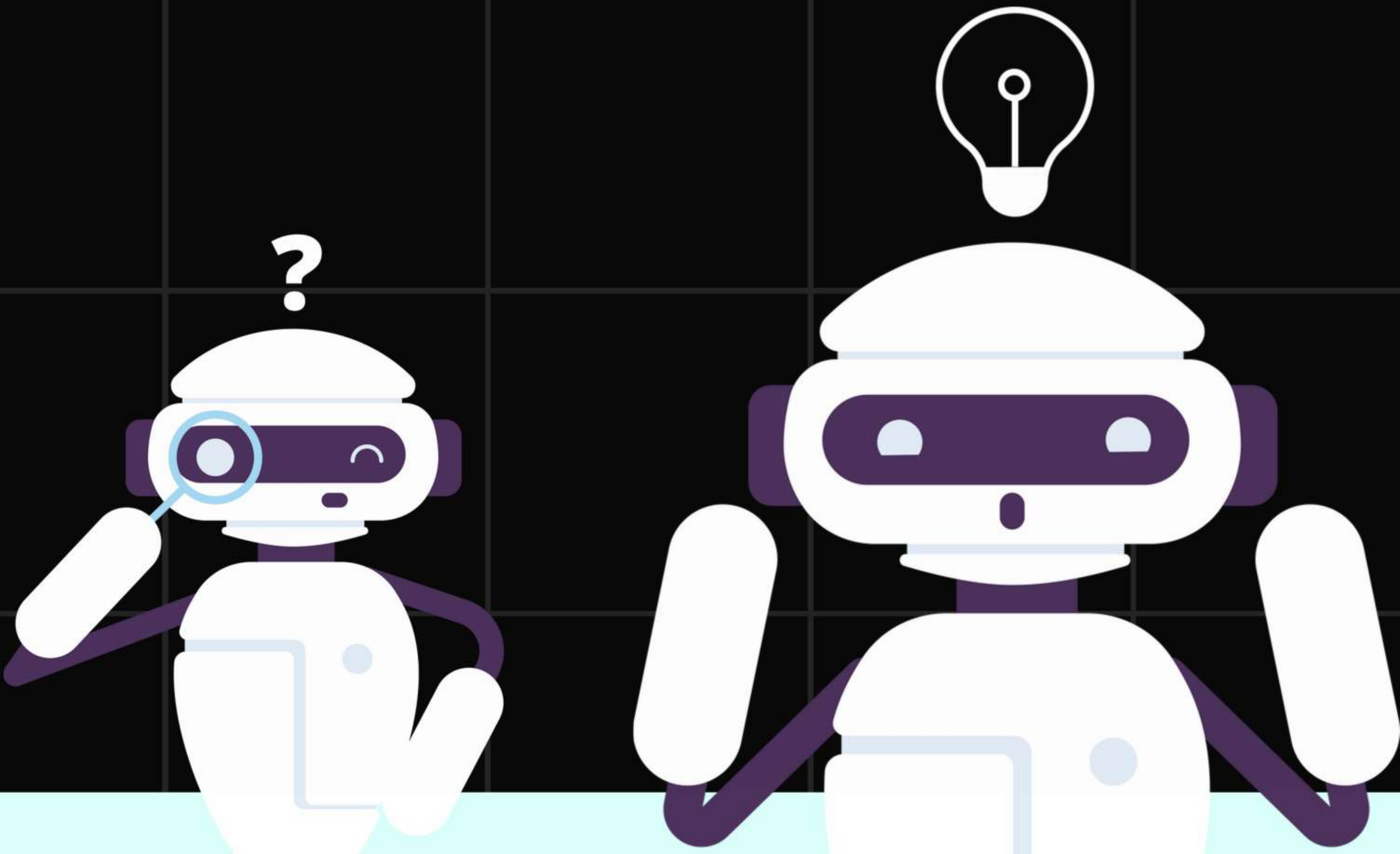
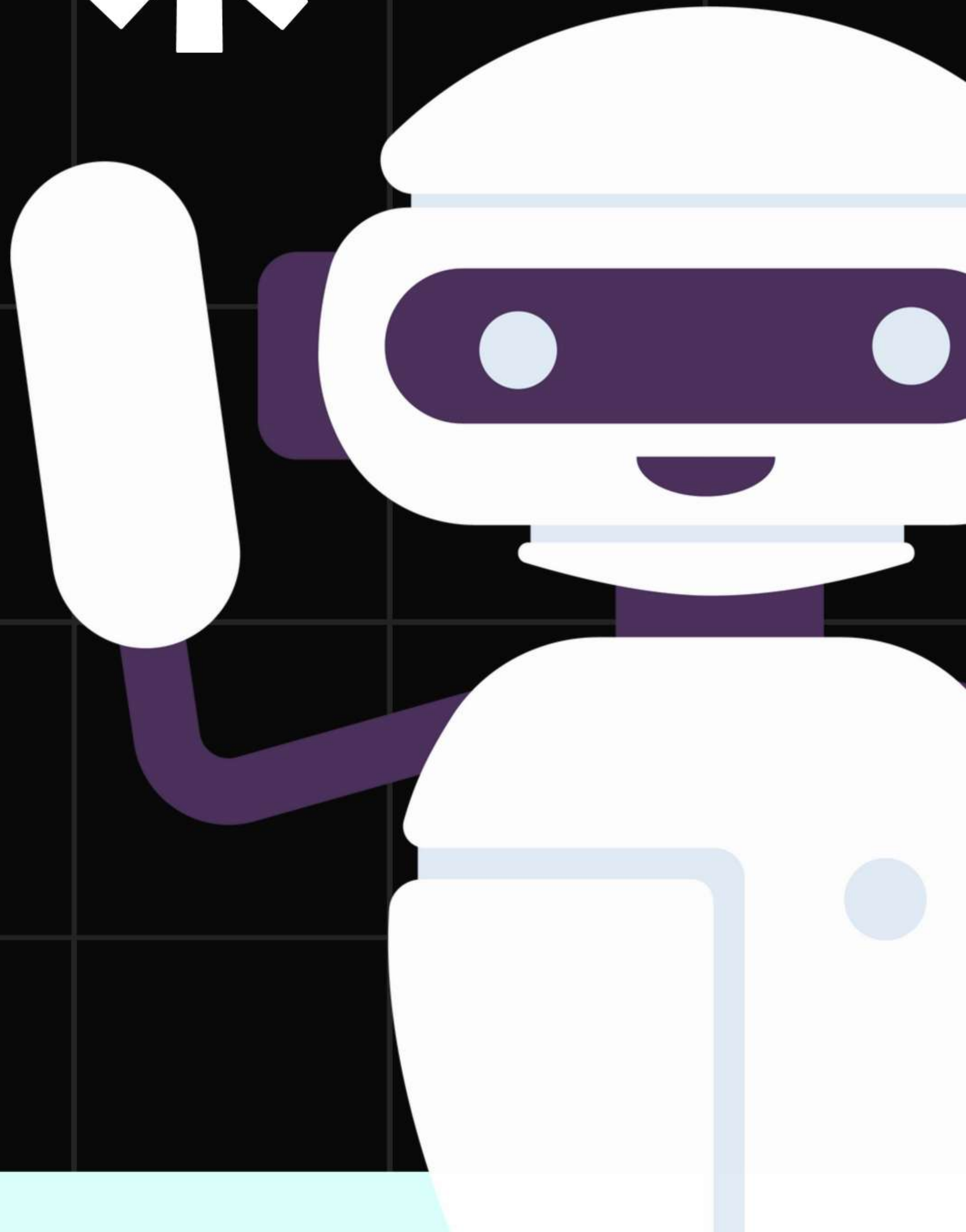
# Quick Answers, Happy Customers: Revolutionizing United Airlines' Call Center



