# Data Analysis Report: ChatGPT vs. DeepSeek AI

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## 1. Introduction

This report presents a comparative analysis of two AI chatbots, **ChatGPT and DeepSeek**, based on synthetic data sourced from Kaggle. The primary goal is to determine which chatbot is more prominent for user engagement and experience. The analysis includes user experience metrics, device compatibility, and statistical significance tests.

**Assumptions**

1. **Active Users and Churned Users are Independent Columns** – There is no overlap between active and churned users.
2. **Old Users Calculation** – Old users are determined using the formula:
3. **Correction Needed Column** – A value of 0 represents False, while 1 represents True.

**Questions Under Study**

1. **Compare the performance of both the AIs**
2. **Create a trend and conduct a time series analysis**

## 2. User Experience Analysis

The computed mean values for each AI platform are as follows:

**Table 1. Mean User Experience Metrics**

| AI Platform | User Rating | User Experience Score | Session Duration (in sec) | Response Accuracy | Response Speed (in sec) | Correction Needed |
|---|---|---|---|---|---|---|
| **ChatGPT** | 3.99 | 1.23 | 22.56 | 0.80 | 3.44 | 0.15 |
| **DeepSeek** | 4.80 | 2.04 | 34.69 | 0.89 | 1.24 | 0.14 |

These mean values suggest a major difference between the two AI platforms. In support of these values, let us look at the following charts:

