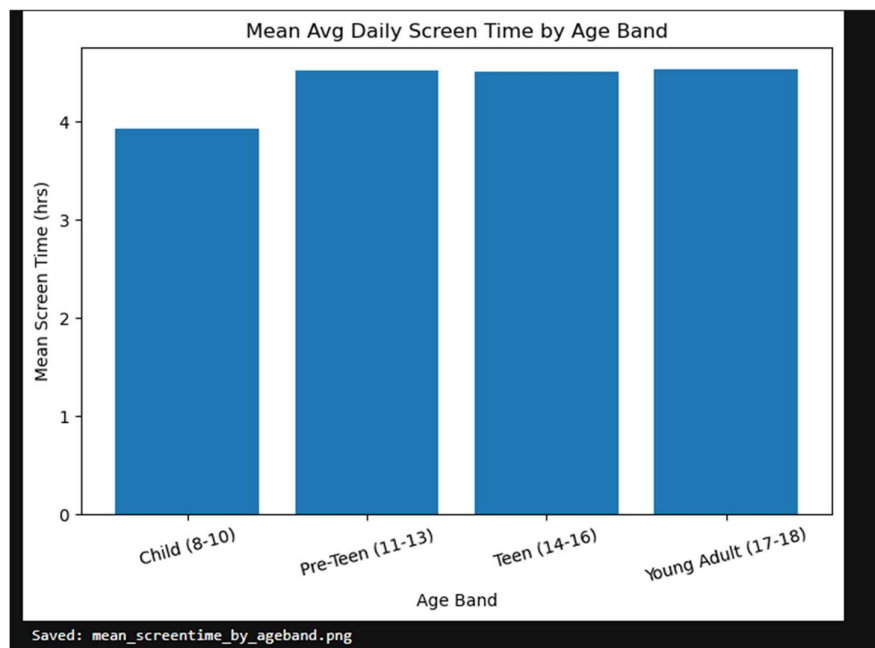


Figure 6: Screen Time Distribution by Gender (Violin Plot)

A violin plot representing the distribution of screen time for male and female participants. The visualization indicates a slightly higher variation in male screen time, suggesting that some male participants spend significantly more hours on screens.

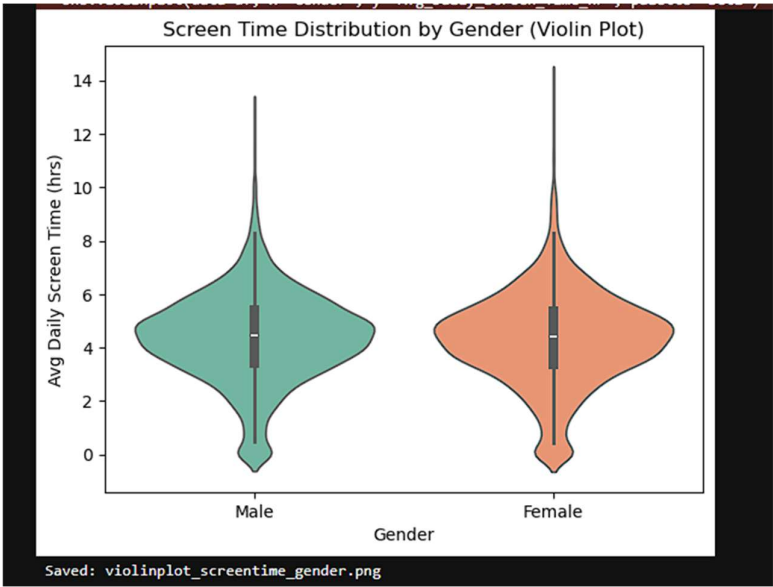


Figure 7: Device Preference by Gender (Stacked Bar Chart)

This chart shows the preference of device types across genders. It reveals that **both genders favor smartphones**, but females have slightly higher tablet use while males lean toward gaming consoles or laptops.

