Comprehensive Call Center Optimization: Analyzing AHT, AST, and Self-Service Improvements

- Analyzing Drivers of Average Handle Time (AHT) and Average Speed to Answer (AST)
- Identifying Self-Solvable Issues for IVR Enhancement
- Predicting Primary Call Reasons for Improved Call Routing

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Deliverable 1 :

Long average handle time (AHT) affects both efficiency and customer satisfaction. Explore the factors contributing to extended call durations, such as agent performance, call types, and sentiment. Identify key drivers of long AHT and AST(Average speed to answer or waiting time to assign a call to the agent), especially during high volume call periods. Additionally, could you quantify the percentage difference between the average handling time for the most frequent and least frequent call reasons?

AHT :

Analysis of AHT is around the duration of the call as the

$$AHT = \frac{total\ call\ duration(handle\ time)}{number\ of\ calls}$$

*For time duration we have the column '**call_duration**'*

Analysing 'call_duration' with other columns/variables can be helpful for us to understand the variation of call_duration w.r.t other factors

AST :

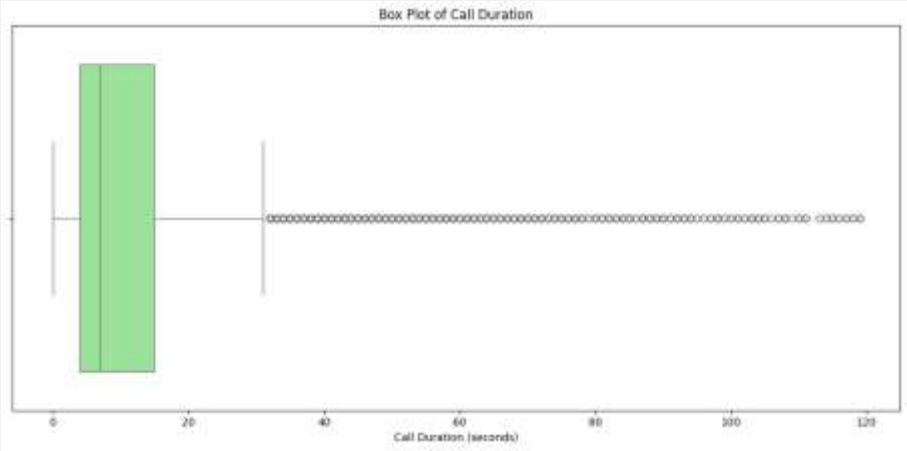
Analysis of AHT is around the agent assignment waiting time(the time taken from starting a call to connecting to the agent)

$$AST = \frac{total\ waiting\ time(agent\ assignment\ waiting)}{number\ of\ calls}$$

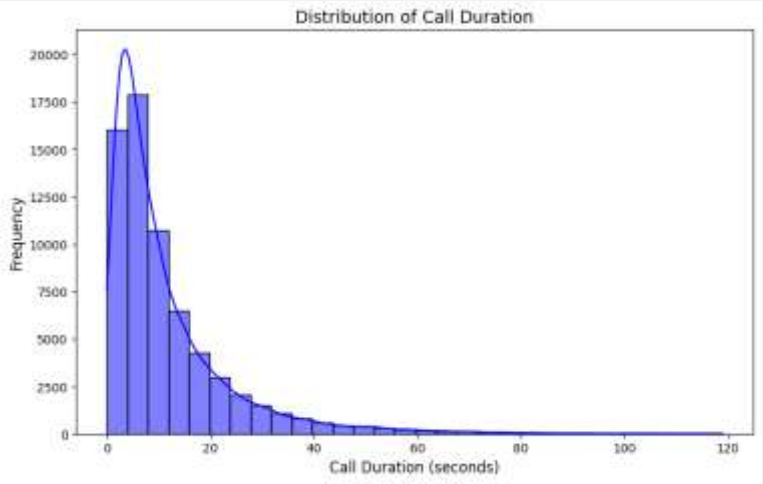
*For agent assignment waiting time, we have the column **'agent_assignment_waiting'***

Analysing 'agent_assignment_waiting' with other columns/variables can be helpful for us to understand the variation of call_duration w.r.t other factors

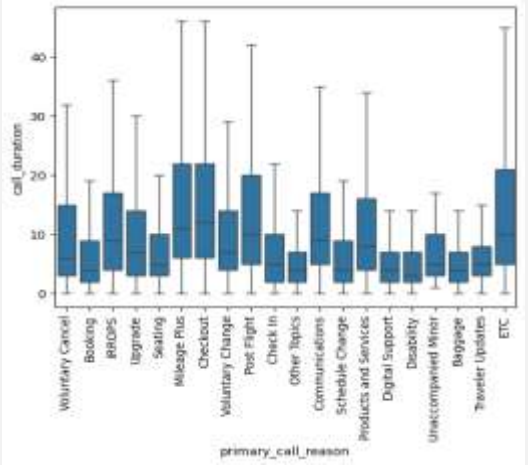
distribution of 'call_duration'



