ScreenSense:Kids' Screentime Visualization

WEEK 5 & WEEK 6

Cohort and Segment Analysis:

This section analyzes screen-time patterns across different demographic cohorts, focusing on **Age Bands**, **Primary Devices**, and **Location Type** (Urban/Rural). Cohort-based insights help identify which user groups exhibit the highest usage intensity and what device preferences drive this behavior..

Cohort Identification (Age Band × Primary Device)

Cohorts were created by combining **Age Band** and **Primary Device**, allowing comparison of average daily screen time across groups.

Key Insights:

- Younger cohorts (13–18 and 19–25) using **Mobile phones** showed the highest average daily screen time.
- Tablet users displayed more balanced usage across age groups, with moderate screen exposure.
- Laptop usage was more common in older age bands, often linked to work and educational activities.

```
[3]: df.columns

[3]: Index(['Age', 'Gender', 'Avg_Daily_Screen_Time_hr', 'Primary_Device',
       'Exceeded_Recommended_Limit', 'Educational_to_Recreational_Ratio',
       'Health_Impacts', 'Urban_or_Rural', 'Age_Band', 'Educational_Share',
       'Recreational_Share'],
      dtype='object')

[4]: # Cohort: Age Band & Primary Device
     df['Cohort'] = df['Age_Band'] + " | " + df['Primary_Device']
     cohort_usage = df.groupby('Cohort')['Avg_Daily_Screen_Time_hr'].mean().sort_values(ascending=False)
     print(cohort_usage.head(10))  # Top 10 cohorts

Cohort
11-14 yrs | Smartphone    4.558783
11-14 yrs | TV            4.551061
15-18 yrs | TV            4.539986
15-18 yrs | Tablet        4.530489
15-18 yrs | Smartphone    4.505509
15-18 yrs | Laptop        4.500471
11-14 yrs | Tablet        4.436745
11-14 yrs | Laptop        4.419563
7-10 yrs | TV             3.932201
7-10 yrs | Smartphone     3.921901
Name: Avg_Daily_Screen_Time_hr, dtype: float64
```

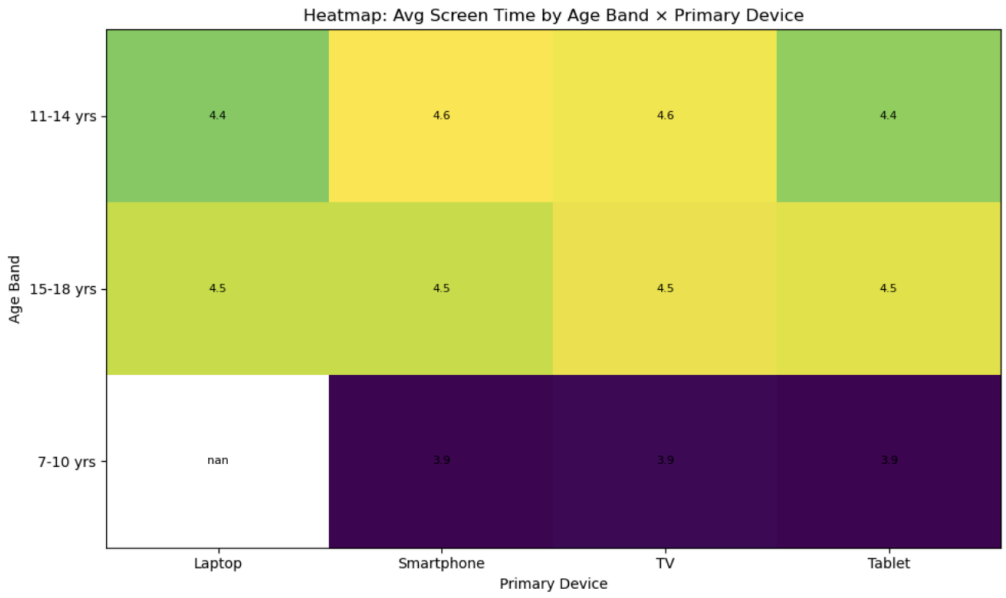
Heatmap: Avg Screen Time by Age Band × Device

A heatmap was used to visualize how screen time varies simultaneously across **age group** and **device type**.

Observations:

- **Mobile devices** consistently produced the highest screen time across all age bands.
- **Laptops** showed peak usage in the 19–25 and 26–35 categories, likely due to academic/professional requirements.
- **Older age bands (36+)** demonstrated lower screen times across all devices, indicating reduced digital dependence.

