This is a graded discussion: 6 points possible

due May 8 at 4:29pm

Module Introduction: Building and Interpreting Managerial Predictive Models [Videos 6.1–6.2 and Discussion 6.1]

29 75

(https://classroom.emeritus.org/courses/9054/modules/items/1507000)

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(https://classroom.emeritus.org/courses/9054/modules/items/1507014)

There are two videos and one discussion on this page. Please scroll down to view and complete each one.

Video 6.1: Building and Interpreting Managerial Predictive Models (11:05)

Welcome back to linear regression. In the last module, you began with visualizing a dataset and worked toward building real models. Now you're going to take it a step further and build the best

Live Support

Video 6.2: Building a Good Model (8:43)

In this video, Vivek introduces three situations that could interfere with your model: irrelevant independent variables, highly correlated independent variables, and too many variables.

In video 6.2, Vivek touches upon the concept of R^2 and its relationship to p-value and other coefficients. For definitions of these concepts, we recommend taking a look at the **glossary of key terms (https://classroom.emeritus.org/courses/9054/pages/module-6-glossary-of-key-terms?module_item_id=1507013)** section of this module. Additionally, we have included some guidelines to keep in mind for how R^2 can affect the p-value below.

1. A low R^2 and low p-value (p-value ≤ 0.05) means that your model doesn't explain much of the variation of the data, but it is significant *(better than not having a model).*
2. A low R^2 and high p-value (p-value > 0.05) means that your model doesn't explain much of the variation in the data, and it is not significant *(this is the worst-case scenario).*
3. A high R^2 and low p-value means your model explains a lot of variation within the data and is significant *(this is the best scenario).*

4. A high R^2 and high p-value means that your model explains a lot of variation within the data, but is not significant *(the model is essentially worthless).*

Discussion 6.1: Generating Probabilistic Questions [20 minutes]

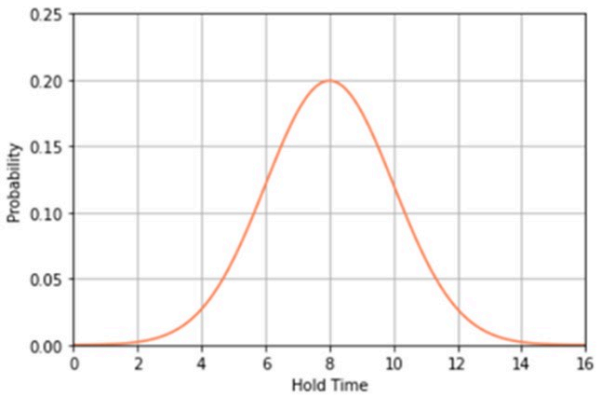
🎯 Learning Outcome Addressed:

- Create a list of probabilistic inquiries given normal distribution, standard deviation, and SST.

This is a required discussion and will count toward course completion.

Please read the scenario below and post to the following discussion board.

Lucian Telecom is striving to improve customer service. A data scientist has been paired up with a customer service manager to help decrease the length of time online customers are on hold before speaking to a help agent. The data scientist created a chart based on the current data taken from Lucian Telecom's online system and provided it to the customer service manager, who manages 15 employees at the call center. The chart (pictured below) is a normal distribution curve showing a probability distribution of the length of time online customers are on hold before talking to an agent. The average hold time is eight minutes (mean), with a standard deviation of two.



If you were the data scientist working on this project, what are **three probabilistic questions** you might ask the customer service manager to find a solution to the problem? Share your probabilistic questions and reasoning in the discussion below.

Read the statements posted by your peers. Engage with them by responding with thoughtful comments and questions to deepen the discussion.

Suggested Time: 20 minutes

Rubric: Discussion 6.1

Criteria	Exceeds expectations	Meets expectations	Below expectations
Thoughtful and complete response to the question(s)	**4 pts** Fully responds to the question(s), post is supported by connections to the reading and real-life examples, and post makes additional connections to the field of data engineering with novel ideas, critical thinking, or extensive application of how to use the topic in future work.	**3 pts** Fully responds to the question(s), and post is supported by connections to the content or real-life examples.	**0 pts** Partially responds to the question(s), or connections to the content are missing or vague.
Engagement with the learning community	**2 pts** Posts thoughtful questions or novel ideas to multiple peers that generate new ideas and group discussion.	**1.5 pts** Asks questions or posts thoughtful responses to generate a single peer's response.	**0 pts** No responses to peers or posts minimal or vague responses to peers that do not motivate a response (e.g., "I agree.").

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Reply

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 1, 2024

Given Case Parameters

- Call centre
- average waiting time (on hold before speaking to a help agent) 8 min +/- 2 min (68% of the calls are between 6 : 10 min)
- 15 call center agents (employees)

Detail the Call Process Descriptive (Qualitative) Model:

Ask the manager to describe in words the system and the processes from the welcome message (start) to the customer ending the call and address the below information areas:

Information Areas	Questions	Determine
1. Number of shifts (one or multiple shifts)	How many shifts does the call centre have within a 24-hour period? Start and end time of each shift? Are shift uniform during the working weekdays?	Dimensions of independent variables to better model the data
2. Week workdays (7, 6 or 5)	How many days does the call centre work in a 7 day/week?	Dimensions of independent variables to better model the data
3. Bank holidays, and weekends	How do bank holidays affect? ◦ Number of shifts ◦ Number of staff ◦ Number of working hours How do weekends affect? ◦ Number of shift ◦ Number of staff ◦ Number of working hours	Dimensions of independent variables to better model the data
4. Periodic work schedule (allocation of agents over time & shifts) for the 15 call agents (e.g. number and names/ID	Can you please provide the latest work schedule for call centre agents with names (anonymized with their ID)	· Staff allocation over time (i.e. are agents equally allocated across shifts or do

shown against the above 3 independent variables)	showing for each agent when they (actually)worked? · the day (day of the week and date) · shift (start and end hour)	some shifts/ hours get more agents) · Segment /disaggregate data per agent. · Probable good practices)good performing agents) · Areas for improvement (i.e. agents that may require further training)
5. Acceptable/ target waiting time upper limit	what is the target/ desirable max time for a caller to be on hold before being answered? Could you please explain how this target was set?	· The trigger for wanting to improve on time (e.g. competition, customer satisfaction/expectation, anticipated higher demand) · Test hypothesis (in prescriptive model) to recommend (as applicable) 1. improved performance of existing agents (keep headcount) 2. increase the number of agents. 3. change in workflow or schedule structure to better meet call demand.