Most of the data lies in range 7 to 15

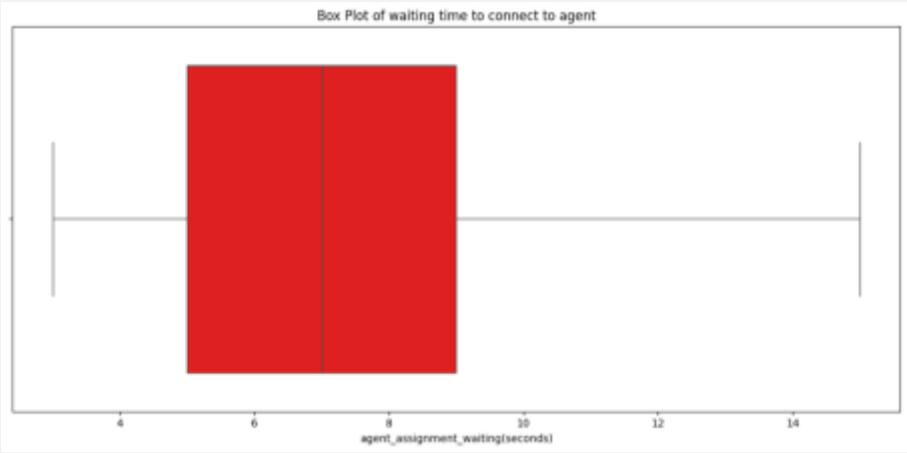


Most of the data lies on left side of the distribution

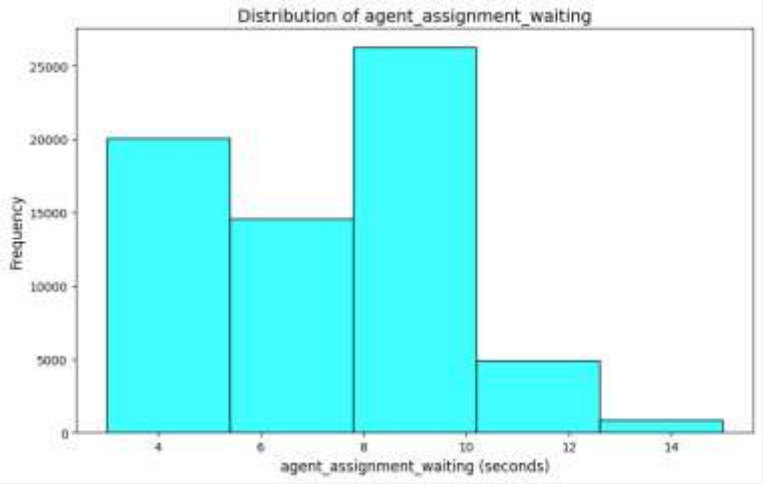


Majority of the data contributing to outlier is from Mileage Plus & Checkout

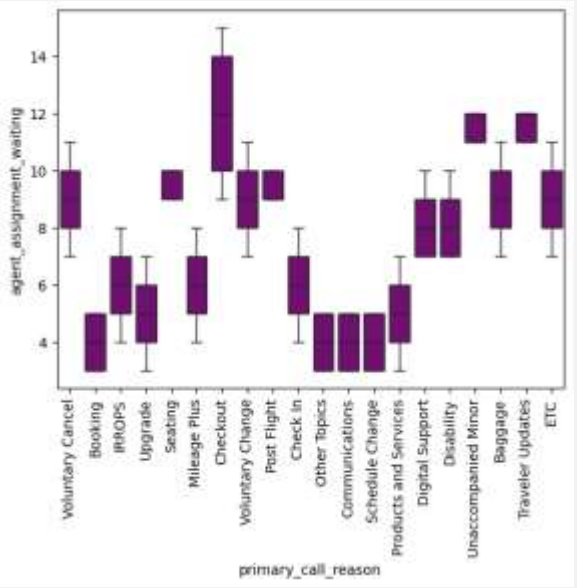
distribution of 'agent_assignment_waiting'



Majority of data lies in between 5 to 9



Distribution is little skewed to left meaning there is more frequency of less waiting time to connect