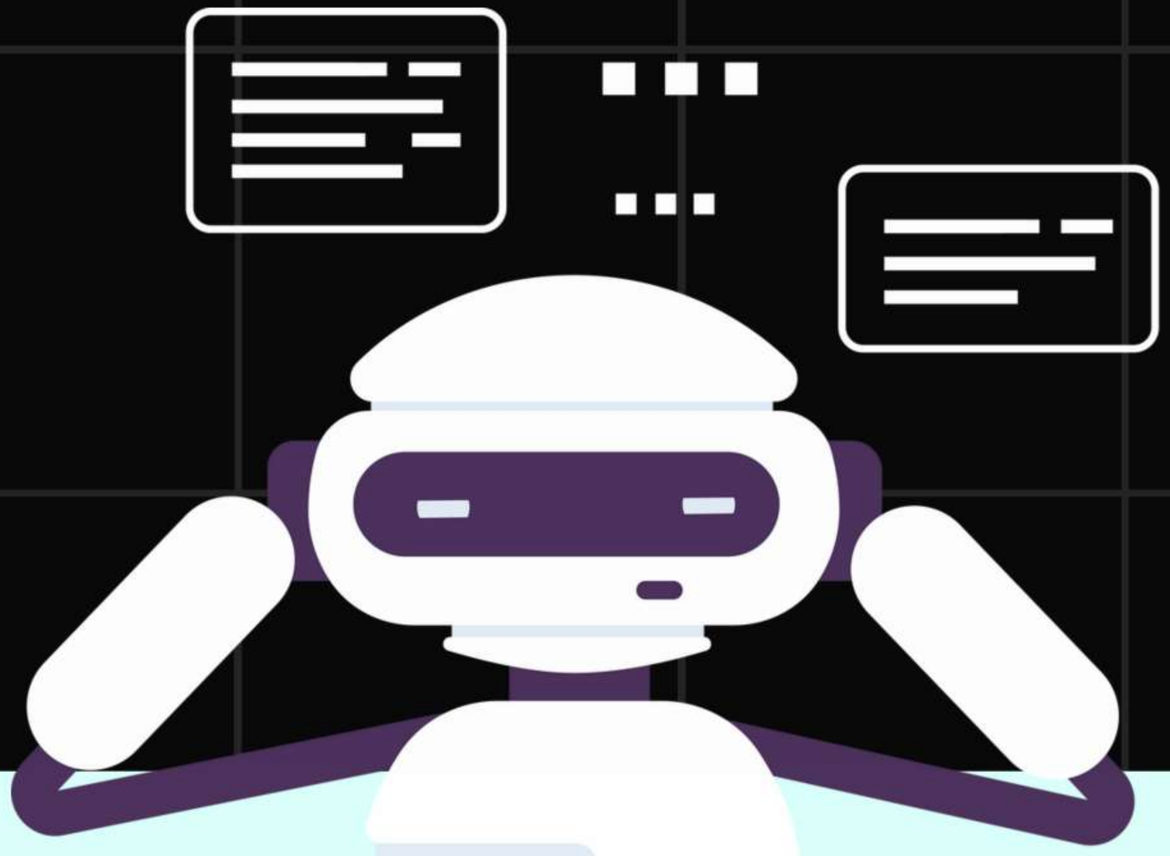
Submitted By : Team ChanduChampion

# Problem Statement

United Airlines aims to optimize its call center operations by reducing Average Handle Time (AHT) and Average Speed to Answer (AST), improving customer service efficiency and satisfaction. Through data analysis, we will identify inefficiencies, key drivers of extended call durations, and areas where self-service options can reduce agent workload. The goal is to streamline call handling processes, enhance resource allocation, and elevate the overall customer experience while maintaining high service quality.



# Data Description



**Calls Data**
Customers call transcript and duration with agents.

**Customer Data**
Customer insights

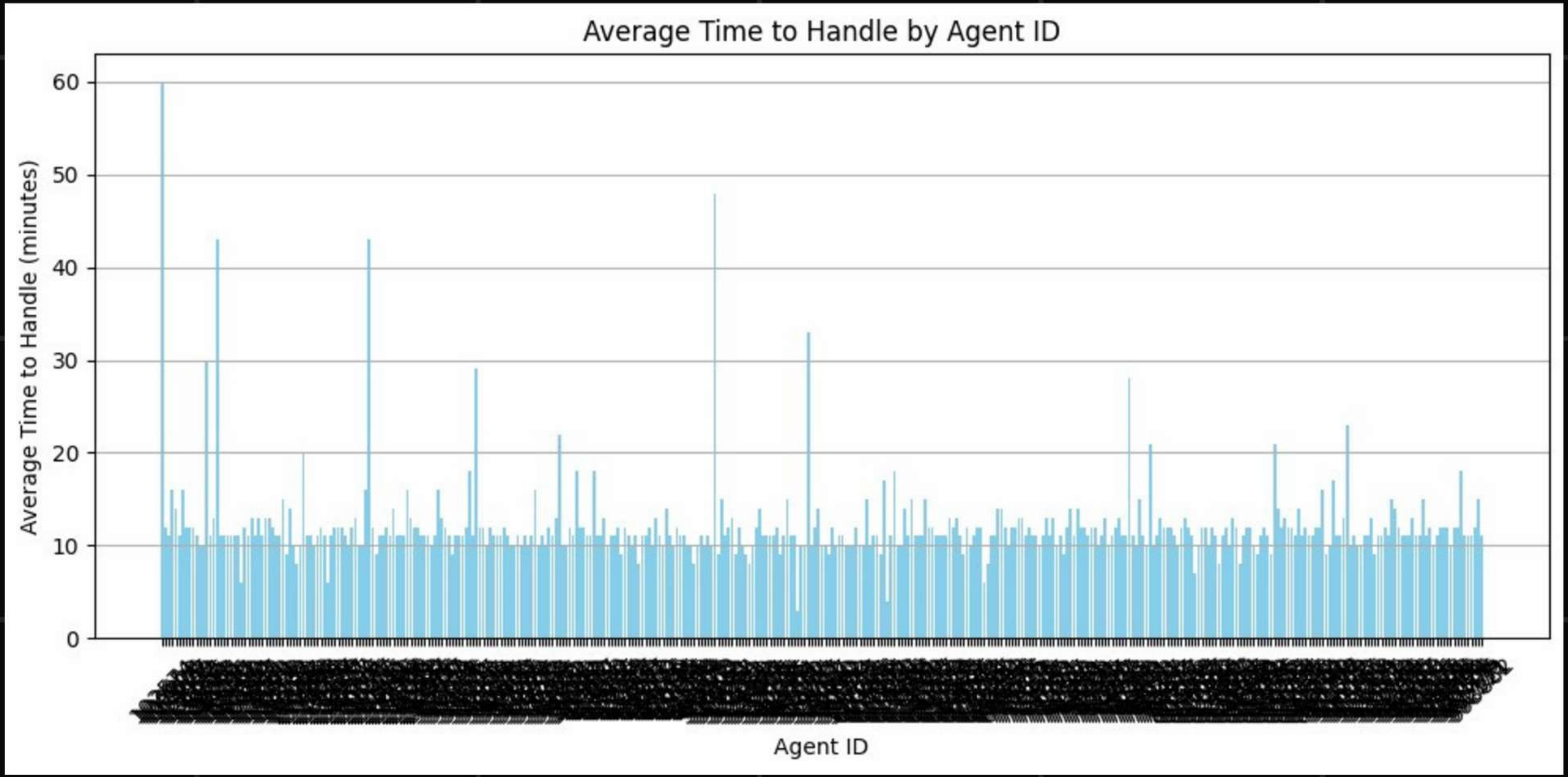
**Call Reasons Data**
Call reasons of conversation