Objective

Conduct an exploratory data analysis to discover the data with the underlying domain while taking the most appropriate data viewpoint

Probabilistic Questions

1. To what degree would improving the performance of certain identified agents (in the upper tail of the bell curve), shift the whole curve to the left and slim it (reduce the standard deviation)?
2. What changes are required to the call agents' shift composition (e.g. number of agents during certain times/days, grouping certain agents in one shift or overlapping shift times)

would significantly move the waiting time curve to the left and make it slimmer?

3. How many agents need to be hired to hit the set performance target?

Inquiry: whether these *probabilistic* questions are better asked to the customer service manager or addressed through a prescriptive model.

Edited by **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864) on May 4 at 9:26pm

Reply

Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)

May 2, 2024

How would you use the inputs you are requesting of the manager to answer probabilistic questions and what would those questions be?

Edited by **Dawn Prewett** (https://classroom.emeritus.org/courses/9054/users/233112) on May 2 at 7:09pm

Reply

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 4, 2024

My response has been amended with further elaboration.

Thank you for the feedback.

Edited by **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864) on May 4 at 7:34pm

Reply

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

May 3, 2024

Hi Haitham-

Great and constructive as always !

I see probabilistic questions were missing from your post?

Reply

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 4, 2024

Good day Manjari

Colleagues providing feedback is a valuable learning opportunity for me. Thank you for the feedback.

I usually use information areas to formulate the exact questions. My response is now amended with further elaboration, as per your and other colleagues' valuable feedback.

Regards

Reply

(http

Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)

May 4, 2024

Haitham, very clear enumeration. While your questions are directed to the understanding the staffing levels/supply we control, I'd try to understand the customer/demand level as well. When are the customers calling? Are there peak times? What causes some customers to have to wait more than 8 or 10mins? Why are some calls less than 6mins? Understanding these questions as well as the cumulative probability of waiting times around those areas is crucial to then take appropriate measures to adjust staff hours and response I would think.
Thought your answer was just missing understanding these insights around the demand/ customer side. Hope this helps, Javier

Reply

(http

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 4, 2024

Good day Javier

Your detailed feedback is much appreciated.

The approach I have taken has two prongs

1. understand the business context and address the information areas (i,e. the questions posed to the manager)

2, analyse the data ("*eyeball*") with the lens developed by the manager's answers.

In this approach, many of the questions you kindly shared will be answered (with a certain probability/confidence) through data analysis and hypothesis testing (prescriptive model). It is expected that addressing those questions will require an iterative and symbiotic process involving both clarifications by the manager and data analysis.

My response is now amended with further elaboration, as per your and other colleagues' valuable feedback.

Regards

Edited by **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864) on May 4 at 9:22pm

Reply

(http **Ricardo Anaya** (https://classroom.emeritus.org/courses/9054/users/228915)

May 7, 2024

great questions

I think the questions should be asked by the store owner, or manager to the customer service manager.

the use of prescriptive models should match or complement the analysis.

Reply

(http **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864)

May 8, 2024

Thanks Ricardo, for the feedback, and for confirming the approach that the prescriptive model addresses such questions.

Reply

(https:/ **Mariana Flores** (https://classroom.emeritus.org/courses/9054/users/237198)

May 2, 2024

As a Data Scientist at Lucian Telecom partnering with a Customer Service Manager, who manages 15 employees at the call center, to help decrease the length of time online customers are on hold before speaking to a help agent - I would ask the following three probabilistic

questions (or probability questions that ask to identify how likely a particular event is to occur) to find a solution to the problem:

1. What is the likelihood a call hold time would be less than 8 minutes when all 15 employees are at the call center? Reasoning: Set a baseline with the average or mean to identify if our baseline is accurate.
2. What is the likelihood a call hold time is more than 6 and less than 10 minutes when all 15 employees are at the call center? Reasoning: Identify if most hold times (about 68%) before speaking to a help agent fall one standard deviation away from the mean.
3. What is the likelihood a call would exceed a 14-minute hold time when 15, 13, 10, or 8 employees are at the call center? Reasoning: Understand how likely it is that calls may fall outside our specified parameter and three standard deviations away from the mean depending on number of employees at the call center.

Reply (2 likes)

(http

Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)

May 4, 2024

Hello Mariana,

Thank-you for sharing your valuable ideas. Your approach to addressing hold times at Lucian Telecom by focusing on the probability of different hold times under varying staffing levels provides a solid foundation for understanding and improving customer service. Your first question about the likelihood of a call hold time being less than 8 minutes when all employees are present is a great starting point to establish a baseline. This leads directly into your second question, which narrows down the focus to the critical range of 6 to 10 minutes. These two questions together will help clarify whether the current staffing is effective within the most common scenarios.

Your third question then expands on this by exploring the impact of reduced staffing levels on the likelihood of exceeding a 14-minute hold time. This is particularly insightful as it considers less-than-ideal conditions and their potential impact on service levels, which is crucial for planning and risk management.

Your analysis of the impact of staffing levels on hold times offers a solid foundation for optimizing our call center operations. To further refine our approach, I propose the following inquiry: "Could you elaborate on how the variability in call duration might influence our staffing strategy? Specifically, are there opportunities to use this variability to enhance shift scheduling, or to inform decisions regarding the addition of staff during peak periods or the implementation of call overflow measures?" This question aims to explore

strategic adjustments that could improve both customer satisfaction and operational efficiency.

Reply (1 like)

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)

May 5, 2024

Hi Jignesh, so nice to connect on the discussion board again. Thank you, I genuinely appreciate your feedback. Great questions, for the purpose of this discussion - I would rephrase them in the following probabilistic manner, “what is likelihood the variability in call duration might influence our staffing strategy? Specifically, what is the probability there are opportunities to use this variability to enhance shift scheduling, or to inform decisions regarding the addition of staff during peak periods or the implementation of call overflow measures?" ;) I agree with you in that connecting the broader strategic and operational objectives to the analysis is vital in making business impact and the essence of our work.

Reply

Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)

May 4, 2024

Hi Mariana,

I like the idea of establishing the baseline model as it allows for immediate assessment of the marginal improvement of any new model that gets developed. What factors would you consider including in the subsequent model for? would that be the number of employees, based on your 3rd question?

Thank you

Reply (1 like)

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)

May 5, 2024

Hi Turki, so nice to connect on the discussion board again. Thank you, I genuinely appreciate your feedback. Great questions – I would center both my baseline and alternative models on the hypothesis we are testing, which questions we are aiming to answer, and business objectives. A model is a simplified version of reality thus I would ensure my assumptions are appropriately aligned and ensure predictive methodology (variables and model selection) follow the scientific method and guidelines. I agree with you in that setting a baseline allows for assessment of marginal improvement.