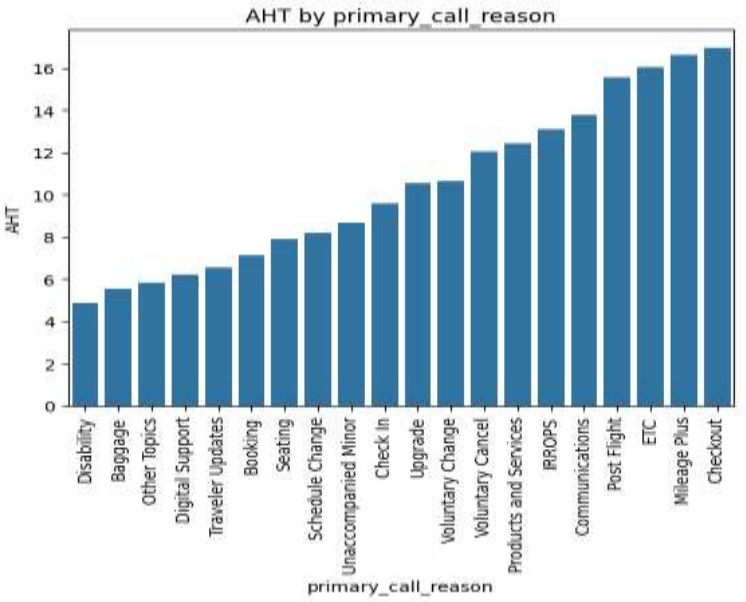


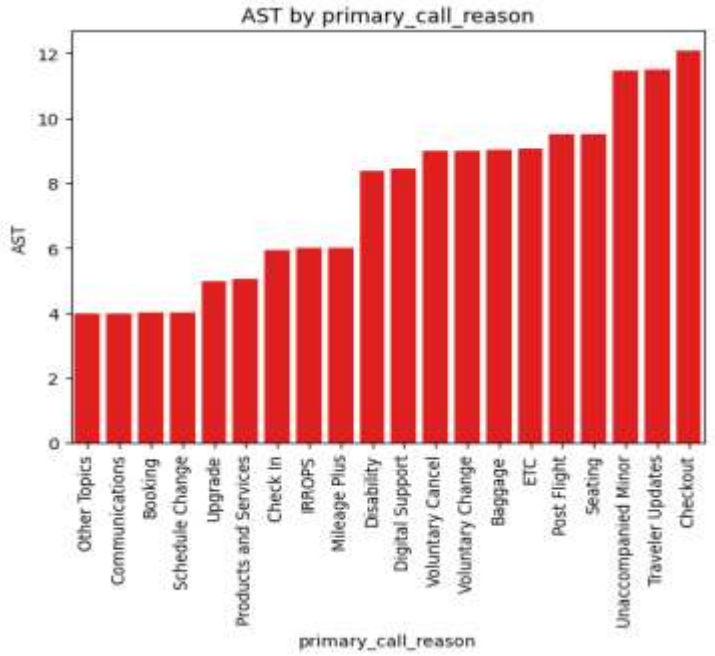
Majority of the outliers is offered by the checkout as call reason

AHT vs AST parallel analysis

#distribution in reason

- - average call duration **or AHT is longest(17 minutes approx) for Checkout** followed by closely by Mileage(16 minutes), ETC(16 minutes) & Post Flight(15 minutes)
- - **AHT is least for Disability(around 5 minutes)** followed **Baggage(5 minutes)** & **Other Topics(6 minutes)**
- - many reasons fall in **mid range AHT(10-13 minutes)** like Upgrade, Voluntary Change, Voluntary Cancel, Products and Services, IRROPS & Communication





#nature of reason :

1. - **transaction-related calls(Check-in, Check-out) tend to have longer AHT**
2. - Mileage Plus related calls are high
3. - issues **requiring more complex problem-solving(Post Flight, Communications & IRROPS)** also have **significant longer duration**
4. - **simple inquiries or status checks** (Baggage, Disability) have **shorter durations**

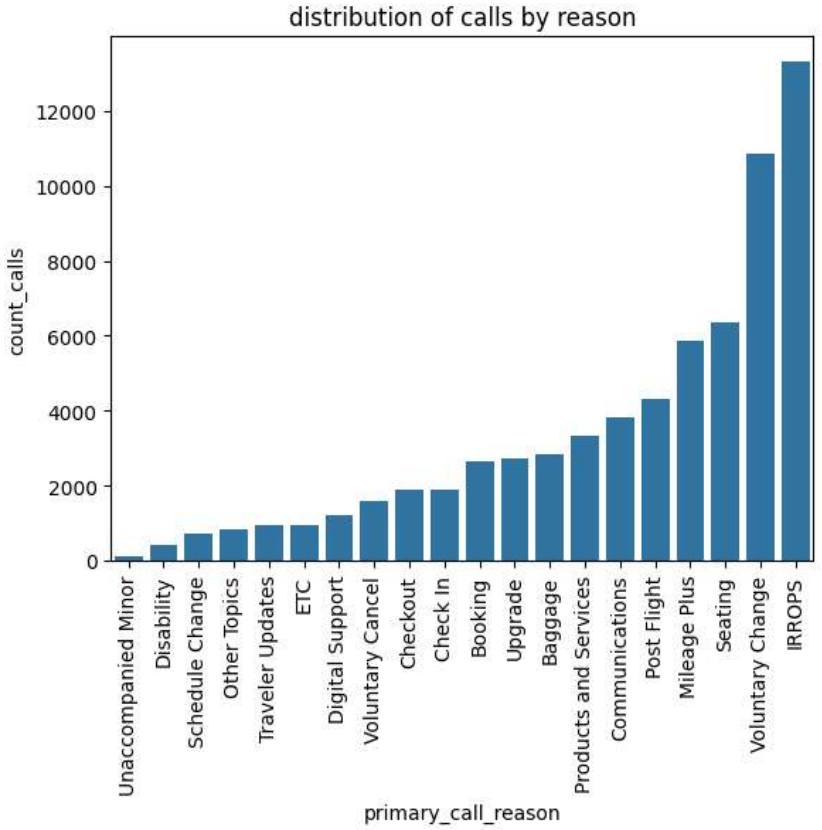
#distribution reason wise

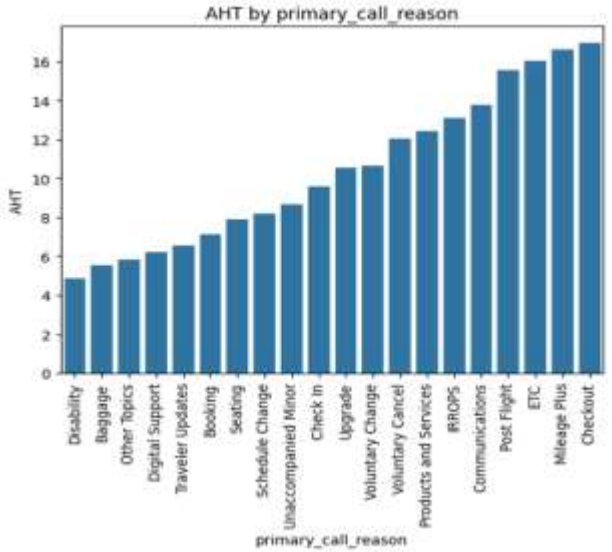
- - The **shortest wait times are for "Other Topics", "Communications", and "Booking" calls.**
- - The **longest wait times are for "Checkout", "Traveler Checkin", and "Unaccompanied Minor"** calls