**Sentiments Data**
Customer conversations sentiments

# Deliverables

- Analyze AHT and AST data to identify inefficiencies and key drivers of long call times.
- Quantify percentage difference between most frequent and least frequent call reasons' AHT.
- Identify self-solvable issues escalating to agents and recommend IVR improvements.
- Categorize primary call reasons to streamline processes and reduce manual efforts.
- Provide actionable recommendations to optimize call center performance.

# AHT and AST Analysis

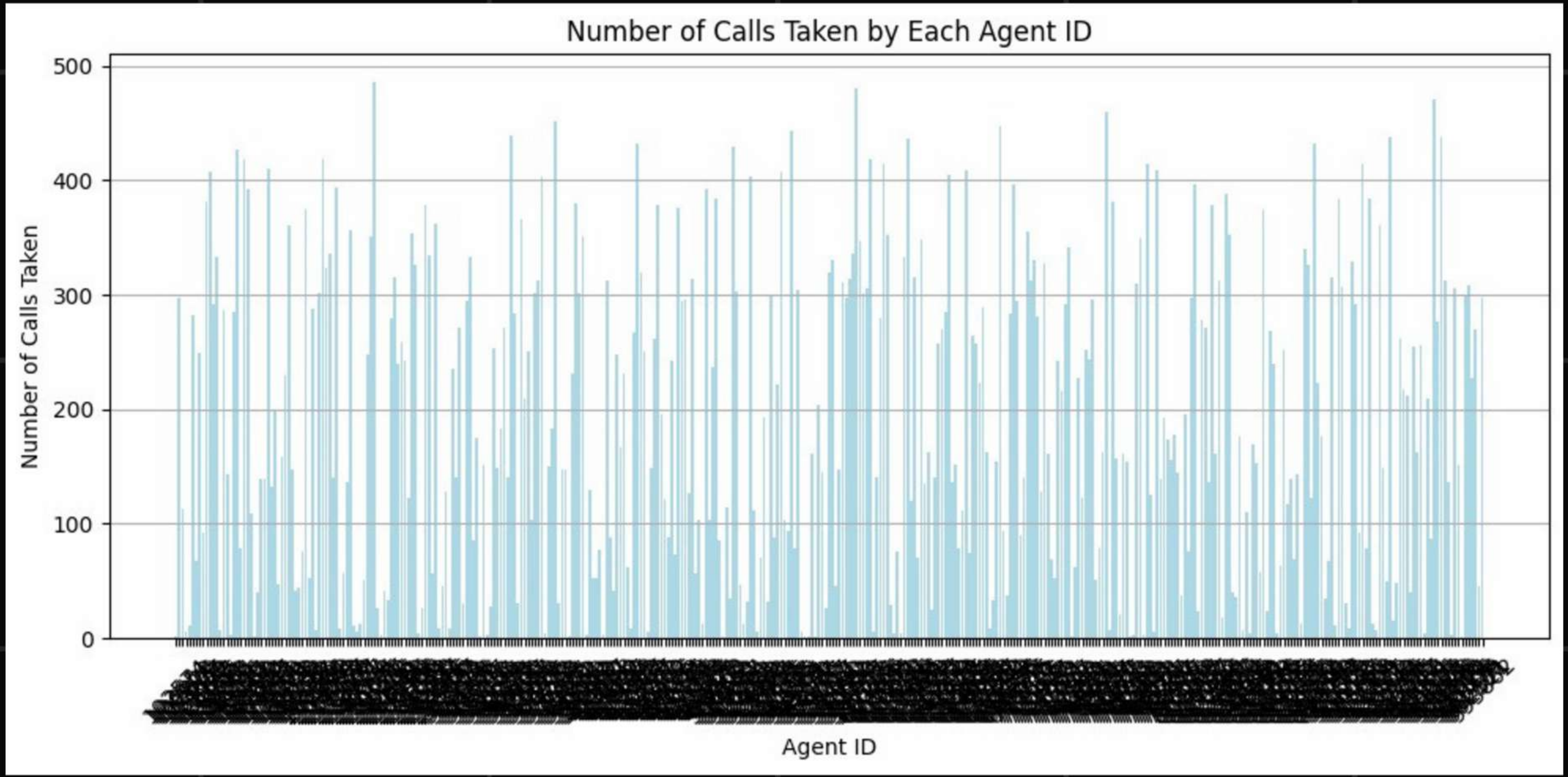



| Metric | Value |
| --- | --- |
| Count | 383 |
| Mean | 0 days 00:12:06.579634464 |
| Std Dev | 0 days 00:04:46.525582134 |
| Min | 0 days 00:03:00 |
| 25th Percentile | 0 days 00:11:00 |
| Median (50th Percentile) | 0 days 00:11:00 |
| 75th Percentile | 0 days 00:12:00 |
| Max | 0 days 01:00:00 |

The graph illustrates each agent's Average Handle Time (AHT). To enhance customer experience, AHT should ideally remain low, but certain agents exhibit significantly higher times. These outliers need to be reviewed, and appropriate steps should be taken to understand and address the reasons behind their longer call durations.