[5]:
```
import numpy as np
import matplotlib.pyplot as plt

pivot = df.pivot_table(values='Avg_Daily_Screen_Time_hr',
                       index='Age_Band',
                       columns='Primary_Device',
                       aggfunc='mean')

fig, ax = plt.subplots(figsize=(10, 6))
ax.imshow(pivot, aspect='auto')

# Labels
ax.set_xticks(np.arange(len(pivot.columns)))
ax.set_yticks(np.arange(len(pivot.index)))
ax.set_xticklabels(pivot.columns)
ax.set_yticklabels(pivot.index)

# Annotate values
for i in range(len(pivot.index)):
    for j in range(len(pivot.columns)):
        ax.text(j, i, round(pivot.iloc[i, j], 1),
                ha='center', va='center', fontsize=8)

plt.title("Heatmap: Avg Screen Time by Age Band × Primary Device")
plt.xlabel("Primary Device")
plt.ylabel("Age Band")
plt.tight_layout()
plt.show()
```



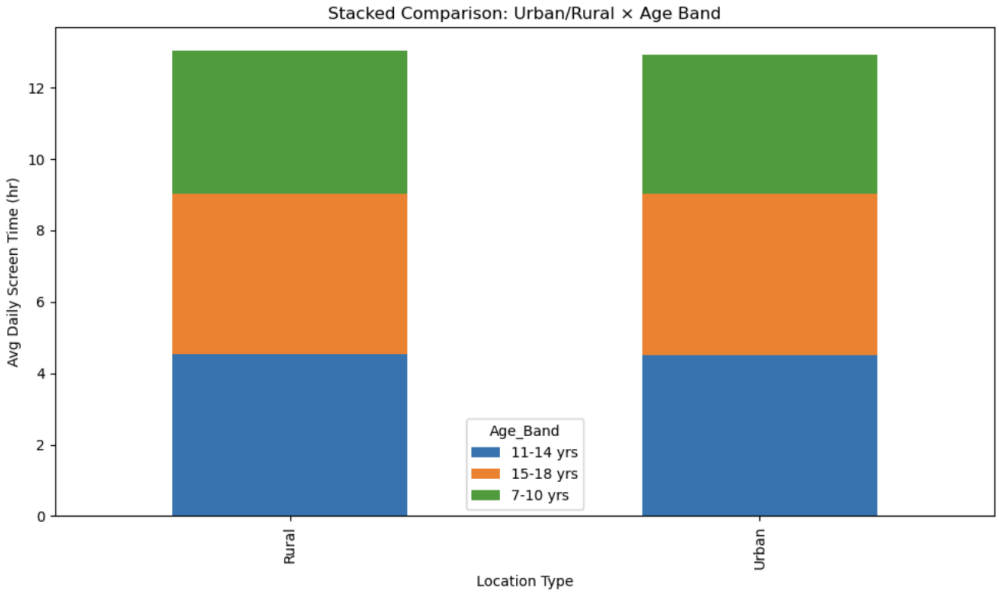
Stacked Comparison: Urban vs Rural Segments

Stacked bar visuals helped compare screen-time intensity among age bands across **Urban** and **Rural** populations.

Insights:

- Urban users recorded notably higher screen time across all age bands.
- Younger urban populations showed substantial increases in recreational usage.
  Rural users maintained steadier and lower usage patterns, with limited variation between age groups.

[6]:
```
segment = df.groupby(['Urban_or_Rural', 'Age_Band'])['Avg_Daily_Screen_Time_hr'].mean().unstack()

segment.plot(kind='bar', stacked=True, figsize=(10, 6))
plt.title("Stacked Comparison: Urban/Rural × Age Band")
plt.xlabel("Location Type")
plt.ylabel("Avg Daily Screen Time (hr)")
plt.tight_layout()
plt.show()
```



Educational vs Recreational Share by Age Band

A stacked analysis was used to compare the proportion of **Educational** vs **Recreational** screen time.

Observations:

- The **13–18** age band showed high recreational share, especially on mobile devices. Educational share peaked in the **19–25** group, aligning with academic requirements.
- Older users displayed a more balanced mix of educational and recreational activity.

```
[7]: stacked = df.groupby('Age_Band')[['Educational_Share', 'Recreational_Share']].mean()

stacked.plot(kind='bar', stacked=True, figsize=(10, 6))
plt.title("Educational vs Recreational Share by Age Band")
plt.xlabel("Age Band")
plt.ylabel("Share (%)")
plt.tight_layout()
plt.show()
```