#nature of reason :

- - **general call reasons**(like Communication, booking & schedule change) **takes less time** as problem has streamlines process
- - **Checkout like complex problems & related calls generally take more time** because every individual has specific problem
- - we can notice here that there is forming **groups of reasons for which it is taking the similar time**(that's because the process of solving those problems is similar e.g **Booking & Schedule change can be done by the same agent**

p = percentage difference btw AHT for most frequent call & least frequent call reason

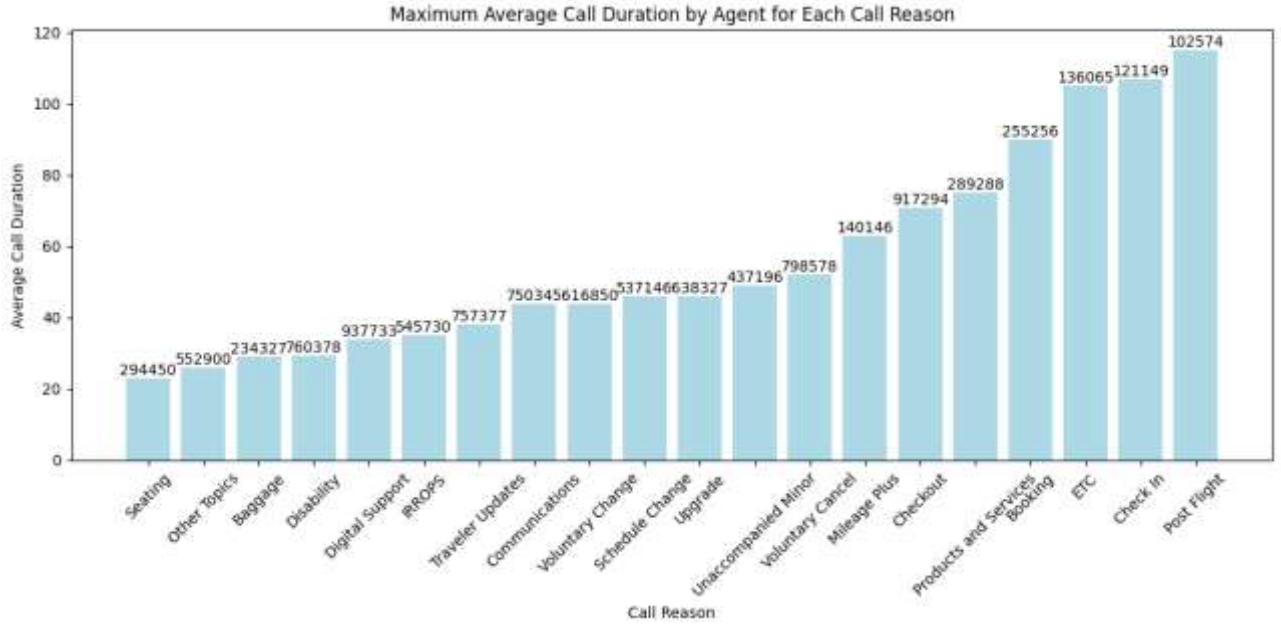


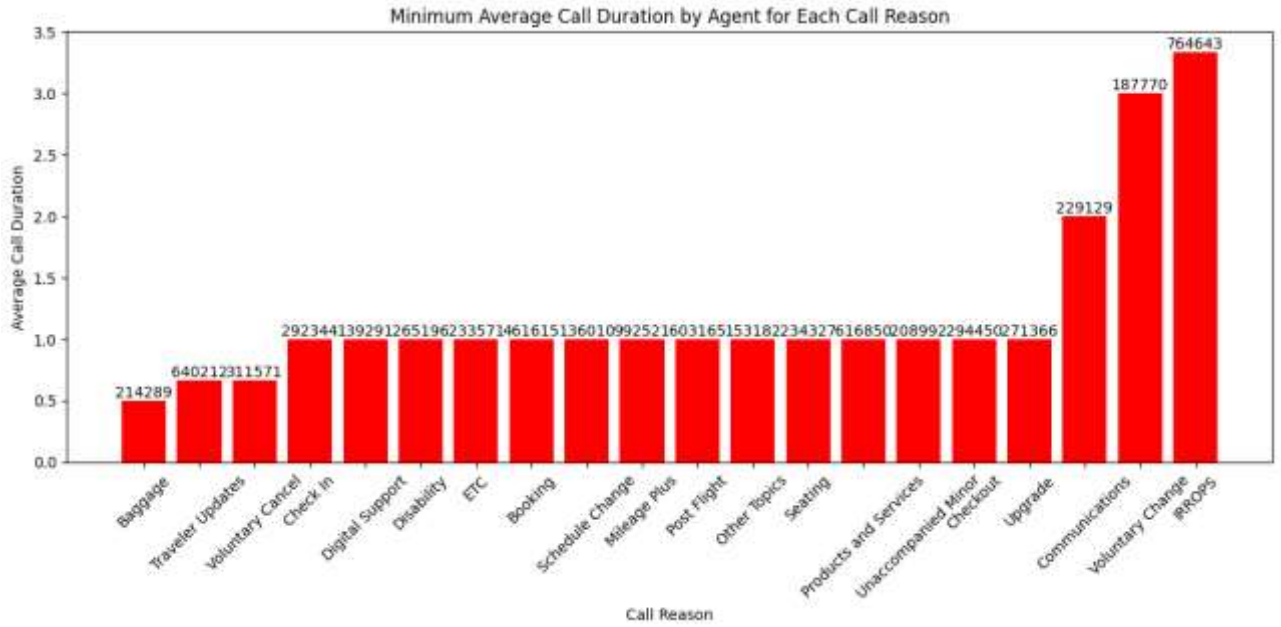


$$P = \left(\frac{(AHT\ of\ IRROPS - AHT\ of\ Unaccompanied\ Minor)}{AHT\ of\ Unaccompanied\ Minor}\right) * 100 = 51.23\ \%\text{(calculated)}$$