Agents with higher AHT should be monitored and coached to optimize their performance and improve overall efficiency.

# AHT and AST Analysis




| Metric | Value |
|---|---|
| Count | 383 |
| Mean | 187.493 |
| Std Dev | 137.938 |
| Min | 1 |
| 25th Percentile | 54.5 |
| Median (50th Percentile) | 161 |
| 75th Percentile | 302.5 |
| Max | 486 |

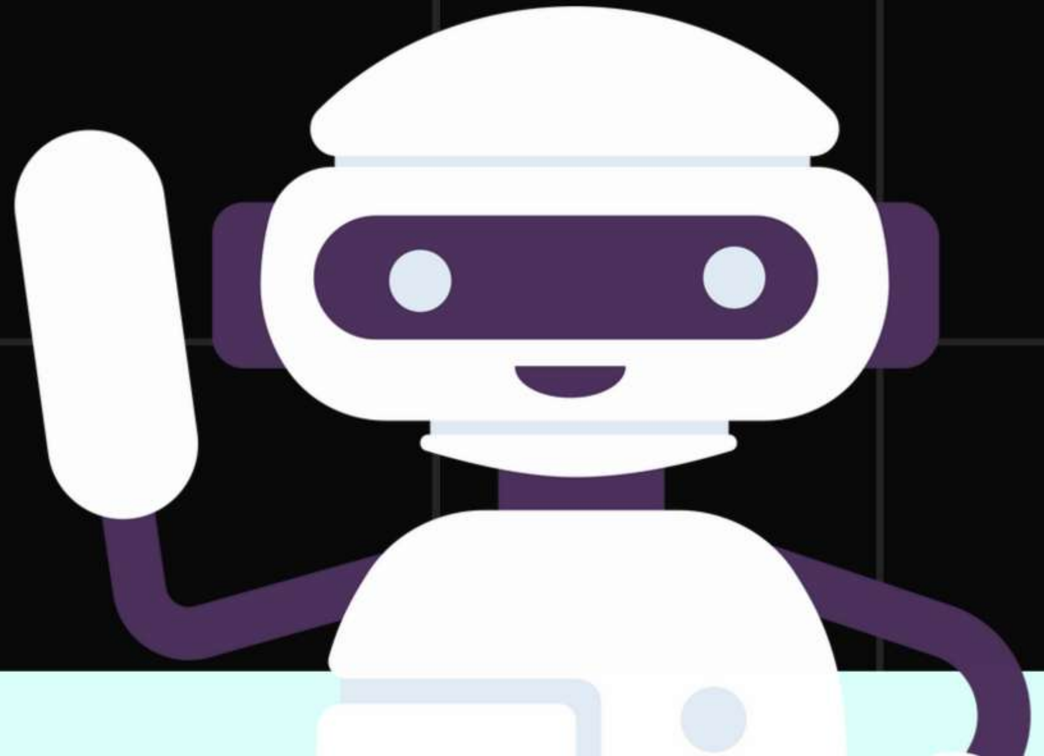
**The graph displays the number of calls handled by each agent. Agents handling fewer calls should be assessed to understand why they are less occupied. If an agent has more available time, they should be handling more calls to reduce customer queueing time and improve the Average Speed to Answer (AST). This can help optimize resource allocation and enhance overall call center efficiency.**

# AHT and AST Analysis

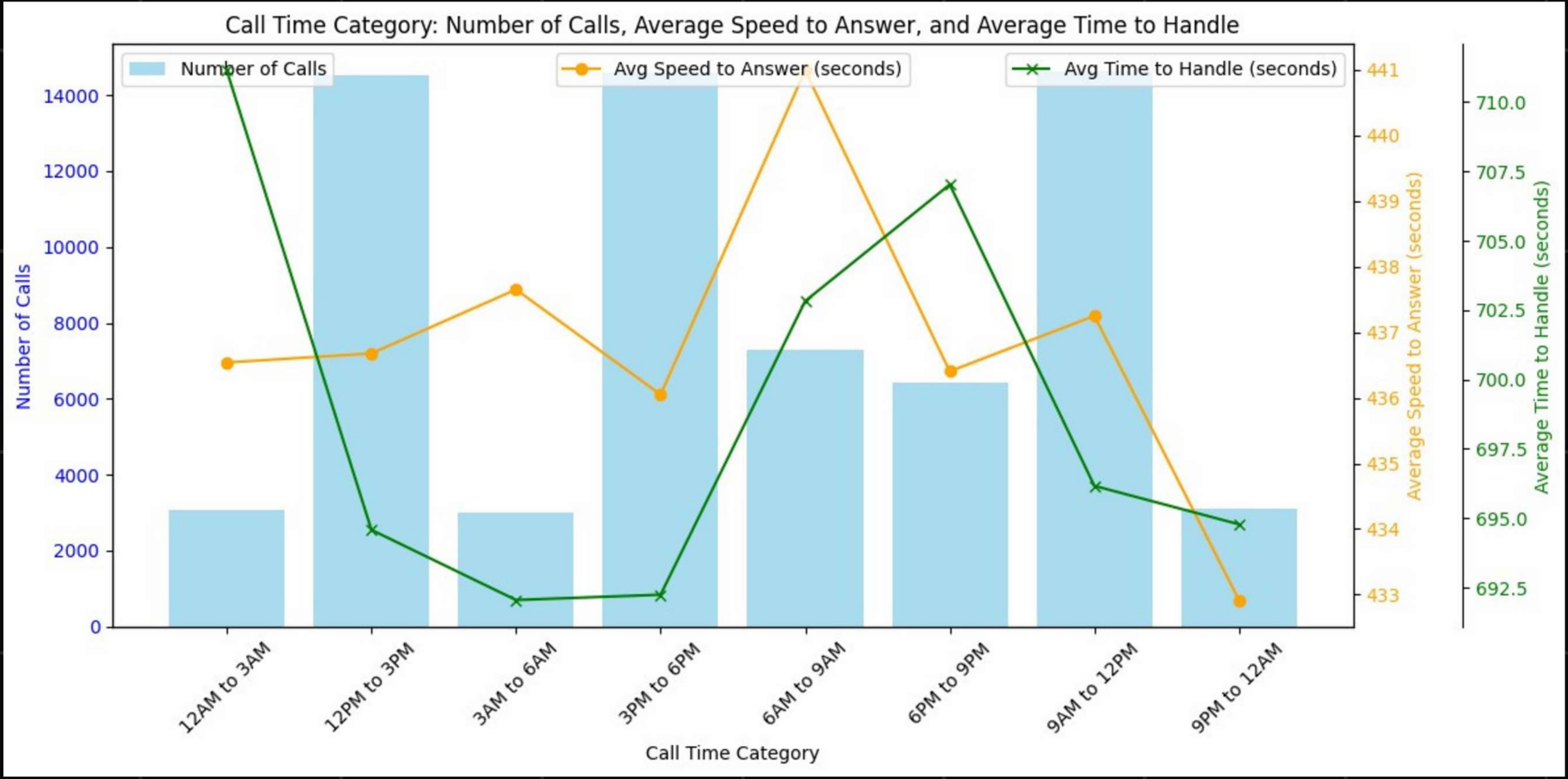
## Agents that must be reviewed:

**Number of agents that need to be revised (High AHT > 12.00 minutes and Low Calls < 54.50): 48**

**The thresholds of 12.00 minutes for high average handle time (AHT) and 54.50 for low call volume are derived from statistical analysis using percentiles. The 12.00 minutes represents the 75th percentile of AHT, indicating that agents exceeding this time are performing slower than 75% of their peers. The 54.50 reflects the 25th percentile of total calls taken, meaning that agents handling fewer than this number may be underperforming in engagement. Together, these metrics highlight agents needing revision for potential performance improvements.**



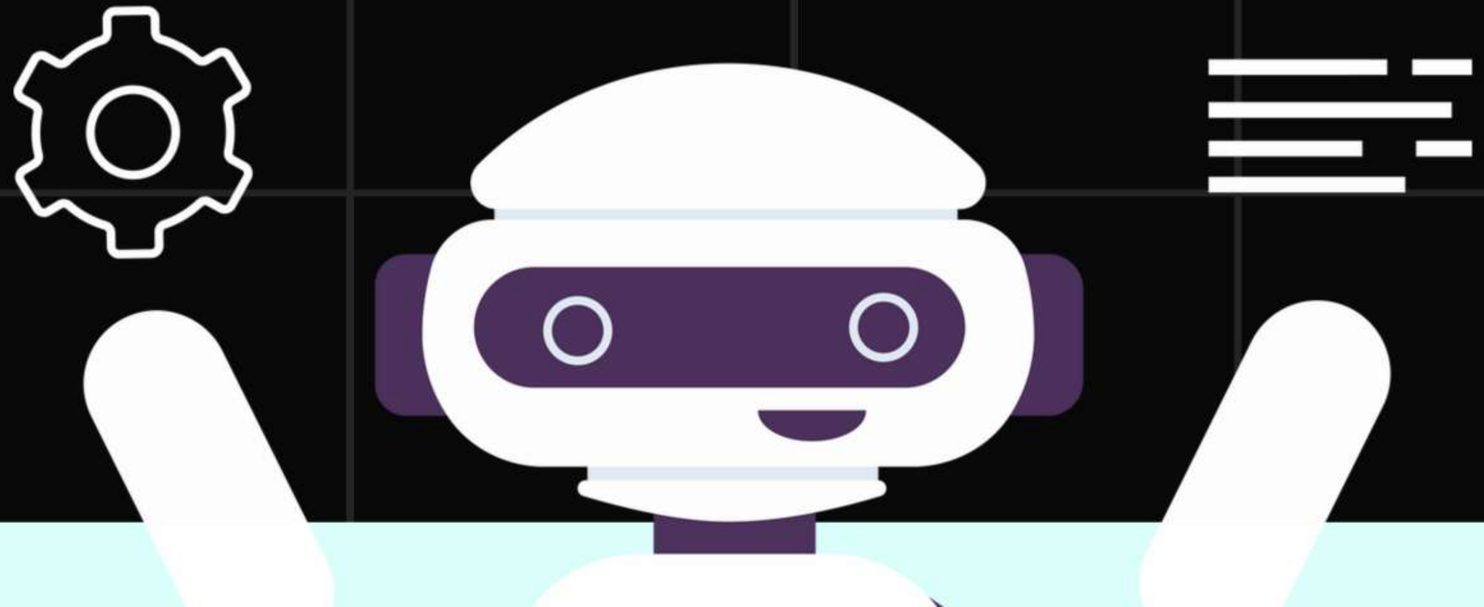