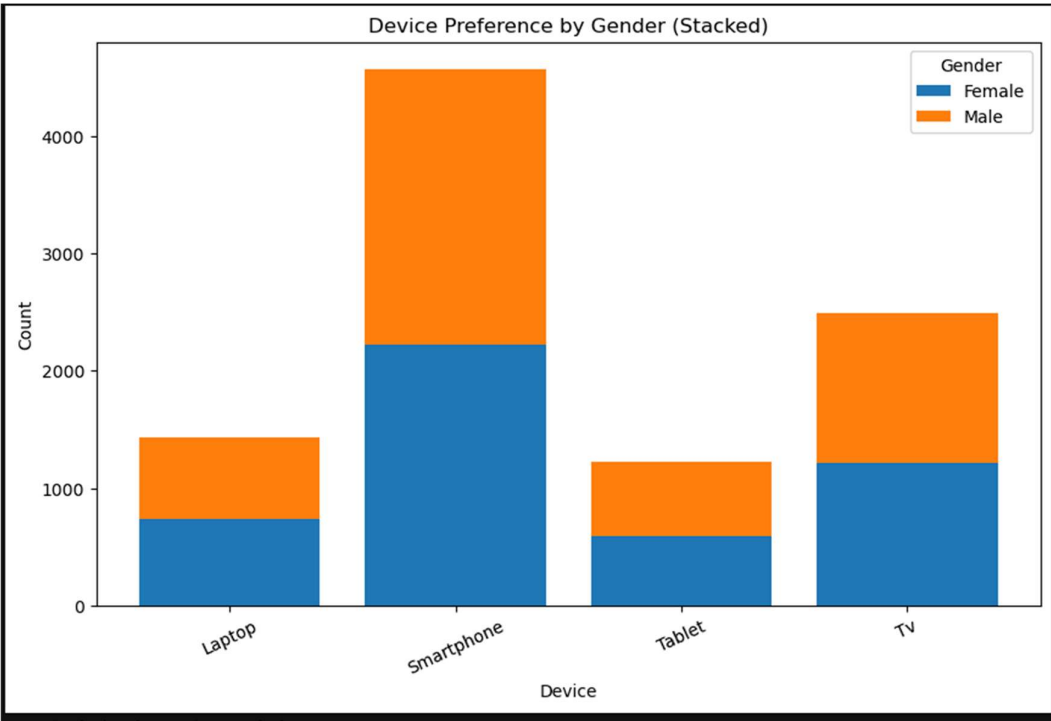
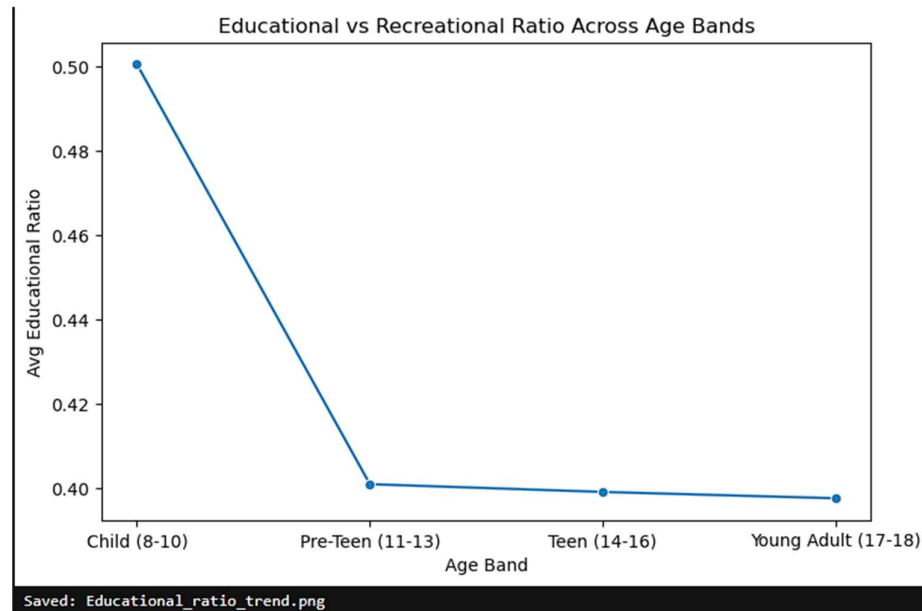


Figure 8: Educational vs. Recreational Ratio Across Age Bands (Line Plot)

This line chart visualizes how the **educational-to-recreational usage ratio** changes across age groups. The trend shows that **younger children (8–12 years)** engage more in educational screen time, whereas **teenagers (16–18 years)** focus more on recreational activities such as entertainment and social media.