customer service implications & potential areas of improvements :

- - **longer call durations for check-out and complex issues** suggest these areas may require more **staff training or improved processes**
- - **short durations for disability-related calls might indicate efficient handling**, but consider if the short duration of disability-related calls is appropriate or if **more comprehensive assistance is needed**
- - the **wide variance in call durations (std of around 4 minutes)** across categories suggests that **different types of issues require significantly different handling times** & this information could be valuable for **staffing and training purposes**
- - **customers calling about Checkout, Mileage, ETC & Post Flight should perhaps be informed** that their call might take longer, this data could help in **setting correct customer expectations** for wait times
- - **some related categories show similar handling times** (Upgrade, Voluntary Cancel & Voluntary Change), this might indicate **consistent handling processes** for similar issues & **staffing can be done for both with similar processes**



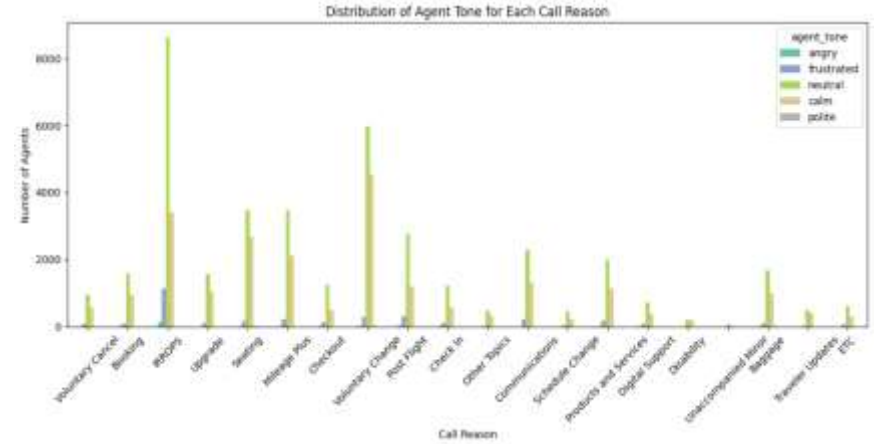


Agent efficiency :

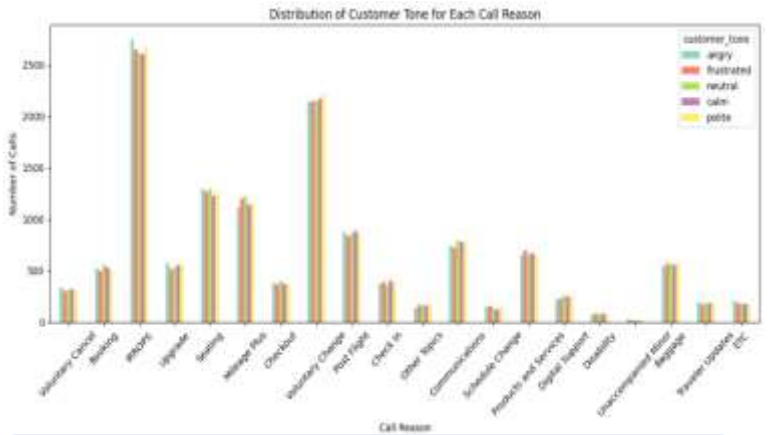
- **agent with these agent_ids are taking the maximum time** for that reason :
- **the working process of that agent need to be monitored** to address the inefficiencies caused by that agent

- **agent with these agent ids are taking the minimum time** for that reason :
- **the working process of that agent need to be monitored** to **take inspirations** from the **efficient work by that agent**

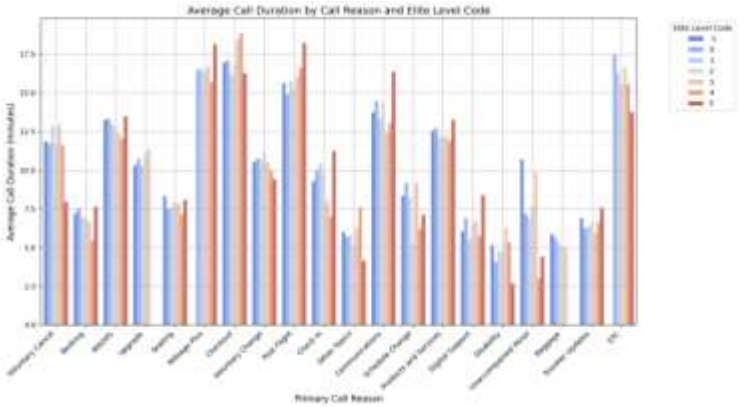
Relation of 'call_duration' *with other factors*



