

```

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

products = ['AlphaPhone', 'BetaBook Pro', 'Delta Earbuds', 'Epsilon
Charger',
            'Eta Watch', 'GammaPad', 'Iota Mouse', 'Kappa Monitor',
            'Theta Keyboard', 'Zeta Speakers']

sentiment_data = {
    'ProductName': products * 3,
    'SentimentCategory': (
        ['Negative'] * len(products) +
        ['Neutral'] * len(products) +
        ['Positive'] * len(products)
    ),
    'Count': [
        # Negative counts
        15, 9, 14, 9, 12, 8, 9, 14, 7, 6,
        # Neutral counts
        13, 18, 23, 13, 21, 15, 15, 19, 19, 12,
        # Positive counts
        17, 27, 20, 23, 20, 21, 22, 23, 34, 19
    ]
}

avg_sentiment_data = {
    'ProductName': products,
    'SentimentScore': [-0.18, -0.02, -0.13, 0.02, -0.12, -0.05, -0.06,
-0.09, 0.08, -0.08]
}

df_sentiment_dist = pd.DataFrame(sentiment_data)
df_avg_sentiment = pd.DataFrame(avg_sentiment_data)

def plot_average_sentiment(df_avg_sentiment):
    plt.figure(figsize=(12, 6))
    plt.bar(df_avg_sentiment['ProductName'],
df_avg_sentiment['SentimentScore'],
            color='steelblue')
    plt.axhline(y=0, color='gray', linestyle='--', alpha=0.3)
    plt.title('Average Sentiment Score per Product')
    plt.xlabel('Product Name')
    plt.ylabel('Average Sentiment Score')
    plt.xticks(rotation=45)
    plt.tight_layout()
    plt.show()

def plot_sentiment_distribution(df_sentiment_dist):
    plt.figure(figsize=(12, 6))

```

```

sentiment_pivot = df_sentiment_dist.pivot(
    index='ProductName',
    columns='SentimentCategory',
    values='Count'
)

x = np.arange(len(products))
width = 0.25

plt.bar(x - width, sentiment_pivot['Negative'], width,
        label='Negative', color='#FF5733', alpha=0.7)
plt.bar(x, sentiment_pivot['Neutral'], width,
        label='Neutral', color='#3498DB', alpha=0.7)
plt.bar(x + width, sentiment_pivot['Positive'], width,
        label='Positive', color='#2ECC71', alpha=0.7)

plt.xlabel('Product Name')
plt.ylabel('Count of Sentiments')
plt.title('Sentiment Distribution per Product')
plt.xticks(x, products, rotation=45)
plt.legend(title='Sentiment')
plt.ylim(0, 35)

plt.tight_layout()
plt.show()

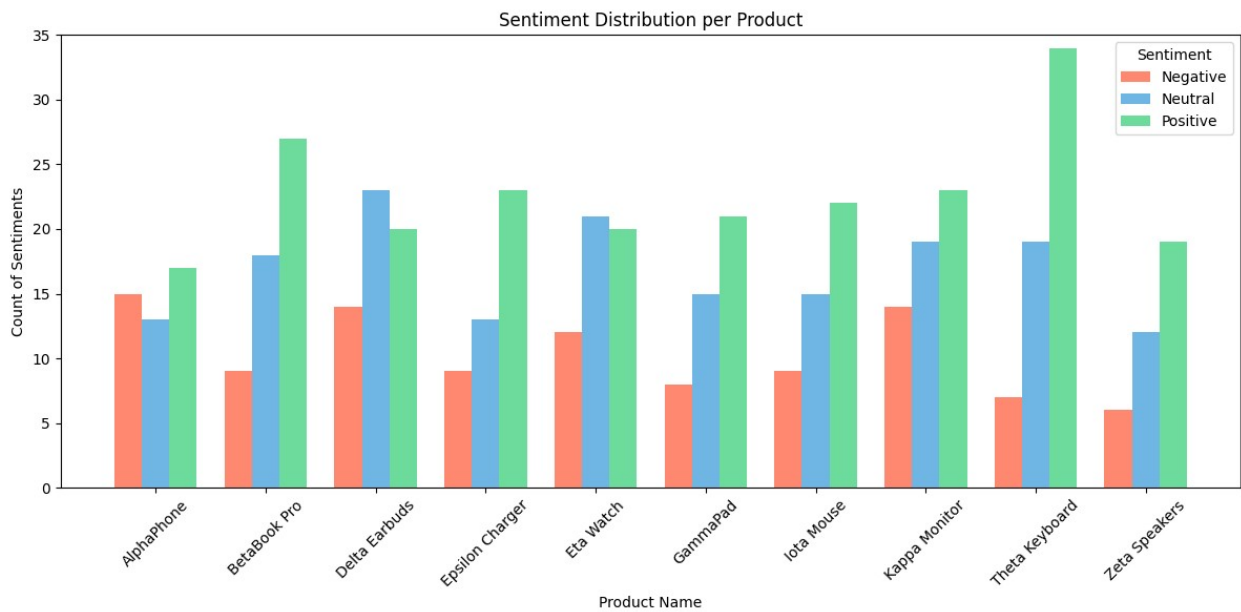
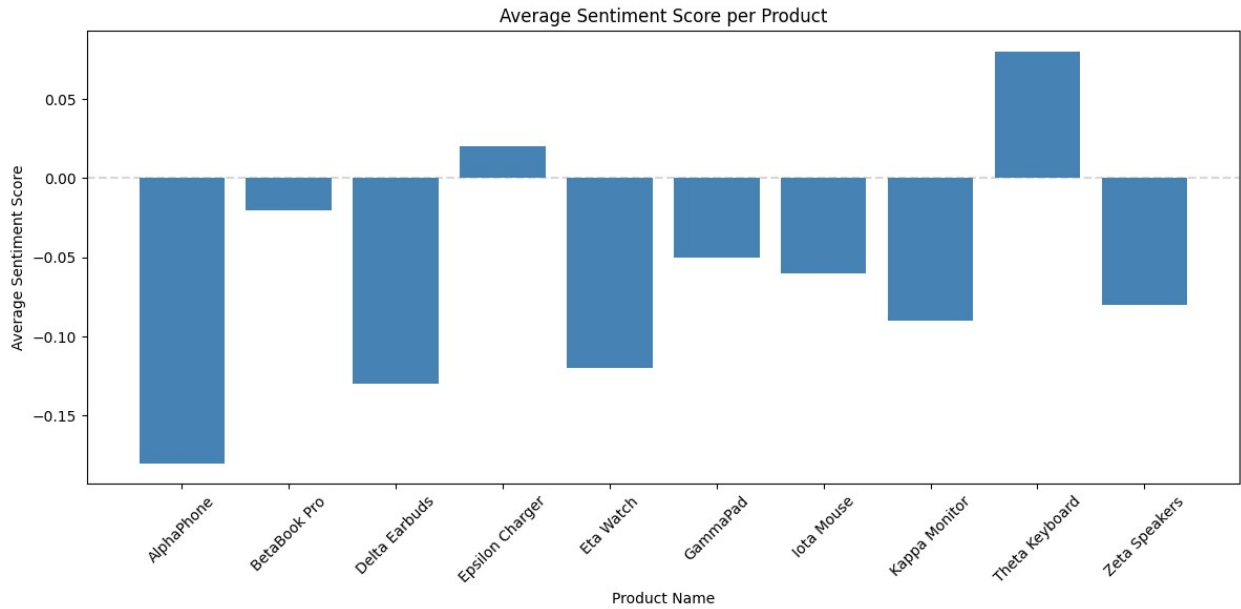
def main():
    plot_average_sentiment(df_avg_sentiment)
    plot_sentiment_distribution(df_sentiment_dist)

    print("\nAverage Sentiment Scores:")
    print(df_avg_sentiment.sort_values('SentimentScore',
ascending=False))

    print("\nSentiment Distribution:")
    print(df_sentiment_dist.pivot_table(
        index='ProductName',
        columns='SentimentCategory',
        values='Count'
    ))

if __name__ == "__main__":
    main()