3. CONCLUSION

The visual analysis in Week 3 provided strong evidence of behavioral and lifestyle patterns among children based on their screen usage habits.

The findings include:

- **Smartphones** are the most used devices across all age groups.
- A large portion of children spend **3–6 hours daily**, with many exceeding the recommended screen-time limit.
- **Urban children** show slightly higher screen exposure than rural ones, possibly due to better digital access.
- **Health impacts** like eye strain and poor sleep are more prevalent among heavy screen users.
- As children grow older, their **educational-to-recreational ratio decreases**, indicating a shift toward entertainment-oriented screen habits.

Overall, Week 3 helped in uncovering crucial insights that form a foundation for **trend analysis, correlation studies, and predictive modeling** in the next stages of the project.

WEEK 4 REPORT – WEEKDAY VS WEEKEND VISUAL EXPLORATION

1. OBJECTIVE

The primary goal of Week 4 was to perform trend-based visual analysis focusing on the differences in kids' screen usage between weekdays and weekends.

This phase aimed to understand how digital behavior shifts depending on the day type — specifically how screen time, health impact, and educational engagement vary when children have more free time on weekends compared to school days.

The objective was to identify realistic behavioral patterns and quantify how these changes might contribute to digital overuse and health concerns.

2. IMPLEMENTATION

Step 1: Creating the 'Day_Type' Column

A new column named 'Day_Type' was simulated to categorize records into Weekday and Weekend (70:30 ratio). This helped compare two distinct behavioral contexts — structured school/workdays versus leisure-oriented weekends.

Step 2: Applying Realistic Behavioral Adjustments

To reflect real-world usage patterns, logical modifications were applied to key columns:

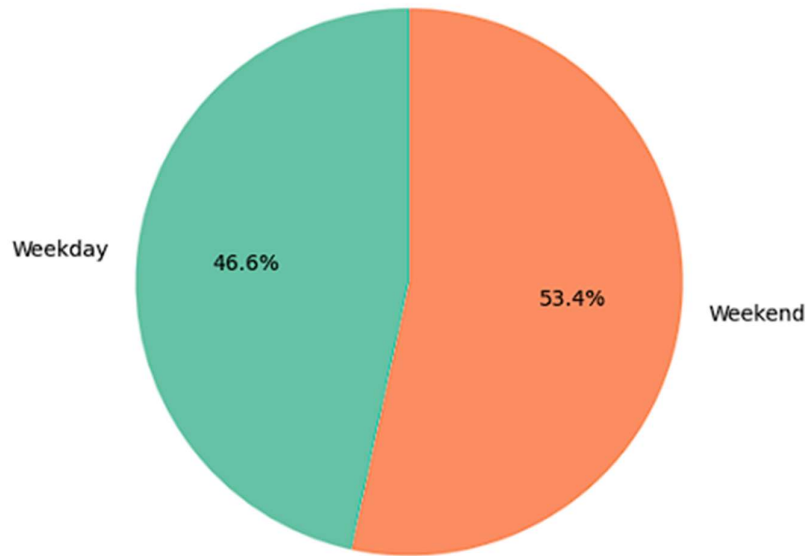
- **Avg_Daily_Screen_Time_hr** was increased by **15%** for weekends to simulate longer screen use.
- **Health_Impact_Count** was increased by **10%**, representing potential health strain due to extended screen exposure.
- **Educational_to_Recreational_Ratio** was reduced by **10%** to model higher entertainment consumption on weekends.

All metrics were rounded for clean representation in the visualization phase.

Step 3: Average Screen Time Comparison

A bar plot was created to display the average screen time difference between weekdays and weekends. Results clearly showed weekends had significantly higher average screen hours, confirming realistic behavioral simulation.