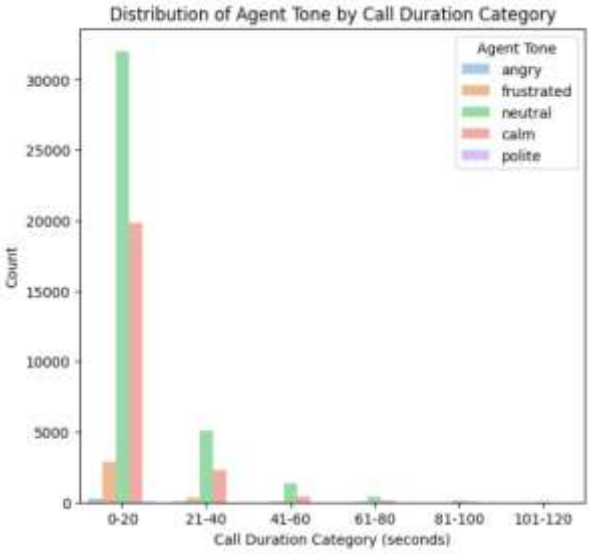
- IR**ROPS has the most diverse tone distribution**, including **frustrated tones**, this suggests it's potentially the **most challenging type of call to handle**



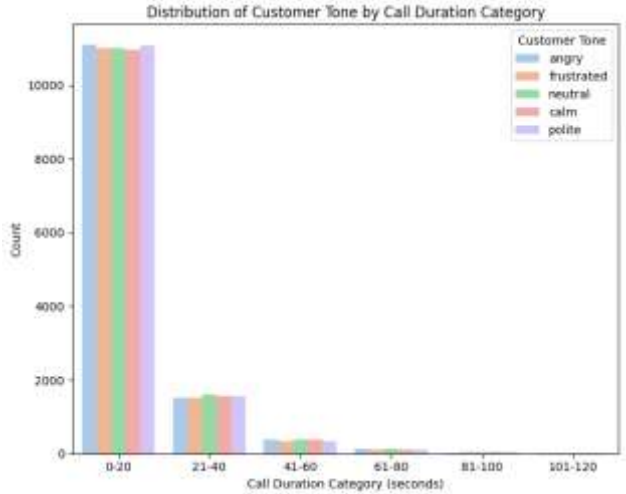
- The **equal distribution of polite and angry tones** suggests that **customer satisfaction might be more related to individual expectations** than specific issues
- **data suggests that predicting customer mood based on call reason is not reliable**



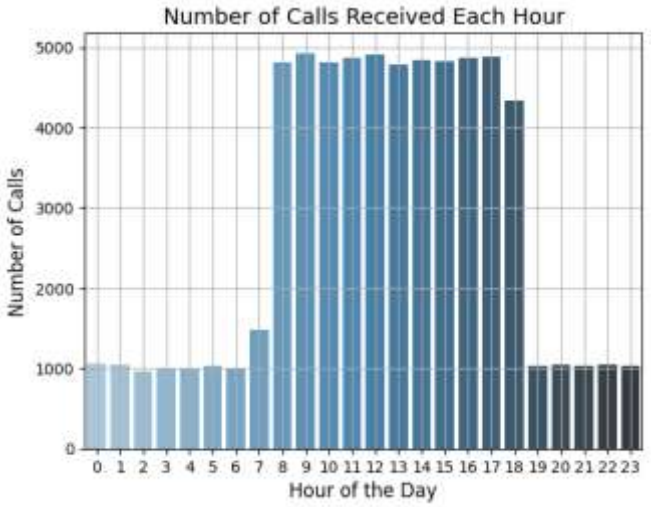
- Generally, **higher elite levels (4 and 5) tend to have longer call durations** for most reasons.
- This suggests that elite **customers may receive more detailed or personalized service**.



- For **0-20 second calls, "neutral" tone is most common**, followed by **"calm"** and then **"frustrated".**
- This indicates that **brief interactions are generally handled professionally**, but there's a **notable presence of frustration**.

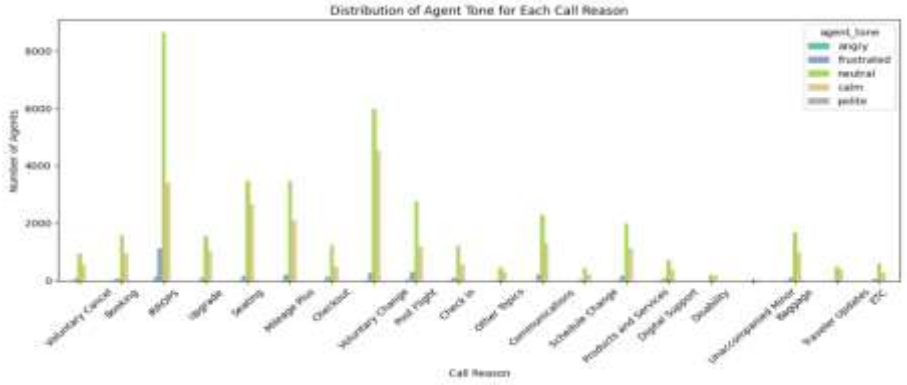


For 0-20 second calls, all customer tones (angry, neutral, polite, frustrated, calm) **are almost equally represented**.
- This suggests a **wide range of customer emotions even in brief interactions**.