Reply (1 like)

Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)

May 5, 2024

Great to re-connect as well!

Centering the alternative models around the hypothesis makes sense. Thank you for the clarification!

Best,

Turki

Reply (1 like)

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)

May 5, 2024

Hi Turki, no problem at all - I'm happy to clarify. For the purpose of this discussion, I would focus on the probabilistic questions that as a data scientist I would ask a customer service manager partnering in helping to improve length of time online customers are on hold before speaking to a help agent. I believe we delve into models in our next discussion.

Reply

Diego Milanes (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/228518)

May 6, 2024

Hi Mariana

Great post! I wonder if the information in your 3 questions is all enclosed in the distribution of the number of employees present in the call center at the time of a call? Would you need any additional information apart from that?

cheers

Diego

Reply (1 like)

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)

May 7, 2024

Hi Diego, so nice to connect on the discussion board again. Thank you, I genuinely appreciate your feedback. Great questions – based on the discussion prompt the normal distribution provided reflects call wait time. The purpose of the probabilistic questions would be to gather additional information.

Reply

Shahrod Hemassi (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/224267)

May 15, 2024

Hi Mariana. I like the way that you looked at this problem within the information that was available. I tried to identify some additional variables to add to the model to see if they are significant variables in predicting the wait time. But I like that you stayed within the information provided in the question and looked to first set a baseline and then look at the probability of calls being within a range of minutes that is one standard deviation outside of the mean. Your third example is somewhat in line with what I was looking to identify by looking at the number of employees that were actively working and evaluating the wait time relative to that factor. Thanks for the post.

Reply

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

May 2, 2024

1. What percentage of customers are choosing “Call back” option?

Reason: Ideally it is not required to wait until customer service agent is assigned. There will be an option to choose “Call back” option, in case of not willing to wait. Identifying this number will help the Data scientist to figure out the actual number of customers trying to reach out customer service.

2. How many customers does each employee attending in a day?

Reason: Finding each employee workload will help the Data scientist to identify the reason for waiting time and can suggest hiring more employees to decrease the waiting time.

3. What are the general reasons and average call duration of customers?

Reason: identifying the reasons and grading the reasons based on priority like level1, level2,..

will support in diverting the calls for example auto ML chat can resolve simple tracking issue and it is not required to transfer all the calls to agents. Also, finding the “call duration” for each level to identify the performance of each employee.

Reply (1 like)

(http

Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)

May 2, 2024

Hiring more employees feels like the likely go to, though in a call center environment there are so many variables that can impact wait times - including average call duration, which you inquire about in your third question. Hold times are a natural reflection of call times - the faster an agent can get off of a call, the sooner they are available for the next customer. There are a number of ways to bring these call times down: from training to better floor support (leads, supervisors, reference tools, etc). As you elude to, there are ways to bring down overall call volume as well and I think many call centers are trying to use machine learning and AI to do some of that. As a customer, getting stuck fighting with the AI in a phone tree is maddening, but as someone who has worked in a call center, I also know how insane it can get. The problem is, by the time you do finally get to talk to a human, you are now frustrated and often angry. The data on how AI impacts call center volume must be fascinating.

Reply (1 like)

(http

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

May 2, 2024

Hi Dawn-

Thanks for your response and I agree :)

Reply

(http

Yossr Hammad (https://classroom.emeritus.org/courses/9054/users/229118)

May 4, 2024

Great post Manjari,

i like your first question, it could be easily overlooked, it also will give insight towards the customer behavior and preference, it deepens the analysis and provide more accuracy toward the call back/ waiting time data analysis.

Reply (2 likes)

(http

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

May 4, 2024

Hi Yossr-

Thanks for your feedback :)

Reply

(http

Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)

May 7, 2024

I sedond Yossr, I overlooked the callback option

Reply

(http

Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)

May 5, 2024

Great insight Manjari in identifying the customers/employee relationship and how many customers each employee is servicing as there could be inefficient employees and a distribution curve around this may be helpful in optimizing staffiling levels, replacing employees or hiring more if needed. This does sound like something that AI may also be able to help automate with technology processes

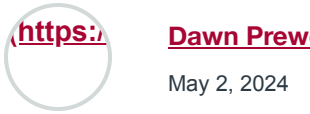
Reply

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

May 6, 2024

Thanks Javier :)

Reply



Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)

May 2, 2024

What is the probability of an agent answering within the desired timeframe as a whole?
Reason: I would want to understand what their desired timeframe is and what the likelihood is of an agent answering within that timeframe regardless of the time of day. This helps set a baseline for the whole and leads into the next question.

What is the probability of an agent answering within the desired timeframe for each hour the call center is open?
Reason: This breaks the issue into hour segments. is there a time when agents are easily answering within the desired timeframe and others where they are struggling? If there are hours where the agents are answering the phone well within the timeframe, possibly even immediately, it could mean that the call center staffing isn't quite landing where it should or even that agents on certain shifts need additional training or support to shorten their call times.

What is the probability of an agent answering within the desired timeframe if an additional agent is added to the queue?
This would help inform whether or not moving agents or adding agents would really solve the issue. If moving agents, it would also be wise to consider what would happen if we removed an agent from that given time.

I would also want to run data around call length, since call length directly impacts queue wait

times. The faster an agent can resolve a customer's question/need, the quicker they are available in the queue again.

Edited by Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112) on May 2 at 7:01pm

Reply

(http

Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)

May 4, 2024

Hi Dawn,

Calculating the marginal increase in likelihood of answering calls within timeframe is a smart way to measure the impact of increased hiring. If I may expand on that idea, I would also try to create a few categories of new employees (e.g. fresh vs. experienced, certified vs. not certified...etc.) and see if that has any impact (positive or negative) on the probability.

Thank you.

Turki

Reply

(http

Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)

May 6, 2024

Hi Turki,

Creating categories is a good idea, though it might not be enough. One of the things that became apparent when I worked at a call center was just how incredibly different an interaction with one person could be from another with the exact same customer over the exact same issue. Agents relied on one another more so than leads and supervisors for support. The first line of inquiry was usually your neighbor as it was faster and typically solved the issue. This was even true with new hires as every call taken created a learning experience and thus created agents with unique pools of knowledge. Of course, the longer an agent had been taking calls, the more knowledge they held by simple virtue of accumulated experience, but no one agent knew everything and everyone had their area of expertise. It was a rather interesting effect to be honest and definitely complicates our inquiry here.