**Chart 1. User Rating Comparison**

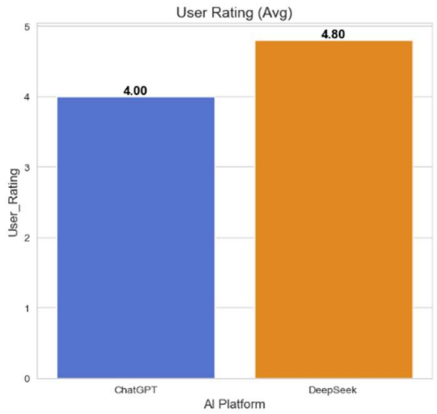



**Chart 2. User Experience Score Comparison**

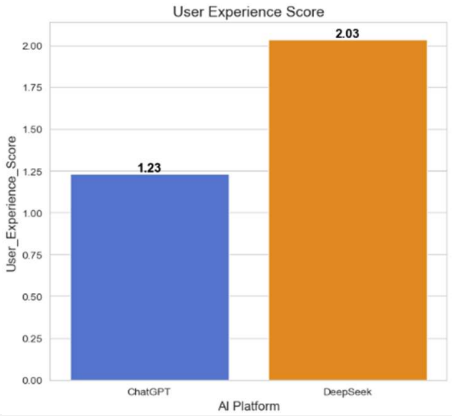



**Chart 3. Session Duration Distribution**

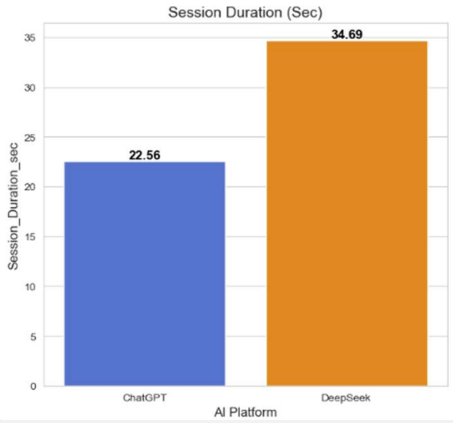



Chart 4. Response Accuracy Analysis

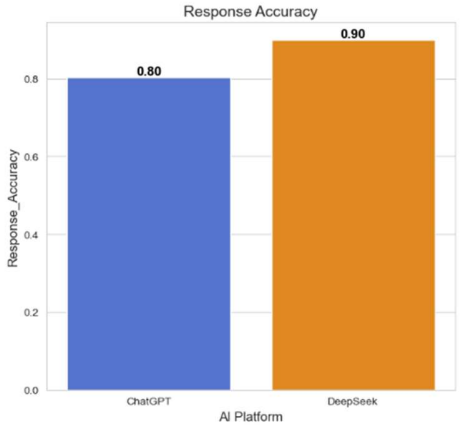



**Chart 5. Response Speed Comparison**

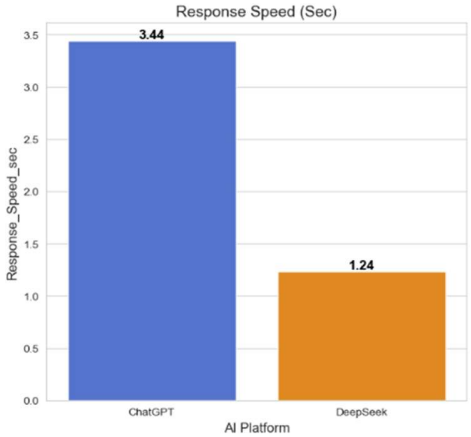
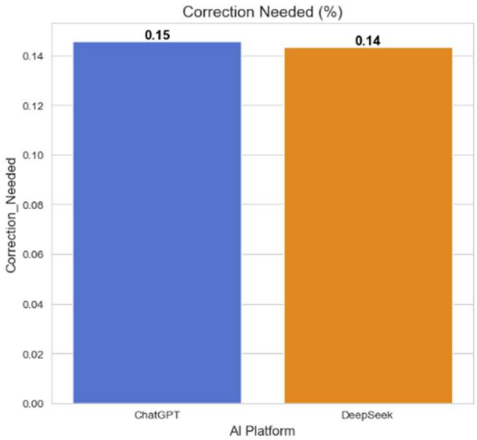



**Chart 6. Correction Needed Frequency**



**Key Observations from Charts**

1. **User Rating (Avg):** Users have given a higher rating for DeepSeek compared to ChatGPT.
2. **User Experience Score:** DeepSeek has a higher user experience score than ChatGPT.
3. **Session Duration (Sec):** DeepSeek has a longer session duration than ChatGPT.
4. **Response Accuracy:** DeepSeek provides more accurate responses compared to ChatGPT.
5. **Response Speed (Sec):** ChatGPT responds faster than DeepSeek.
6. **Correction Needed:** The average correction required for ChatGPT is slightly higher (0.01) than that of DeepSeek.

These observations indicate that **DeepSeek is more efficient in terms of user experience**, although ChatGPT responds faster.

## 3. Device Compatibility Analysis

To check which AI Platform is more compatible on which device, I took these devices:

1. Laptop/Desktop
2. Mobile
3. Smart Speaker
4. Tablet

Chart 7. Based on Number of Users

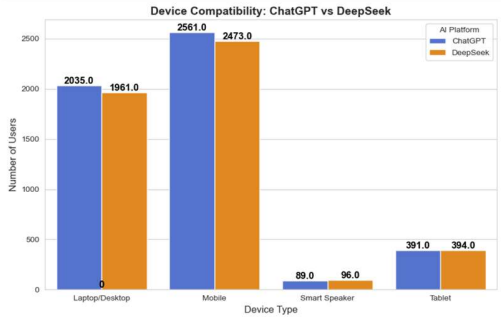



Chart 8. Based on User Rating

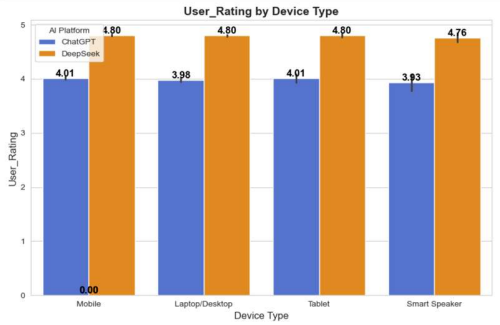


Chart 9. Based on User Experience Score

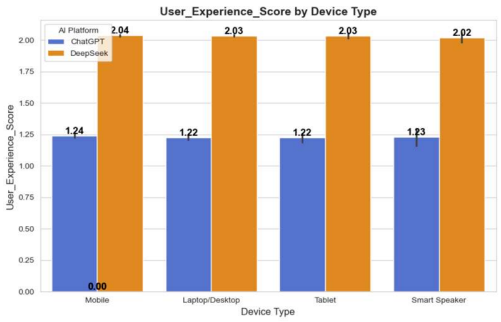
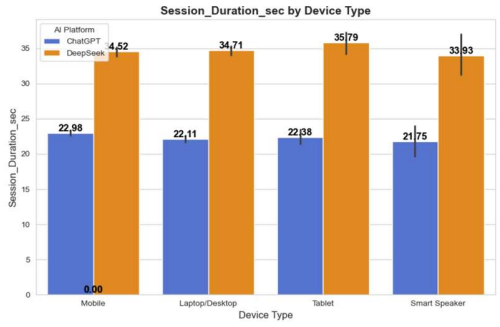