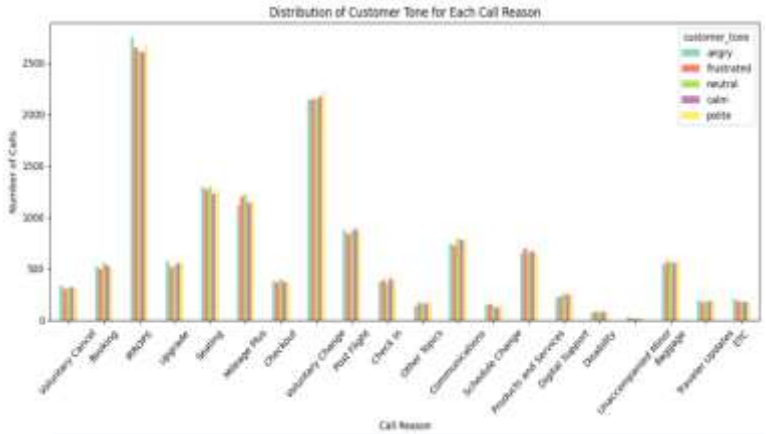


- Peak hours: The busiest period appears to be **between 9 AM and 7 PM (hours 9-19),** with **call volumes consistently above 4,000 per hour**

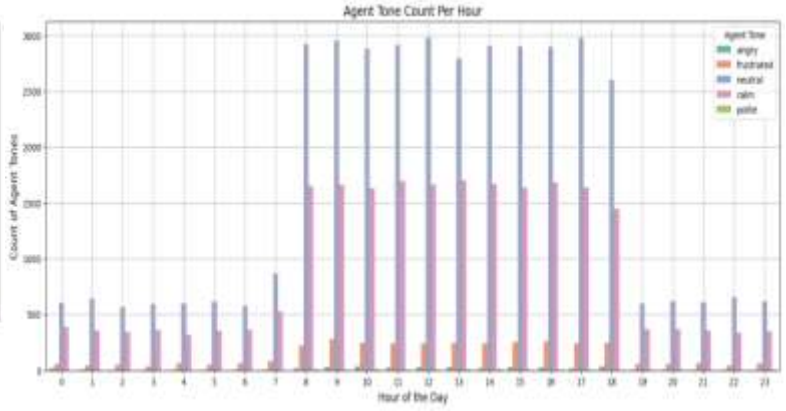
Other factors relations within



- **Very low instances of angry tone**, which is **positive for customer service**
- **Frustrated tone appears occasionally**, notably **in IRROPS (Irregular Operations)**

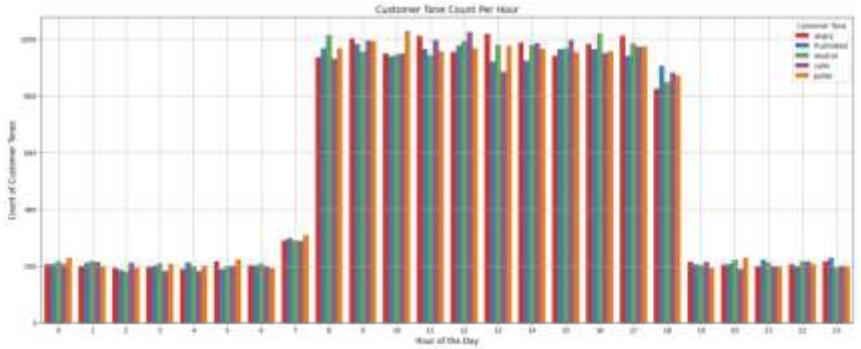


- **IROPS, while having the most calls, maintains the same tone distribution**
- This suggests that even in irregular situations, **customer reactions are varied but balanced**

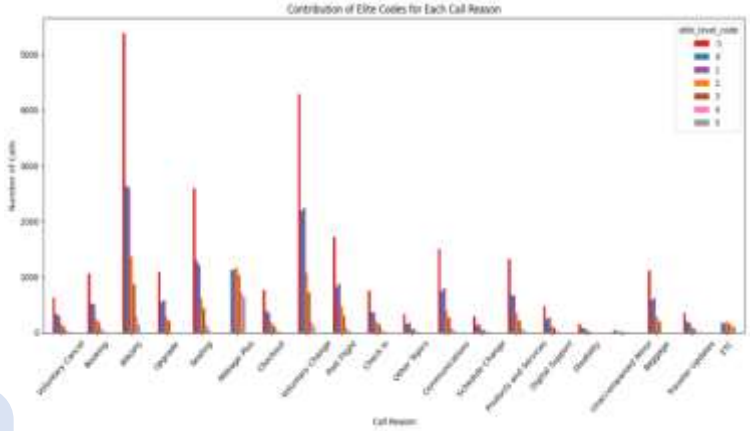


- Use of "**polite" tone increases during busy hours.**
- **"Calm" tone becomes more prominent during nighttime hours**.