Dawn

Reply

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 8, 2024

Good day Dawn , Turki

Your discussion on hypothesis testing clarifies how the questions will be addressed.

Thank you

Reply

Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)

May 3, 2024

What is the probability that a customer will abandon the call as a function of time of the day?

The reasoning is that i will help understand patterns in customer patience and think strategically about allocating resources appropriately given the time of day to mitigate customer churn.

What are the probabilities that a customer will abandon the call as a function of hold time for each category(reason) for call?

Assuming that there information that will allow us to segment the calling customers by the reason they called, this is important because customers will wait for varying times depending on the importance of their calls. Customers in dire need of customer support will likely wait more than some others will that are calling for more general inquiries.

How does the variability in hold times (standard deviation) differ across times of day or days of the week?

Lower variability in hold times can lead to a more predictable model and more precise forecasting and then allow the allocation of customer reps to be more targeted and effective

Reply

(http

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

May 3, 2024

Hi Roy-

Great post! Does the question1 and question2 falls under same category? Also, I feel there might be various reasons for Abandoning the call other than patience level of customers. Does it impact the analysis anyway?

Reply

(http

Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)

May 3, 2024

Call abandonment can happen for a myriad of reasons, but typically it is due to extended wait times. Abandonment rates do go up when wait times go up. If I recall correctly, you could typically separate out abandoned calls by those that were on hold past a certain time and those that weren't to differentiate the likelihood of which was due to being on hold too long. But an abandoned call does move someone else up in the queue which would lead to a shorter wait time for them.

Reply

(http

Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)

May 3, 2024

Hi Dawn,

Thank you for your post! I totally agree. I think about the times where I was put on hold and the times I have dropped the call. I would call for something not that important in the evening and run out of patience and try again in the morning or at time where I would think the wait time would be shorter, in hopes of completing the request, if I want to complete it bad enough.

One can even associate abandonment rate with wait times where there is an increased probability of a network error or connection lost. The longer you are on the more likely this can happen to you. It not just about customer patience.

Reply

(http

Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)

May 3, 2024

Hi Manjari,

Thank you for your questions.. When you ask about question 1 and 2 being under the same category, do you mean they both focus on call abandonment? They do share overlap in this regard, but they ask about different dimensions for abandonment (time of day, reason for the call) to help with a multi-dimensional perspective for the analysis and therefore I think yes, it will impact the analysis by enriching it each with a different dimension for each question. Time of day will help in terms of resource allocation strategy of our 15 employees. Reason for the call will help with segmentation and help us in strategizing my customer needs in mind. I agree that there will be various reasons for abandoning the call, other than patience level and those would be additional questions to ask if framed in a probabilistic way.

Thanks again!

Reply

(http

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 8, 2024

Good day Roy

I would have missed addressing the "*abandon the call" (*similar to the cancelled flights in the Optima case) observations, during data preparation for analysis.

Thank you

Reply

(https:/

Roman Jazmin (https://classroom.emeritus.org/courses/9054/users/225803)

May 3, 2024

As a Data Scientist looking over the Telecom data, a few probabilistic questions come to mind in my review. Probabilistic question 1 is “What will it take to have all employees perform so that they can be within 1-2 standard deviations from the mean?” Probabilistic question 2, “What factors are making employees perform at a level more than 5 standard deviation away from the

mean?” Probabilistic question 3, “What factors needs to be implemented to the working environment so that the resulting outcome will give us a high R^2 with a low p-value so that we can be confident that our model is relevant and able to explains a lot of variation within the data?” Probabilistic question 4, “What factors does the company need to take into consideration in order to reduce the hold time from 8 minutes?”

Reply (1 like)

Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)

May 4, 2024

Your approach to leveraging probabilistic questions to improve call center operations at Lucian Telecom is commendable. You've targeted key areas that can potentially explain and mitigate variability in employee performance and call hold times. Your first question focuses on standardizing employee performance, which is essential for maintaining service consistency. The second question is crucial for identifying and addressing outliers, which could significantly affect overall performance metrics. The third question aims to refine the predictive power of our models, ensuring we base decisions on robust statistical evidence. Lastly, your fourth question directly targets operational improvements to enhance customer satisfaction.

Building on your insightful queries, I'd like to suggest exploring the timing of interventions with a further question: "Given the variations in hold times and employee performance metrics, how might real-time data analytics improve our response times and the allocation of resources during shifts?" This question encourages us to consider the integration of dynamic data analysis in our operational strategy, potentially leading to more adaptive and efficient resource management.

Reply

Chris Cosmas (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/226607)

May 3, 2024

1) What percentage of customers currently experience hold times greater than 10 minutes?

This would allow the senior manager to look at the proportion of calls which have to wait longer and identify what is causing longer waiting periods.

2) What is the probability that a customer will have to wait less than 5 minutes to speak to an agent?

This would allow the manager to look at calls which get answered quickly and identify methods which seem to lead to quicker response rate which can inform the rest of the team on how to yield better results.

3) How much would the average hold time need to be decreased by so 75% of callers experience a waiting time of less than 8 minutes?

This allows the manager to set an achievable target by focusing on problem areas.

Reply (3 likes)

○

(http

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)

May 3, 2024

Hi Chris, so nice to meet you. Great post, your probabilistic questions lead to identifying important solutions to decreasing call wait time especially around the likelihood of wait time being 5 minutes or less and 75% of callers having a wait time less than 8 minutes. I agree with you in that your questions allow for the manager to set an achievable target. Applying probability theory in the real world can have a significant business impact – thank you for sharing.

Reply (1 like)

○

(http

Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)

May 7, 2024

love the specifics,

setting targets, is good, are those by industry standard or something? how did you came up with the 10 minutes hold time and the others?

Reply

○

(https:/

Yossr Hammad (https://classroom.emeritus.org/courses/9054/users/229118)

May 4, 2024

Given that the mean is 8 and std is 2 here are some probabilistic questions:

1- what is the probability that the waiting time is 5 minutes (shorter than the given) or 9 minutes (longer) so we can understand the probability of a shorter time that is needed for customer satisfaction.

2- what are different independent variables that can better allow us see the correlation and hence improve the service. for instance the correlation between increasing the staff and the waiting time.

3-what is the correlation between the peak hours call volume and the waiting time.