# AHT and AST Analysis



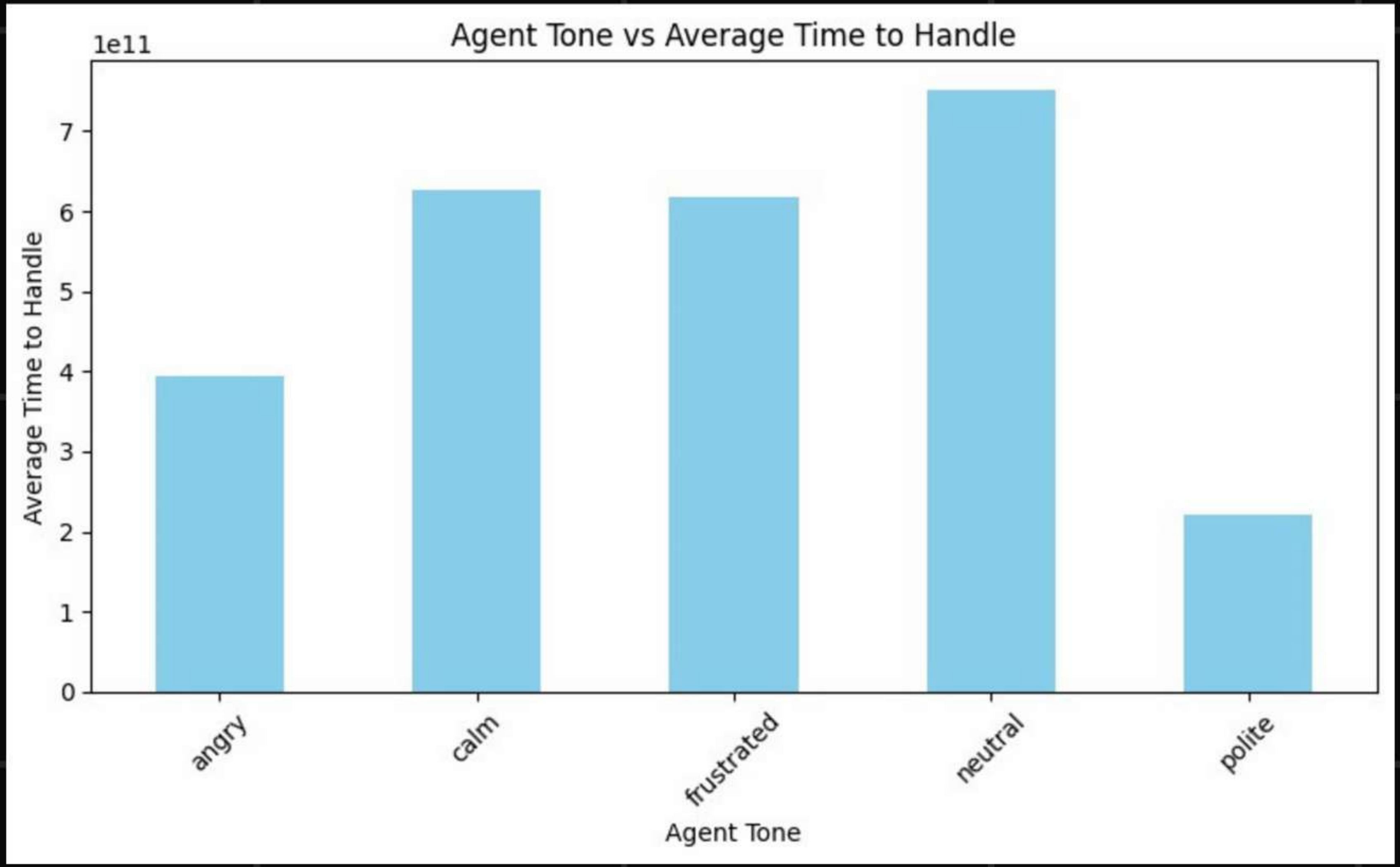
# AHT and AST Analysis

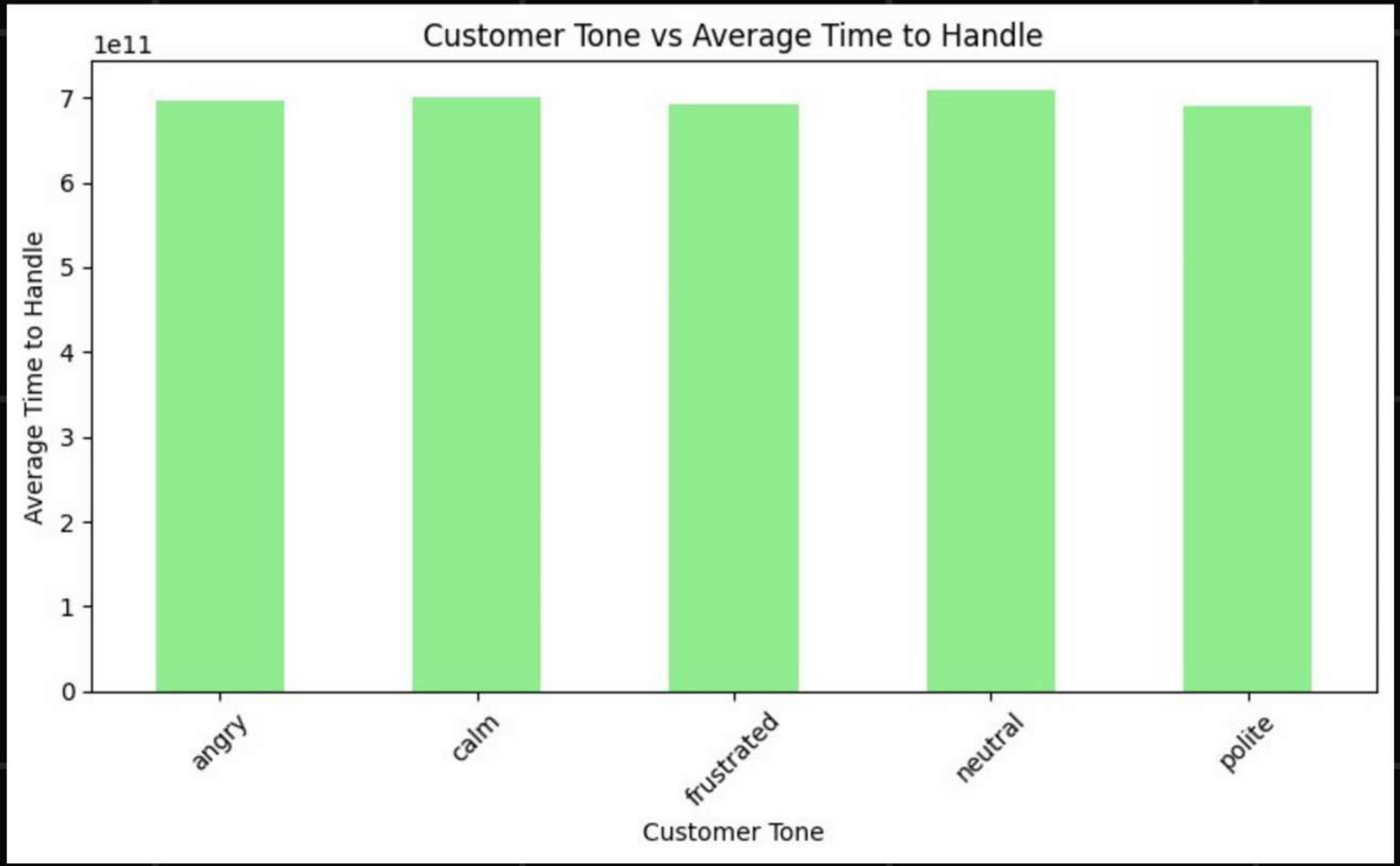
This graph in the previous slide shows call volume across 3-hour slots, along with Average Speed to Answer (AST) and Average Handle Time (AHT).

- **High AST During Low Traffic (9 PM - 12 AM):** Despite fewer calls, AST remains high, indicating inefficiency during low traffic hours.
- **Consistent AST Despite High Traffic (6 AM - 9 AM):** Even with higher call volumes, AST is not reduced, suggesting inefficiency during peak hours.
- **Actionable Insight:** AST should be reduced to decrease waiting time, particularly during low-traffic periods. AHT improvements can enhance call handling and overall efficiency.