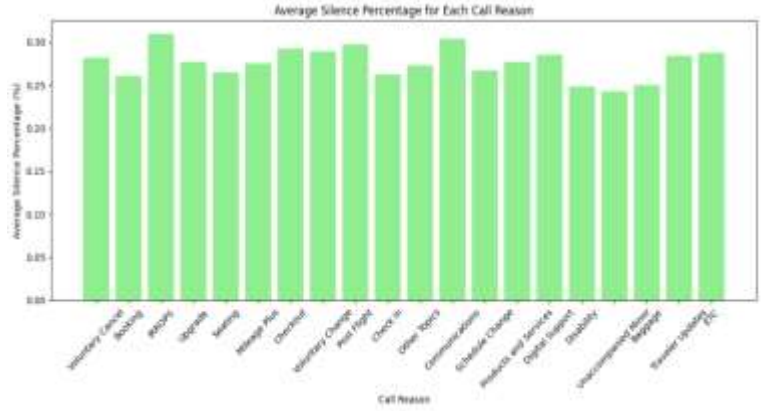
Relation of 'agent_assignment_waiting' *with other factors*



- **"Angry" and "frustrated" tones are present in significant amounts,** especially during **peak hours**.
- This **points to areas of customer dissatisfaction.**
- **Positive Behavior**:
- **"Polite" and "calm" tones are also prominently featured**, showing **positive responses from some customers.**



- **Non-elite customers (-1) make the most calls** across all categories



- **Consistent silence across categories** suggests **standardized processes**
- **Customers might need to be prepared for some wait time** during calls

Deliverable 2 :

Analysis of Call Transcripts: Common Patterns

Key Insights:

1.Change Requests:

- Customers frequently call to **request changes to flight dates or times** due to unforeseen circumstances.

2.Fee Concerns:

- Consistent inquiries about **waiving or reducing change fees** indicate a recurring concern.

3.Customer Frustration:

- Many customers express **frustration about delays** or the need to change plans, highlighting urgency.

4.Agent Empathy:

- Agents demonstrate **empathy and a willingness to assist**, often **waiving fees as a courtesy**.

5.Information Sharing:

- Customers provide **confirmation numbers or reservation details** for efficient flight information retrieval.

6.Flexibility in Options:

- Many customers appreciate being presented with **multiple flight options** (earlier or later) and are open to alternatives, including different airlines.

7.Need for Transparency:

- Customers regularly inquire about **change fees**, emphasizing the importance of **clear communication about fees and conditions**.

8.Confirmation and Urgency Needs:

- Customers often request **immediate confirmation of changes**, indicating **time-sensitive needs.**

9.Complexity of Calls:

- Some calls are lengthy, requiring **multiple steps to resolve**, indicating the need for **efficient handling**.

10.Seating Issues:

- Complaints about **seating arrangements** are common, especially when **specific seats were paid for but not received**.

Proposals for Enhancing the IVR System

Recommended Improvements:

1. ***Self-Service Change Options:***
   - Introduce a feature allowing customers to **change flight dates and times through the IVR**, with prompts for confirming details and associated fees.
2. ***Fee Waiver Information:***
   - Include IVR options explaining **situations where fees may be waived**, helping customers understand their options before contacting an agent.
3. ***Urgent Assistance Prompts:***
   - Create options for **urgent matters** to escalate calls to an agent quickly for customers with **immediate needs** (e.g., missed flights).
4. ***Personalized Notifications:***
   - Implement a system to proactively **notify customers of flight changes** (e.g., delays, cancellations) through the IVR.
5. ***Frequent Flyer Benefits:***
   - Provide information about **loyalty program benefits** that may assist customers in offsetting change fees.
6. ***Transparent Fee Information:***
   - Clearly state any applicable **change fees upfront** to manage customer expectations.
7. ***Instant Confirmation:***
   - Allow customers to receive **instant confirmations** via SMS or email after completing changes through the IVR.
8. ***Feedback Mechanism:***
   - Prompt customers to **rate their experience after transactions** to gauge satisfaction and identify improvement areas.
9. ***Self-Service Information:***
   - Implement options for customers to **check flight statuses**, including potential weather-related delays, without needing to speak to an agent.

Additional IVR Improvements for Reduced Agent Intervention

Further Enhancements :

1. ***Real-Time Availability :***
   - Provide **real-time flight availability information** during calls to reduce back-and-forth communication.
2. ***Live Agent Transfer :***
   - Ensure easy **transfer to a live agent** for complex issues that the IVR cannot resolve.
3. ***Change Flight Menu :***
   - Introduce a dedicated menu option for **changing flight reservations**, guiding customers through identifying bookings and understanding fees.
4. ***Callback Option :***
   - If wait times are long, offer customers the option to receive a **callback instead of waiting on hold**.
5. ***Natural Language Processing (NLP) :***
   - Utilize **NLP to recognize and respond to natural speech patterns**, creating a more conversational IVR experience.
6. ***Empathy and Tone Consistency :***
   - Train the IVR system to identify **frustrated customers** and direct them to empathetic agents or provide calming messages when possible.
7. ***Personalization :***
   - The IVR could greet customers **by name** and reference their previous interactions or current flight details.
8. ***Voice Recognition for Queries :***
   - Implement **voice recognition** to allow customers to state concerns naturally, improving user experience.
9. ***Hold Music and Information :***
   - While customers are on hold, provide information about **flight policies and compensation options** to keep them engaged.
10. ***Priority Options for Frequent Flyers :***
    - Create dedicated paths for **frequent flyers** to access faster service or special deals.

Deliverable 3 **:**

Call Reason Prediction Model Repository

Overview :

Contains **2 Jupyter Notebooks**:

- **Model Training**: Trains a BERT-based call reason prediction model.
- **Test Engine**: Utilizes the pre-trained model.

Key Features:

•**BERT Model**: Classifies call reasons, improving customer support efficiency.
•**Benefits**: Handles long transcripts effectively.

Challenges: Limited to **1 training epoch**, leading to longer prediction times.

Future Improvements : Increase training epochs and utilize advanced hardware.

Repository Link:

Call Reason Prediction Model Repository link
For more details related to the model, refer to the README.md file of the repository

GitHub Repository Barcode