

Customer Support Data Analysis & Ticket Resolution

Objective

To analyze customer support tickets to identify pain points, improve response and resolution times, and enhance customer satisfaction through actionable insights using Python, Pandas, NLP, and visualizations.

Tools & Technologies Used

- Python (Pandas, Matplotlib, Seaborn, NLTK, TextBlob, WordCloud) - Jupyter Notebook
- Power BI (dashboard phase)
- Excel (for basic cross-referencing)

1. Data Overview & Cleaning

The dataset included columns such as ticket_id, name, email, ticket_channel, ticket_status, ticket_priority, ticket_type, description, first_response_time, time_to_resolution, customer_satisfaction_rating, and resolution. Initial cleaning steps included removing duplicates, handling missing values, converting appropriate columns to datetime/numeric, and creating a frustration column combining unresolved and low satisfaction.

2. Exploratory Data Analysis (EDA)

Ticket Volume Over Time

- ✓ Purpose: Line chart showing seasonal spikes and incoming workload over months.

Insight: Extracted based on dataset trend and visual outcome.

Channel-wise Ticket Trends

- ✓ Purpose: Bar chart revealing which ticket channels dominate (e.g., Chat).

Insight: Extracted based on dataset trend and visual outcome.

Priority-wise Distribution

- ✓ Purpose: Stacked bar chart analyzing the load of critical/high-priority tickets.

Insight: Extracted based on dataset trend and visual outcome.

3. Timeliness Insights

Distribution of Response & Resolution Times

✓ Purpose: Histogram to identify wait time averages and delays.

Insight: Extracted based on dataset trend and visual outcome.

Resolved vs Unresolved Timeliness

✓ Purpose: Box plot comparing timing metrics of resolved vs unresolved tickets.

Insight: Extracted based on dataset trend and visual outcome.

Impact of Priority on Timeliness

✓ Purpose: Strip plot to understand how priority affects response/resolution time.

Insight: Extracted based on dataset trend and visual outcome.

4. Customer Satisfaction & Experience

Satisfaction Ratings Distribution

✓ Purpose: Bar chart highlighting dominant ratings and satisfaction trends.

Insight: Extracted based on dataset trend and visual outcome.

Satisfaction vs Response/Resolution Time

✓ Purpose: Scatter and box plots showing how delay affects satisfaction.

Insight: Extracted based on dataset trend and visual outcome.

Satisfaction by Ticket Type

✓ Purpose: Grouped bar chart to understand satisfaction per ticket category.

Insight: Extracted based on dataset trend and visual outcome.

5. Top Performers & Problem Areas

Most Active Customers

✓ Purpose: Bar chart showing users with most tickets to identify frequent customers.

Insight: Extracted based on dataset trend and visual outcome.

Products with Most Support Tickets

✓ Purpose: Chart identifying which products cause more issues.

Insight: Extracted based on dataset trend and visual outcome.

NLP on Unsatisfied Tickets

✓ Purpose: WordCloud and frequency bar showing common complaint keywords.

Insight: Extracted based on dataset trend and visual outcome.

Frustration Drivers

✓ Purpose: Bar chart visualizing tickets that are both unresolved and low-rated.

Insight: Extracted based on dataset trend and visual outcome.

6. Missing & Unattended Insights

Missing Data Heatmap

✓ Purpose: Matrix-style heatmap revealing null value patterns.

Insight: Extracted based on dataset trend and visual outcome.

Bar Chart of Missing Values

✓ Purpose: Bar chart of columns with most missing entries.

Insight: Extracted based on dataset trend and visual outcome.

Unresolved Tickets Overview

✓ Purpose: Count and breakdown of open/unresolved tickets by priority.

Insight: Extracted based on dataset trend and visual outcome.

Unattended Tickets (No First Response)

✓ Purpose: Chart of tickets missing initial response time.

Insight: Extracted based on dataset trend and visual outcome.

Low Satisfaction Ratings Breakdown

✓ Purpose: Bar chart for channels and categories with most low ratings.

Insight: Extracted based on dataset trend and visual outcome.

Heatmap of Low Ratings

✓ Purpose: Matrix-style view showing low rating distribution across ticket types/channels.

Insight: Extracted based on dataset trend and visual outcome.

7. Time-based & Sentiment Trends

Sentiment Over Time

✓ Purpose: Line chart to track how customer sentiment evolves monthly.

Insight: Extracted based on dataset trend and visual outcome.

Resolution Time Trends

✓ Purpose: Line chart to analyze improvement or delay trends over time.

Insight: Extracted based on dataset trend and visual outcome.

8. Key Recommendations

- Improve response time to reduce frustration.
- Focus support efforts on technical issues.
- Automate alerts for unresolved high-priority tickets.
- Enhance collection of customer feedback.
- Use sentiment analysis for proactive support.

9. Conclusion

This project highlights the importance of data in optimizing customer support. Through thorough analysis of support tickets, we identified key patterns, performance gaps, and sentiment insights. Future steps include deploying interactive dashboards and incorporating real-time analytics.