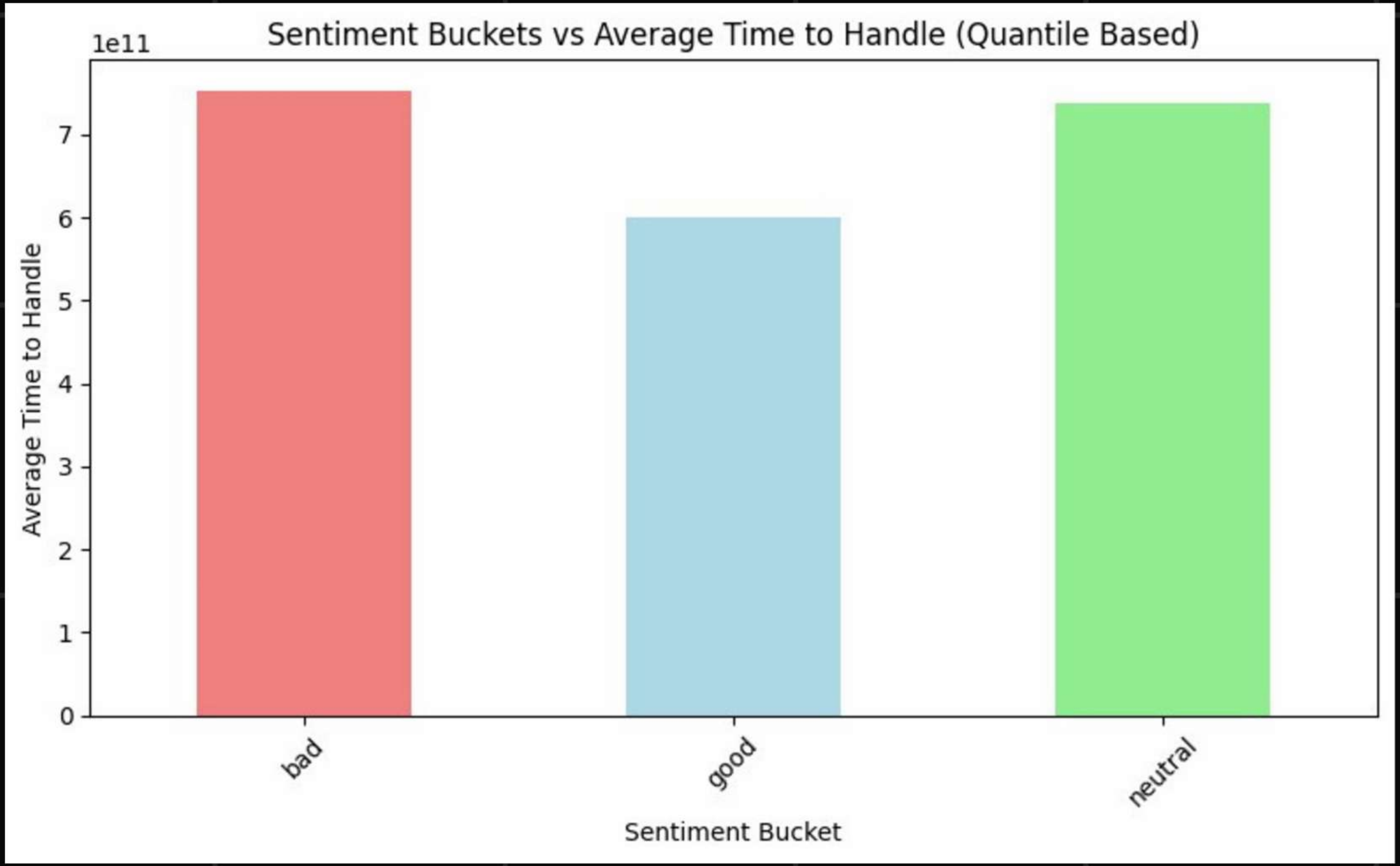
# Sentiment Analysis




**Observation: The graph doesn’t reveal clear patterns or behaviors that directly explain the impact on call durations. Therefore, we can't precisely predict how different factors are affecting call times from this data alone.**

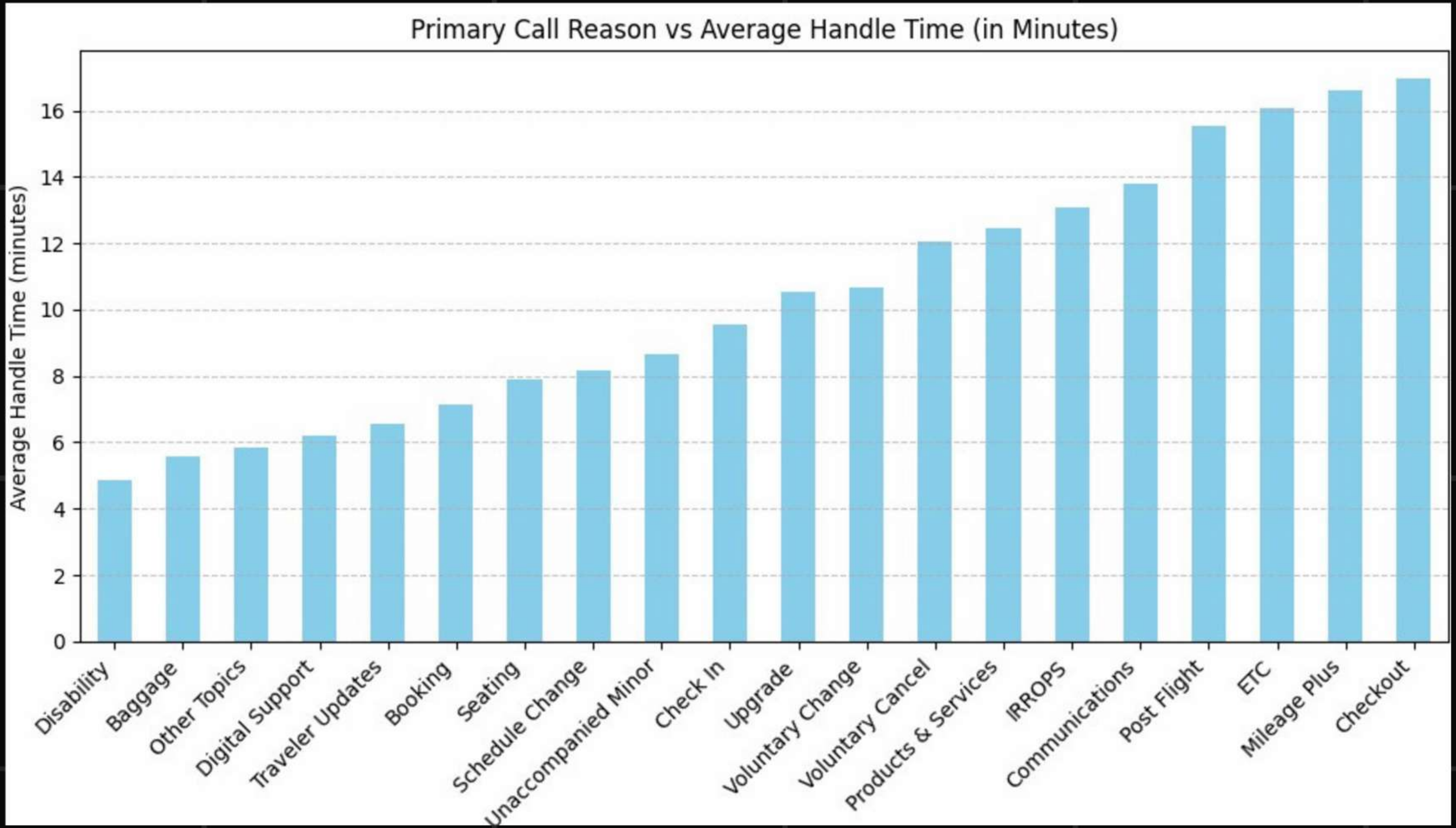
# Sentiment Analysis




The graph divides sentiment into three buckets (bad, neutral, good) based on quantiles. The "bad" sentiment bucket shows a higher Average Handling Time (AHT), indicating that negative sentiment correlates with longer handling times. To improve efficiency, we should aim to maintain more positive sentiment during calls, which can help reduce AHT.