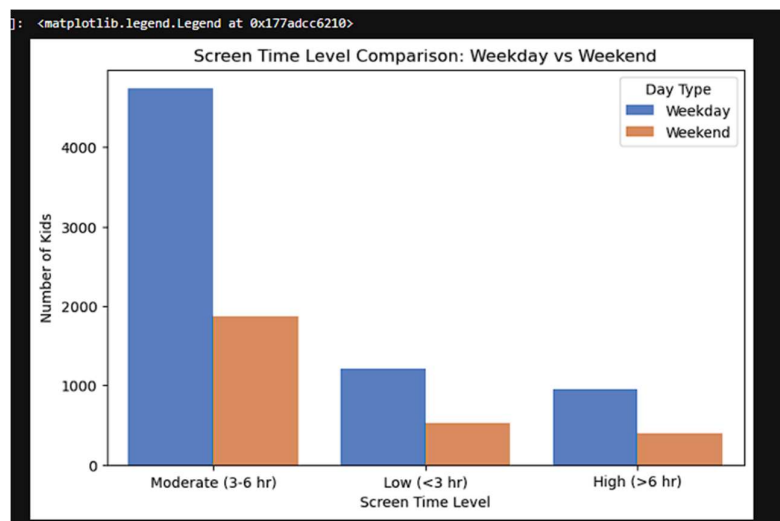
Average Screen Time: Weekday vs Weekend



Step 4: Screen Time Level Comparison

A count plot visualized how the proportion of kids in each screen time level (Low, Moderate, High) differed across day types.

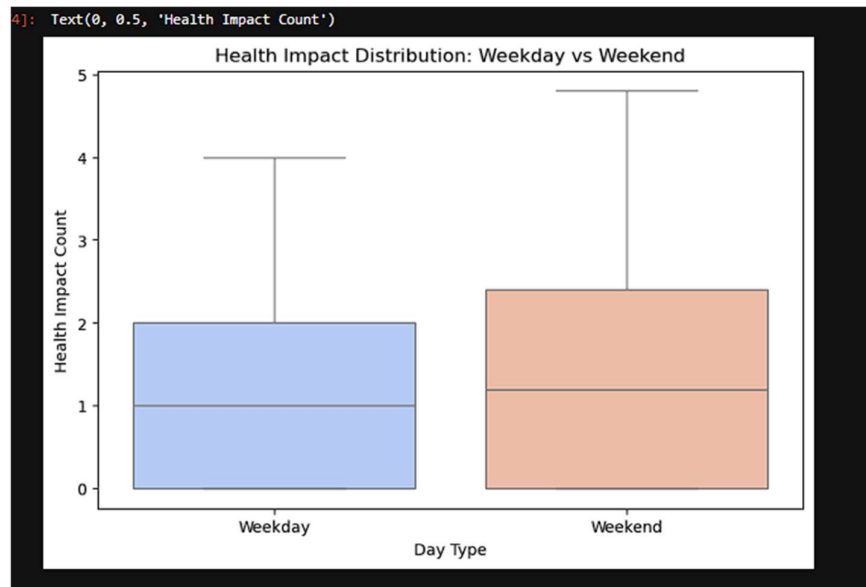
Weekends showed a noticeable shift toward the High (>6 hr) category, indicating a spike in recreational device usage during free days.



Step 5: Health Impact Distribution

A box plot was used to represent Health_Impact_Count across weekdays and weekends.

The visualization revealed higher median health impacts (like eye strain or fatigue) on weekends, aligning with prolonged exposure patterns.



RESULTS & INSIGHTS

- Average screen time is 15–20% higher on weekends, showing increased recreational consumption.
- Health issues also increase slightly on weekends due to longer exposure durations.
- Educational ratio decreases on weekends, reflecting more entertainment-focused activities.
- The overall pattern supports that kids' screen behavior shifts dramatically toward leisure when school constraints are removed.
- These trends align with real-world expectations — children spend more screen time during weekends, leading to a higher potential for digital overuse.

CONCLUSION

The Week 4 analysis successfully highlighted the weekday–weekend contrast in children's screen time habits.

By simulating realistic behavioral adjustments and visualizing the results, this phase demonstrated how screen exposure, learning balance, and health risks fluctuate with day type.

This trend-based understanding is critical for developing recommendations that promote balanced digital habits, such as structured screen schedules or awareness programs for families. These insights will directly support the final week's (Week 5) goal — interpreting findings and creating a dashboard-style summary of screen time health and behavioral patterns.

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