```



Average Sentiment Scores:

	ProductName	SentimentScore
8	Theta Keyboard	0.08
3	Epsilon Charger	0.02
1	BetaBook Pro	-0.02
5	GammaPad	-0.05
6	Iota Mouse	-0.06
9	Zeta Speakers	-0.08
7	Kappa Monitor	-0.09
4	Eta Watch	-0.12
2	Delta Earbuds	-0.13

0	AlphaPhone	-0.18	
Sentiment Distribution:			
SentimentCategory	Negative	Neutral	Positive
ProductName			
AlphaPhone	15.0	13.0	17.0
BetaBook Pro	9.0	18.0	27.0
Delta Earbuds	14.0	23.0	20.0
Epsilon Charger	9.0	13.0	23.0
Eta Watch	12.0	21.0	20.0
GammaPad	8.0	15.0	21.0
Iota Mouse	9.0	15.0	22.0
Kappa Monitor	14.0	19.0	23.0
Theta Keyboard	7.0	19.0	34.0
Zeta Speakers	6.0	12.0	19.0

Sentiment Score Analysis

Highest Sentiment Scores: Theta Keyboard (0.08) and Epsilon Charger (0.02) have the highest positive sentiment scores This implies these products have the strongest customer satisfaction and are meeting user expectations

Negative Sentiment Scores: AlphaPhone (-0.18), Delta Earbuds (-0.13), and Eta Watch (-0.12) show the most negative scores This shows significant customer dissatisfaction and requires immediate attention

Distribution Analysis

Most Positive Distribution: Theta Keyboard shows the strongest positive distribution with 34 positive reviews After that, BetaBook Pro has 27 positive reviews, which is in line with its slightly higher sentiment score.

Most Negative Distribution: AlphaPhone and Delta Earbuds show high negative distributions (15 and 14 negative reviews respectively) This correlates with their low average sentiment scores

Balanced Distribution: GammaPad shows a relatively balanced distribution (8 negative, 15 neutral, 21 positive) This suggests mixed user experiences and opportunities for targeted improvements

Strategic Recommendations

Priority Improvements: AlphaPhone (highest negative score and poor distribution) Delta Earbuds (high negative reviews) Eta Watch (significant negative sentiment)

Marketing Opportunities: Take advantage of the good attitude behind Theta Keyboard in your marketing efforts. Promote your product using the glowing reviews from BetaBook Pro.

Product Development Strategy

Approach to Continuous Monitoring

Apply the offered code framework to real-time sentiment tracking

Make use of the visualization tools to monitor sentiment trends by product over time.

Prepare for major shifts in sentiment with the use of automated warnings.

Use the code's pivot table capability to generate monthly reports on sentiment dispersion.