Reply (1 like)

(http

Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)

May 4, 2024

Hello Yossr,

Thank you so much for sharing your ideas,

You've identified some crucial probabilistic questions that aim to dissect the elements influencing wait times at our call center. Your focus on specific waiting times around the mean provides a granular look at where we can optimize to meet customer satisfaction levels more consistently. Additionally, exploring the impact of various independent variables such as staffing levels on wait times, and examining the correlation between call volume during peak hours and wait times are both strategic approaches to improving our service delivery.

Building on your thorough analysis, I propose we delve even deeper into the staffing variable with a specific focus on the quality of service. "Could we examine how the experience level of employees during various shifts affects wait times? Additionally, can we determine if there is a significant difference in wait times handled by newer versus more experienced staff?" This question aims to assess whether specific staff training or scheduling experienced employees during peak times could further reduce wait times and enhance customer experience.

Reply

(http

Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)

May 7, 2024

Great questions asked Yossr. I like your second question and I am equally curious to know the other factors/ independent variables we can consider to effectively reduce customer wait call time. Perhaps when the probabilistic questions are answered right, it can give us a clue on some of the factors that could be looked at, for instance the staffing.

Reply

Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)

May 4, 2024

With an average hold time of eight minutes and a standard deviation of two minutes, you have a normal distribution centered around the mean hold time.
This distribution can provide valuable insights into the variability of hold times and help in making informed decisions to reduce customer wait times. 68% of the calls are between 6 - 10 mins duration.
Some probabilistic questions that can help reduce waiting times and improve service are:

1) Are there recurring issues that can be put on an initial automated answer system to save time of the agents?

2) Are there peak times when holding times are longer? Is it possible to utilize insights around the distribution curve to optimize staffing levels?
Then we could try to use predictive modelling to forecast future call volumes and adjust staffing levels

3) What is the probability that a random selected customer experiences wait times of less than 10 minutes before speaking to an agent?
We can then identify if there is a small or larger sample experiencing long wait times and implement actions to shorten it

What is the probability that the wait time excess the average holding period of 8 minutes by more than 2 standard deviations?
Identify root causes of these large wait times and take corrective actions to reduce the right tail of the distribution curve

Asking these relevant probabilistic questions and then taking appropriate measures to improve the customer service will result in better customer service

Edited by **Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)** on May 4 at 11:45am

Reply

Timothy Andrew Ramkissoon (https://classroom.emeritus.org/courses/9054/users/226697)

May 19, 2024

Hello Javier,

Your questions would indeed provide insights into improving customer service. However, these questions seem geared towards a fellow data scientist. If I were to put myself in the shoes of a customer service manager, I wouldn't be able to answer these questions for you. One of the things to consider when working along with other departments is how to phrase questions based on the background of the managers that you're addressing.

Reply

Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)

May 4, 2024

Scenario, Where I am collaborating as a data scientist with a customer service manager at Lucian Telecom, My focus is to discuss 3 key probabilistic questions to strategically reduce customers hold items, based on normal distribution graph.

Firstly, While the mean is 8 minutes, I would like to ask the percentage of calls that are answered within six minutes. This will help to understand how many customers enjoy wait times, which could lead to strategic understanding about staffing adjustment to increase this proportion.

Secondly, It's crucial to understand how often customer wait more than 10 minutes. Identifying this instances helps pinpoint when customer satisfaction might be severely impacted and guides necessary changes to reduce these wait times.

Lastly, analyzing if hold times vary significantly during different times of the day would reveal peak periods requiring more staff to manage calls efficiently, this will help maintain average wait times.

These questions use statical insights to guide operational improvements, ultimately aiming to enhance customer service at the call centre by optimizing resource allocation and handling processes.

This approach is intuitive as it directly connects data-driven insights to practical steps for improving the customer experience.

Reply

Lee Lanzafame (https://classroom.emeritus.org/courses/9054/users/231975)

May 6, 2024

i think the simplest one and the most useful in practice would be adjusting staffing like you mentioned.

Reply

Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)

May 4, 2024

Since the goal is to improve customer service, I would start by asking the service manager whether customer satisfaction scores are negatively correlated with wait time? if that is not the case, then maybe wait time is not the problem at hand and we should focus on another problem. However and if customer satisfaction and wait time are indeed negatively correlated, then I would proceed as follows:

In simple terms, average wait time for any caller can be viewed as follows:

Wait time = (# of callers ahead in the queue) * (average length of time to service each caller)

This means the 2 main areas to focus on to reduce wait time:

1. Optimizing the number of service agents; or
2. Decreasing the service time per caller.

Some of the questions I would ask are:

- **Does the workload ratio (e.g. number of calls per hour divided by the number of agents) vary by day, weekend, month, or hour?**
  - If workload is seasonal or if it changes depending on the time of day, it might be worthwhile to adopt a dynamic staffing strategy where the number of service agents is

increased or decreased in response to fluctuations in number of callers. This could be optimized by aiming to maintain workload ratio below a certain threshold at all times.

- **Does the service time vary by agent for the same call category?**
  - If some agents are able to service their queue much faster than others for the same type of service, then it might be worthwhile to determine what the top and bottom performers are doing differently. Then, I would take actions to propagate the best practices and minimize bad behaviors.
- **Do certain categories of service requests require longer service time, resulting in a longer wait time in the queue?**
  - This is important to understand as not service calls are the same. Some callers' requests can be addressed very quickly whereas others' could require a very long time to resolve. Once those "time sink" service categories are identified, measures could be taken to minimize their impact. For example, time sink calls could be diverted to a specialized call center as to not increase the wait time for other callers.

After getting the answer to those questions, I would proceed to ask the service manager if they have a target wait time they would like to hit. Then, I would start developing a regression model the estimated wait based on the variables identified in the questions above.

Edited by **Turki Alghusoon** (https://classroom.emeritus.org/courses/9054/users/229165) on May 5 at 4:28pm

Reply

(http **Roy Nunez** (https://classroom.emeritus.org/courses/9054/users/229552)

May 5, 2024

Hi Turki,

You start off with a great and often overlooked question! Determining whether customer satisfaction scores are negatively correlated with wait time should be the fist question as first we want to determine if wait time is really a problem or not!

In terms of the 2 main areas you suggested to focus on to reduce wait time, what are you thinking in terms of decreasing the service time per caller? Is this including wait time or beyond the wait time and actual servicing time? My concern with bringing this as one of 2 priorities to focus on assuming its actual service time minus wait time is that it will impact the quality of the service a customer gets especially if its listed as one of two priorities. While an important item to consider, I believe it should rank much lower in the list as we put the customer first. Just a thought.