**Chart 10. Based on Session Duration (Sec)**




**Key Observations:**

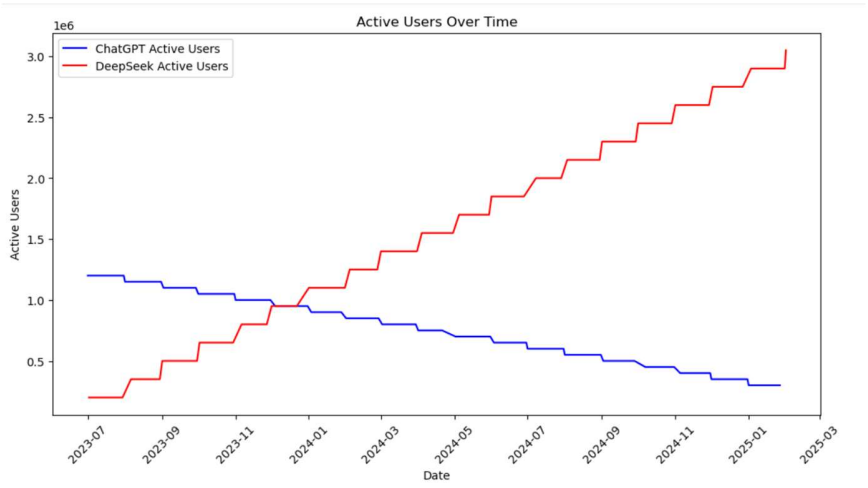
1. Based upon the number of users, ChatGPT turned out to be more compatible with Laptop/Desktop and Mobile than DeepSeek when DeepSeek is significantly more compatible with Smart Speaker and Tablet than ChatGPT.
2. Based upon User Ratings, User Experience Score and Session Duration (Sec), DeepSeek is more compatible with each device when compared with ChatGPT.

## 4. Time Series Analysis

To forecast the future performance of the AI platforms – ChatGPT and DeepSeek AI, I conducted a time series analysis.

Chart 11 visualizes the active users' trend over time for both the chatbots.

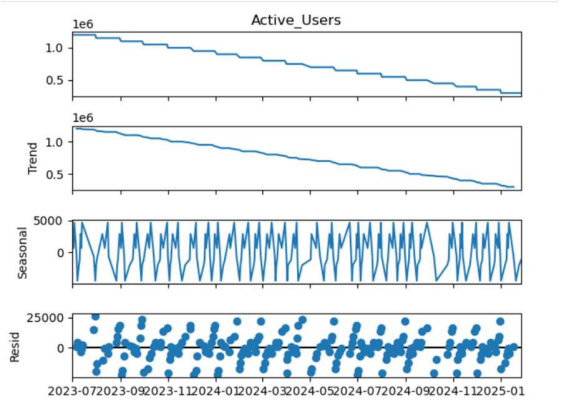
**Chart 11.**



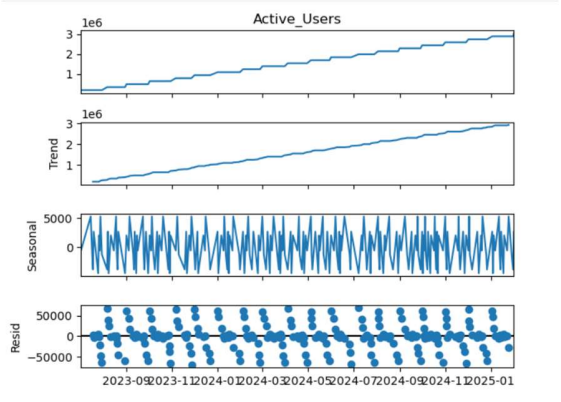

According to chart 11, number of active users are increasing for DeepSeek over time while there is a gradual decrease in the number of active users for ChatGPT.