# Difference in AHT b/w most frequent and least frequent call reasons

Your paragrh text




- **Most Frequent Reason: IRROPS**
- **Least Frequent Reason: Unaccompanied Minor**
- **Average Handle Time (AHT):**
  - **IRROPS: 00:13:05**
  - **Unaccompanied Minor: 00:08:39**
- **Percentage Difference in AHT: 51.21%**

# Self-solvable Issues Analysis

| | |
|---|---|
| IRROPS | 13311 |
| Voluntary Change | 10848 |
| Seating | 6365 |
| Mileage Plus | 5851 |
| Post Flight | 4330 |
| Communications | 3840 |
| Products & Services | 3332 |
| Baggage | 2832 |
| Upgrade | 2738 |
| Booking | 2637 |
| Check In | 1904 |
| Checkout | 1888 |
| Voluntary Cancel | 1607 |
| Digital Support | 1225 |
| ETC | 952 |
| Traveler Updates | 937 |
| Other Topics | 818 |
| Schedule Change | 731 |
| Disability | 403 |
| Unaccompanied Minor | 104 |

Name: primary_call_reason, dtype: int64

**Key Insights:**

- **Self-Solvable Reasons (49% of total calls):**
  - Voluntary Cancel, Booking, Seating, Mileage Plus, Checkout, Voluntary Change, Check In, Schedule Change, Digital Support, Traveler Updates
- **Agent-Required Reasons (28% of total calls):**
  - IRROPS, Upgrade, Baggage, Disability, Unaccompanied Minor
- **Mixed/Complex Reasons (23% of total calls):**
  - Other Topics, Communications, ETC

**Recommendation:**

Automate common tasks to reduce agent interactions by up to 49%, improving efficiency and customer satisfaction.

# Designing the Model

Data Preprocessing

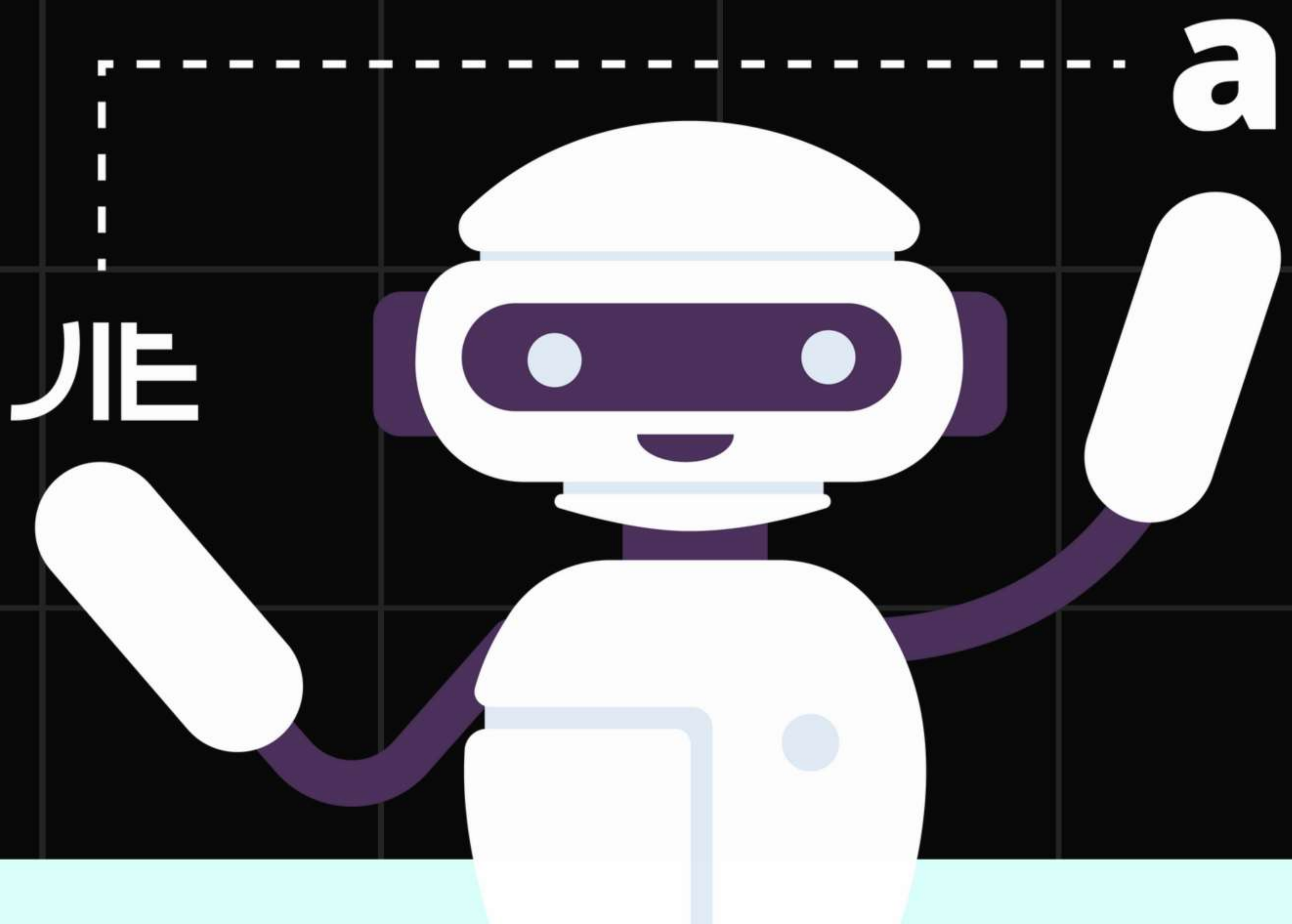
- Tokenize Call Transcripts
- Generate Embeddings
    - Using Normal Tokenizer
    - Using Universal Sentence Encoder

Modeling

- Pass Embeddings to Models
    - ANN (Artificial Neural Network)
    - ANN with LSTM (Long Short-Term Memory)

Training

- Train Models on Dataset
- Predict Call Reasons



# Proposed Architecture

| Layer (type) | Output Shape | Param # |
|---|---|---|
| lstm_6 (LSTM) | (None, 1, 256) | 787,456 |
| dropout_16 (Dropout) | (None, 1, 256) | 0 |
| lstm_7 (LSTM) | (None, 128) | 197,120 |
| dropout_17 (Dropout) | (None, 128) | 0 |
| dense_55 (Dense) | (None, 256) | 33,024 |
| dense_56 (Dense) | (None, 128) | 32,896 |
| dense_57 (Dense) | (None, 20) | 2,580 |

**Total params:** 1,053,076 (4.02 MB)

**Trainable params:** 1,053,076 (4.02 MB)

**Non-trainable params:** 0 (0.00 B)

**This architecture consists of:**

- LSTM Layers: Two LSTMs with 256 and 128 units, learning sequential patterns.
- Dropout Layers: Added after each LSTM to prevent overfitting.
- Dense Layers: Three fully connected layers (256, 128, and 20 units) for classification.
- Total Parameters: 1,053,076 (all trainable).

**Thankyou**