Reply

Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)

May 5, 2024

Hi Roy,

Thank you for your feedback! I thought it was important to state the possibility that wait time is not the culprit since it was not directly mentioned in the question :)

Regarding your second point: I am not including the wait time and focusing only on the actual service time. I agree with you that wait time is ultimately the variable we are aiming to reduce and I am making the argument that wait time is a function of how long it takes to service each caller. Imagine being in line at the Bank: the faster the tellers are at servicing the customers ahead of you, the shorter your wait time ends up being; that is the approach I am taking to this problem. By analyzing the factors that impact the length of the interaction between customers and service agents ("service time") and optimize them to lower the that duration, I can subsequently lower the wait time. For instance, if I can manage to reduce the service time by 30 seconds per caller, then I will reduce the wait time for the 4th person in the queue by 2 minutes, and so on.

I hope this makes sense and I am interested to hear your thoughts.

Best,

Turki

Reply

Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)

May 7, 2024

Turki,

haha. I agree on ruling out as a culprit first.

I agree it is a good idea to reduce the waiting time. I personally would have ranked other priorities first and but ultimately reducing service time should also be a priority. In your example with the teller, if there is something that can be automated or speed up for the teller, maybe ID verification and/or transaction

processing, it will have a positive impact overall on the customer experience. An alternative approach would be to determine the reason why customers are there on line and redirect to specialized tellers/attendants. Of course this comes at a cost and must be done strategically with efficiency optimization in mind. Both approaches are I guess, its all a matter of preference and scenario based.

Reply

(http

Koffi Henri Charles Koffi (https://classroom.emeritus.org/courses/9054/users/208039)

May 11, 2024

hey Turki , kudos for the first point determining the correlation between wait time and satisfaction score .
and for the second point <<**Does the service time vary by agent for the same call category? >>** is it a yes/No answer or the answer lead to a probability?

Reply

(https:/

Lee Lanzafame (https://classroom.emeritus.org/courses/9054/users/231975)

May 6, 2024

1. What are the times of day where the average time on hold is 8 minutes?

-Lunch times or after work could be busier.

2. What percentage of customers spend more than 8 minutes on hold?

-This identifies how many customers would be frustrated because they aren't getting a normal experience.

3. What percentage of staff are working when customers spend more than 8 minutes on hold?

-This determines if more staff need to be rostered during busy times.

Reply

(http

Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)

May 7, 2024

Great post Lee. I like how your questions are aimed at helping to identify the necessary parameters needed to understand the issue on ground and how these answers can help come up with realistic solution to reduce the wait time for customers. At the end of the day, customer satisfaction is key and the ability of the company making well informed decisions such as allocation of resources to effectively serve their customers is also ensured.

Reply

Diego Milanes (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/228518)

May 6, 2024

I would try to identify relevant variables in the problem. For that few questions looking for information about each data entry could be:

- which is the time of day and day distributions?

- are all 15 employees working the whole time? how many of them are working during each data event?

- are the customers categorised? If so, how is the hold time as a function of the customer type?

Reply (1 like)

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)

May 7, 2024

Hi Diego, so nice to connect on the discussion board again. Great post, your probabilistic questions lead to identifying critical solutions to decreasing call wait time especially around the likelihood of events occurring in day or daypart, customer type, and fluctuation in call volume and duration for appropriate allocation of customer representatives. Applying probability theory in the real world can have a significant business impact – thank you for sharing.

Reply

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

May 8, 2024

Good day Diego

Your point "customers categorised" is a great dimension for disaggregating data.

Thanks for highlighting

Edited by Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864) on May 8 at 10:06am

Reply

(http

Swati Sharma (https://classroom.emeritus.org/courses/9054/users/236938)

May 13, 2024

Hello Diego: its always great to see what you wrote :). These questions definitely uncover key factors influencing hold times and staffing needs.Thank you for sharing!

Reply

(https:/

Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)

May 7, 2024

What is the desired service level for customer wait times?

We need to understand the target service level.:

if Lucian Telecom targets for 90% of customers to wait less than a certain time (for example 5 minutes), we can use statistical methods to determine the corresponding percentile of the distribution. This helps set a specific goal for reducing wait times.

How does the distribution change during peak hours or week days? How about holidays or special events such as concerts o sports?

Customer service demand can vary significantly based on time of day, day of the week, or other factors.

The distribution during peak hours needs to be looked at, then identify when the call center experiences the highest load. This information can give guidance on resource allocation and scheduling adjustments.

What factors correlate with longer wait times?

Investigate potential factors that contribute to longer hold times.

Are certain product-related queries more time-consuming to resolve?

Do certain customer segments experience longer or shorter wait times?

Are there patterns related to the call center's staffing levels or agent seniority/ training or availability?

Reply

Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)

May 7, 2024

The three probabilistic questions I will be asking the customer service manager are;

1. **What is the probability that the length of time online customers are on hold before speaking to a help agent is more than 10 minutes?**
   - This will help us understand the chances of customers waiting beyond a given time limit to be able to identify the extent of the issue. Also, it will help in setting time limit for reducing hold times.
2. **How does the probability distribution of the length of hold time differ during peak and off-peak hours of the day and days of the week?**
   - This is to help identify the variation in hold times throughout the hours of the day as well as days in the week to make informed staffing decisions. In other words, peak hours or days will require more human resource to attend to them as off-peak hours or days will require less human resource. This information will help to effectively address changes in customer demand.
3. **What is the percentage of customers who experience longer hold times of more than 10 minutes?**
   - This will help us identify the proportion of customers facing long wait times relative to the average. We are able to effectively know the percentage of customers affected and the urgency required to implement data-driven recommendations.

Edited by **Priscilla Annor-Gyamfi** (https://classroom.emeritus.org/courses/9054/users/226376) on May 7 at 10:05am

Reply

STEPHEN HUTSON (https://classroom.emeritus.org/courses/9054/users/233645)

May 7, 2024

Hi Priscilla! Really liked the question around the length of time holds during and off peak hours, this was something I hadn't considered in my analysis but really makes sense when the company would need to consider making business process adjustments

Reply

STEPHEN HUTSON (https://classroom.emeritus.org/courses/9054/users/233645)

May 7, 2024

If I were the data scientist for this telecom company, some of the questions I might ask the manager what our desired hold time is, and then what would the probability be for a customer to be on hold for less than or equal to that hold time? This way we could assess how often we're meeting our targets. I would also ask that if we were to increase the number of employees working at the call center, how would that impact the current distribution of hold times, and how much would we expect that average to decrease? Finally I might ask what is the percentage of our customers that experience a hold time above 1 standard deviation above the mean, in other words what is the probability they are on hold for 10 minutes or longer, to see how often our customers are experience bad service.