To support my findings, I took a statistical test to calculate a seasonal decomposition.

**Chart 12. Seasonal Decomposition**



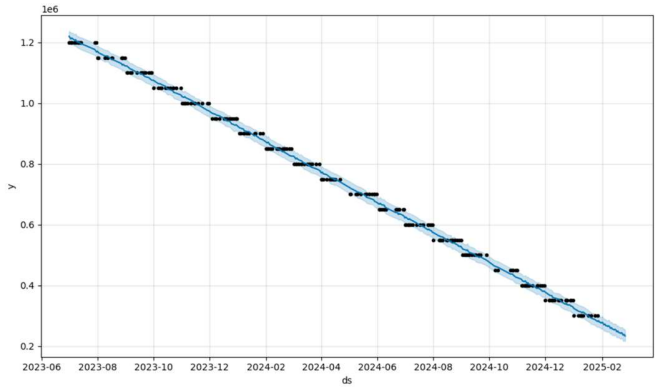

**(a)**




**(b)**

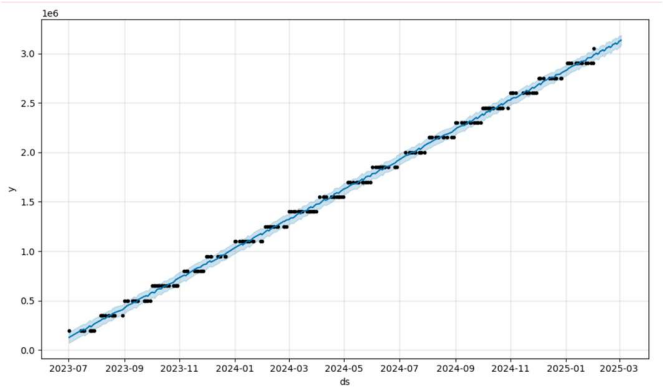
To predict the future performance of both the chatbots, I used Prophet library. The resultants obtained from the analysis are:

**ChatGPT**




| | ds | yhat | yhat_lower | yhat_upper |
|---|---|---|---|---|
| **251** | 2025-02-17 | 246894.421498 | 227554.029341 | 266139.581280 |
| **252** | 2025-02-18 | 249673.865276 | 231150.104517 | 267909.949167 |
| **253** | 2025-02-19 | 244709.087393 | 226669.357370 | 262701.147959 |
| **254** | 2025-02-20 | 244128.422014 | 226500.610864 | 263431.765408 |
| **255** | 2025-02-21 | 241914.600160 | 222964.919223 | 260911.853629 |
| **256** | 2025-02-22 | 244185.722427 | 226111.281106 | 262343.848673 |
| **257** | 2025-02-23 | 241122.636928 | 222234.062006 | 261900.597757 |
| **258** | 2025-02-24 | 235527.049859 | 215832.880266 | 254905.756332 |
| **259** | 2025-02-25 | 238306.493636 | 219254.824038 | 256970.331744 |
| **260** | 2025-02-26 | 233341.715753 | 215872.420029 | 252554.791423 |

**DeepSeek**




| | ds | yhat | yhat_lower | yhat_upper |
|---|---|---|---|---|
| 256 | 2025-02-22 | 3.091147e+06 | 3.033253e+06 | 3.141361e+06 |
| 257 | 2025-02-23 | 3.090775e+06 | 3.036156e+06 | 3.144615e+06 |
| 258 | 2025-02-24 | 3.099407e+06 | 3.045450e+06 | 3.150577e+06 |
| 259 | 2025-02-25 | 3.104898e+06 | 3.050480e+06 | 3.160558e+06 |
| 260 | 2025-02-26 | 3.093656e+06 | 3.037890e+06 | 3.148689e+06 |
| 261 | 2025-02-27 | 3.098547e+06 | 3.042905e+06 | 3.156939e+06 |
| 262 | 2025-02-28 | 3.110167e+06 | 3.055716e+06 | 3.165333e+06 |
| 263 | 2025-03-01 | 3.125320e+06 | 3.065142e+06 | 3.178179e+06 |
| 264 | 2025-03-02 | 3.124948e+06 | 3.067950e+06 | 3.179072e+06 |
| 265 | 2025-03-03 | 3.133581e+06 | 3.081823e+06 | 3.188167e+06 |

Here, the yhat value gives the Predicted values and yhat_lower and yhat_upper are the confidence intervals.