Reply

Koffi Henri Charles Koffi (https://classroom.emeritus.org/courses/9054/users/208039)

May 11, 2024

Probability Question

1. **What is the most reasonable hold time threshold ?**

=> by knowing what is acceptable wait time is , it can guide . For instance, if the company wants to ensure that 95% of customers can wait less than a given time , in that case we can use a normal distribution to find the appropriate hold time.

2. **is there a variation on the call volume base of the day of the week?**

=> this question also help us to identify the independent variable

3. **what are the factors affecting the hold time?**
=> this question can help us to determine the independent variable and significant and non significant variable

Reply

(http

Mhelissa Yayalar (https://classroom.emeritus.org/courses/9054/users/233590)

May 14, 2024

Hello Koffi Henri Charles Koffi,

I think your 3rd question should be revised so that it's more relevant to getting more accurate estimate and reduce the noise of other irrelevant variables. For instance, you can consider this question instead: What are the call issues (e.g., technical issue, errors, escalations, etc.) that affects the hold time? I think this question is a loaded one but you can certainly gauge into the specific relevant variable. Remember, asking direct question vs broader questions, may lead to higher incorporation of irrelevant variables.

Hope this helps!

-my

Reply

(http

Isabella Tockman (https://classroom.emeritus.org/courses/9054/users/207395)

May 19, 2024

Hi Koffi,

I had formulated my questions with the assumption that our customer service might be understaffed, and some employees might not be performing optimally. But you've raised an excellent point, figuring out an acceptable wait time is a really good question.

Reply

(https:/

Swati Sharma (https://classroom.emeritus.org/courses/9054/users/236938)

May 13, 2024

As the data expert working to improve Lucian Telecom's customer service, here are three simple questions I might ask the manager:

1. How long can customers wait before they get upset and hang up? Reason: Knowing this helps us set goals for improving wait times that customers find acceptable.
2. What percentage of customers wait longer than 10 minutes on hold? Reason: This helps us focus on helping those who wait the longest.

3. Do you notice any patterns in hold times during different times of the day or week? Reason :Understanding when wait times are highest can help us plan better to reduce wait times during busy times.

Reply

Mhelissa Yayalar (https://classroom.emeritus.org/courses/9054/users/233590)

May 14, 2024

As a data scientist working on this project, here are three probabilistic inquiries that I think I should ask the customer service manager to address the issue of reducing hold times for online customers:

1. What is the probability that an online customer will be on hold for more than a specific duration?

Answer: To calculate this, by find the area under the normal distribution curve to the right of a given threshold (e.g., more than 10 minutes). To do this, standardize the threshold value using the z-score formula, where ‘x’ is the threshold value, ‘mu’ is the mean (8 minutes), and ‘sigma’ is the standard deviation (2 minutes). Then, apply the standard normal distribution table or using Python, use the cumulative distribution function (CDF) to find the probability.

2. What is the likelihood that an online customer will experience a hold time within a specific range?

Answer: To calculate this, we can consider the probability that a customer will be on hold between 6 and 10 minutes. Calculate the z-scores for both endpoints of the range and find the area under the curve between those z-scores. Using Python, we can use CDF values to calculate the difference at the endpoints of the range.

3. What hold time corresponds to a specific percentile of the distribution? Such as, 10^{th} percentile.

Answer: To calculate this, we can lookup the z-score corresponding to the 10th percentile (using a standard normal distribution table) and then convert it back to the original time scale using the formula: x = mu + z sigma. Using Python, we can use the inverse CDF function.

Reply

Ahmad Abu Baker (https://classroom.emeritus.org/courses/9054/users/234460)

May 14, 2024

Hi Mhelissa,

I really appreciate your detailed approach to addressing the hold time issue at Lucian Telecom. Your questions are spot-on, and I agree that they can provide valuable insights for improving customer service. Here are my thoughts on your inquiries:

1. **Probability of Hold Time Exceeding a Specific Duration**:
    - Your explanation on calculating the probability using the z-score and CDF is very clear. This method will indeed help us understand the likelihood of exceptionally long hold times and identify critical periods that need attention.
2. **Likelihood of Hold Time Within a Specific Range**:
    - Calculating the probability for a range, like 6 to 10 minutes, is a great idea. This will give us a better understanding of the most common wait times and help us ensure that we are optimizing for the majority of customer experiences.
3. **Hold Time Corresponding to a Specific Percentile**:
    - Identifying the hold time for specific percentiles, such as the 10th percentile, can help us set realistic and customer-focused targets for our service levels. Using the inverse CDF function in Python will make this calculation straightforward and precise.

Overall, your approach is comprehensive and well thought out. These probabilistic inquiries will definitely aid in developing strategies to reduce hold times and improve customer satisfaction. I'm curious to know if you've thought about integrating real-time data monitoring to dynamically adjust staffing levels based on these probabilistic models?

Looking forward to further discussion!

Best,

Ahmad Baker

Reply

Ahmad Abu Baker (https://classroom.emeritus.org/courses/9054/users/234460)

May 14, 2024

Hi everyone,

As a data scientist working on improving Lucian Telecom's customer service, I've been examining the current data on hold times. To address the issue of long hold times before customers speak to a help agent, I've come up with three probabilistic questions that could help us find a solution:

1. **What is the probability that a customer will be on hold for more than 10 minutes?**
    - **Reasoning**: By understanding the likelihood of exceptionally long hold times, we can identify periods when our system is under the most stress. Calculating this probability will help us determine how often customers experience delays that could lead to dissatisfaction. This information is crucial for strategizing resource allocation during peak times to reduce these extended wait times.
2. **What is the probability that a customer will be on hold for less than 5 minutes?**
    - **Reasoning**: Knowing the likelihood of shorter wait times can help us evaluate the current efficiency of our system. If this probability is high, it suggests that our system performs well under certain conditions. Analyzing these conditions can provide insights into best practices that can be applied to reduce hold times during peak periods, thereby improving overall customer satisfaction.
3. **What is the probability that the average hold time exceeds the acceptable threshold (e.g., 8 minutes) during peak hours?**
    - **Reasoning**: It's important to understand the behavior of our system during peak hours. By calculating the probability that the average hold time surpasses an acceptable threshold, we can identify the times when the system is most likely to fail to meet our service level agreements. This information can be used to optimize staffing schedules and improve system performance during critical periods.

I believe discussing these probabilities with the customer service manager can help us create targeted strategies to mitigate long hold times and enhance overall customer satisfaction. I'm looking forward to hearing your thoughts and any additional questions or insights you might have!