From the above analysis, DeepSeek is outperforming ChatGPT in many different ways.

## 5. Limitation

The data used in this analysis is synthetic in nature and was sourced from Kaggle. While the dataset provides a useful basis for comparison, it is important to note that synthetic data may not fully reflect real-world user behavior or interactions.

## 6. Data Dictionary

The dataset used in this analysis was sourced from Kaggle: DeepSeek vs ChatGPT AI Platform Comparison. Below is a description of the key columns in the dataset:

| Column Name | Description |
|---|---|
| **User Rating** | The average rating given by users for the AI platform (scale of 1 to 5). |
| **User Experience Score** | A score representing the overall user experience with the AI platform. |
| **Session Duration (sec)** | The average duration of user sessions in seconds. |
| **Response Accuracy** | The accuracy of responses provided by the AI platform (scale of 0 to 1). |
| **Response Speed (sec)** | The average time taken by the AI platform to respond to user queries in seconds. |

| Column Name | Description |
| --- | --- |
| Correction Needed | Indicates whether corrections were needed for the AI's responses (0 = False, 1 = True). |
| Device Type | The type of device used to interact with the AI platform (e.g., Laptop, Mobile). |
| Active Users | The number of active users for the AI platform. |
| Churned Users | The number of users who stopped using the AI platform. |

## 7. Conclusion

This comparative analysis of **ChatGPT** and **DeepSeek AI** provides valuable insights into their performance across various user experience metrics, device compatibility, and future trends. Based on the synthetic dataset sourced from Kaggle, the following key findings were observed:

1. **User Experience Metrics**:
    - **User Rating**: DeepSeek received a higher average user rating (4.80) compared to ChatGPT (3.99), indicating greater user satisfaction.
    - **User Experience Score**: DeepSeek scored significantly higher (2.04) than ChatGPT (1.23), suggesting a superior overall user experience.
    - **Session Duration**: DeepSeek users engaged in longer sessions (34.69 seconds) compared to ChatGPT users (22.56 seconds), reflecting higher user engagement.
    - **Response Accuracy**: DeepSeek demonstrated better response accuracy (0.89) than ChatGPT (0.80), making it more reliable for users.
    - **Response Speed**: ChatGPT responded faster (3.44 seconds) than DeepSeek (1.24 seconds), which could be a critical factor for users prioritizing quick interactions.
    - **Correction Needed**: Both platforms required minimal corrections, but ChatGPT had a slightly higher correction rate (0.15) compared to DeepSeek (0.14).
2. **Device Compatibility**:
    - ChatGPT was more compatible with **Laptop/Desktop** and **Mobile** devices in terms of the number of users.

- DeepSeek, however, outperformed ChatGPT in compatibility with **Smart Speakers** and **Tablets**.
- Across all devices, DeepSeek consistently received higher user ratings, better user experience scores, and longer session durations compared to ChatGPT.

3. **Time Series Analysis**:
   - The number of active users for DeepSeek is increasing over time, while ChatGPT is experiencing a gradual decline in active users.
   - Seasonal decomposition and forecasting using the Prophet library further support the trend that DeepSeek is likely to continue outperforming ChatGPT in the future.
4. **Limitations**:
   - The analysis is based on **synthetic data**, which may not fully capture real-world user behavior. While the findings are insightful, they should be validated with real-world data for more accurate conclusions.

**Final Recommendation:**

DeepSeek AI emerges as the more efficient and user-friendly platform in terms of **user experience**, **response accuracy**, and **engagement**. However, ChatGPT has an advantage in **response speed**, which may appeal to users who prioritize quick interactions. For organizations or users seeking a more accurate and engaging AI chatbot, DeepSeek is the recommended choice. On the other hand, ChatGPT remains a strong contender for scenarios where speed is critical.

Further research with real-world data is recommended to validate these findings and provide more robust insights into the performance of these AI platforms.