Best,

Ahmad Baker

Reply

Todd Engle (https://classroom.emeritus.org/courses/9054/users/228910)

May 14, 2024

Looking at the normal distribution curve, it shows the probability of a particular wait time for online customers. The data scientist has labeled the average hold time at eight minutes, with a standard deviation of two minutes. I interpret this to mean that the majority of customers will wait somewhere around eight minutes to speak with an agent. The probability of a customer waiting a significantly longer time, or a significantly shorter time, decreases as you move further away from the center of the curve with a standard deviation of two.

As a data scientist looking at this problem, the three probabilistic questions I might ask the customer service manager.

Question 1: What percentage of customers are currently abandoning calls after waiting on hold for more than X minutes?

Knowing this will help customer service understand how many customers are frustrated by long wait times and potentially taking their business elsewhere. We can set a specific wait time of (X) based on industry benchmarks or customer feedback, and then use the normal distribution curve to determine the probability of a customer exceeding that wait time. This helps us gauge the severity of the problem and prioritize solutions. The focus is on the *quantifiable data* about customer abandonment based on a hold time threshold. It helps us understand *the scale of the problem* by identifying the percentage of customers impacted by long waits.

Question 2: Based on experience, at what point in the hold queue do customers typically start abandoning calls?

Customer service managers have valuable insights into customer behavior. Understanding the "tipping point" for call abandonment can help us tailor solutions. For example, if customers abandon calls after 5 minutes on hold, we might prioritize solutions that specifically target that timeframe. Knowing this can also help inform strategies like offering a callback option or estimated wait time announcements. This data will focus on *qualitative data* about customer behavior based on the manager's experience. It helps us understand the *timing of the problem* by pinpointing the specific hold duration where abandonment becomes more likely.

Question 3: How much would reducing the average hold time by Y minutes improve the probability of a customer waiting less than Z minutes?

This question allows customer service to assess the impact of potential solutions. By setting specific values for Y (reduction in average hold time) and Z (desired maximum wait time), we can calculate the new probability distribution using the adjusted mean. This helps us compare the effectiveness of different strategies aimed at reducing hold times.

Reply

Shahrod Hemassi (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/224267)

May 15, 2024

If I was a data scientist working with this customer manager, I would want to gather some more information in order to identify some significant and relevant independent variables to help produce a model to help with identifying the factors that are contributing to the wait time. To do this, I would ask the following probabilistic questions:

Question 1: What is the time of day (broken down to the half-hour) that the call began and the wait time for calls started in each half-hour period? When looking at this variable, what is the probability that the wait time is more than 10 minutes (i.e. more than 1 standard deviation (2 minutes) above our mean of 8 minutes?

I would try to identify if adding this variable because I suspect that the wait time varies at different times of the day. I would be looking to improve our prediction of the wait time by looking to see if the this variable increases the R^2 while having a low p-value which would indicate that this is a good variable to introduce into our model.

Question 2: How many calls are received during each half-hour period throughout the day and the wait times for these calls? When looking at this variable, what is the probability that the wait time is more than 10 minutes (i.e. more than 1 standard deviation (2 minutes) above our mean of 8 minutes?

Again, I suspect that volume of calls contributes to average wait time. If we can identify if this is a significant variable in the same manner as above, we could improve our prediction of wait times and take appropriate actions to reduce wait times during periods of high volume of calls. We could alert the caller to a likely high wait time during this time of the day and suggest they either call back or leave a message so a customer service agent can return their call without keeping them on hold for a long wait time.

Question 3: How many employees are working at the time that the call began and what are the wait times for each count of employees working? When looking at this variable, what is the probability that the wait time is more than 10 minutes (i.e. more than 1 standard deviation (2 minutes) above our mean of 8 minutes?

It is likely that the number of employees working when each call began is a contributor to wait time. If we can identify this as a significant variable in our model by seeing a higher R^2 value while having a low p-value for the variable, then this could lead to a better means of predicting

wait time. This again would allow us to take some measures to reduce the wait time or provide the customer a different avenue to getting a response in a more comfortable manner and thus improving the customer experience.

Edited by **Shahrod Hemassi** (https://classroom.emeritus.org/courses/9054/users/224267) on May 15 at 1:53am

Reply

Timothy Andrew Ramkissoon (https://classroom.emeritus.org/courses/9054/users/226697)

May 19, 2024

What Is the desired service level?
I would inquire about the desired service level in terms of hold time. For example, do we want to ensure that a certain percentage of customers are served within a specific time frame (e.g., 90% of customers served within 5 minutes)? This helps set a performance target and defining an SLA guides performance evaluation and improvement efforts.

What factors influence hold times?
I'd explore factors that impact hold times, such as peak hours, staffing levels, or specific issues. We can develop targeted strategies to reduce hold times by understanding these factors. How many agents are typically available during busy hours? Is our staffing level sufficient to handle the call volume? Addressing staff adequacy ensures that we have enough agents to minimize hold times.

How does the current distribution compare to the desired service level?
I'd ask for information on the current distribution of hold times. Are most customers experiencing hold times close to the average (mean) of 8 minutes, or are there significant deviations? During which hours of the day do we experience the highest call volume? Are there specific periods when hold times tend to be longer? Understanding peak hours tends to allocate resources effectively and manage staffing levels.

Reply

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1. How many calls does the call center receive daily, and how are these calls allocated among the 15 employees?

- Understanding the volume of calls and their distribution among employees is crucial. This information helps determine if the call center is understaffed or if there are performance issues with certain employees. If it's a staffing issue, hiring more staff might be necessary. If it's a performance issue, implementing training programs and establishing clear performance metrics could improve efficiency.

2. What are the peak times during the day when call volume is highest, and how do hold times vary during these peak periods?

- Identifying peak call times allows for optimized shift scheduling. By assigning more staff during busy periods, the company can reduce hold times and improve customer satisfaction. This strategic staffing ensures that customer service resources are used most effectively.

3. Are calls categorized by the type of issue, and if so, how are they routed to the appropriate agents? Or do all calls initially go to any available agent who then redirects them?

- If long hold times result from customers waiting to be transferred to the appropriate agent, an improved call routing system could be beneficial. Implementing a more efficient menu system or an automated call distribution system ensures that customers are directed to the right agent from the start, reducing wait times and improving the overall customer experience.

Edited by **Isabella Tockman (https://classroom.emeritus.org/courses/9054/users/207395)** on May 19 at 11:34pm

Reply