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Improving Efficiency: Optimizing the Average Processing Time of Crm Systems Based on Machine Learning

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Abstract: ***This paper delves into the innovative application of machine learning (ML) technologies to reduce Average Handle Time (AHT) in Customer Relationship Management (CRM) systems, a critical metric for assessing customer service efficiency and effectiveness. Through an in-depth analysis, we examine how ML algorithms can automate routine tasks, provide predictive insights, and enable personalized customer interactions, thereby streamlining operations and enhancing customer satisfaction. The integration of ML within CRM systems poses unique challenges, including technical integration complexities, data privacy concerns, and the need for continuous adaptation and training. By exploring practical implementation strategies, this study highlights the transformative potential of ML in redefining customer service paradigms. Furthermore, we address the ethical considerations and change management approaches essential for successful ML adoption. Our findings suggest that leveraging ML not only reduces AHT but also significantly improves the overall customer service experience by allowing agents to focus more on complex, value-added interactions. The paper concludes with a forward-looking perspective on the future of ML in CRM, emphasizing continuous improvement, ethical data use, and the cultivation of a culture of innovation. This study contributes to the growing body of knowledge on the intersection of ML and CRM, offering valuable insights for organizations seeking to enhance their customer service operations through technological advancements.***

Keywords: AHT, CRM, NLP; Machine Learning, GenAI, Speech To Text, Call Routing, IVR

1. Introduction

In the intricate dance of customer service, every second pirouettes between profit and loss. Industry benchmarks reveal that an increase of just 10 seconds in average handle time (AHT) [1] can cascade into a 5% decline in customer satisfaction, painting a stark picture of today's service sensitivity. The Customer Service Barometer reports that 60% of customers are unwilling to wait more than one minute on the phone, and a staggering 30% feel even that is too long. In a digital era where instant gratification is the norm, businesses witness a direct correlation between AHT and customer loyalty scores, a silent but formidable factor in the race for market leadership. But beyond customer impatience lies a deeper narrative: research from Gartner, underscores that a 15% reduction in AHT can enhance customer service agent productivity by up to 20%, showcasing a dual avenue for customer satisfaction and operational efficiency. As businesses grapple with these metrics, the emerging prowess of machine learning looms on the horizon—a beacon of innovation poised to revolutionize response times and redefine what it means to be customer-centric. This article explores the transformative intersection where advanced analytics meets human touch, potentially reshaping the landscape of customer engagement for generations to come.

Average Handle Time (AHT) remains a critical, albeit challenging, performance metric in the dynamic sphere of customer service. It's the barometer that gauges the efficiency of customer interactions, encapsulating the total duration of the call, including conversation, hold, and after-call work. In an ideal world, a lower AHT signifies swift resolutions and high customer turnover rates—essential in high-volume service centers.

However, an overemphasis on minimizing AHT can inadvertently lead to rushed interactions and unresolved customer issues, prompting repeat calls and, paradoxically, higher overall handle times. CRM systems sit at the heart of this conundrum, offering the tools for interaction but also bearing the brunt of inefficiencies. The challenge is two-fold: ensuring customer representatives are equipped to handle queries expeditiously and leveraging CRM capabilities to streamline and accelerate service delivery.

Moreover, CRM applications are often a nexus of diverse customer information, requiring agents to navigate through complex interfaces and data silos to retrieve relevant customer history, product information, or support documentation. This complexity can inflate AHT, particularly when systems are outdated, integration is patchy, or user interfaces are not optimized for ease of use. Agents must toggle between screens, enter repetitive data, and, at times, contend with sluggish system responses—each action incrementally contributing to the clock ticking upward.

The digital transformation era demands more from CRMs; they must be nimble, intelligent, and predictive. As businesses strive to offer personalized customer experiences, the demand on agents to deliver bespoke service with a multitude of options and solutions only expands the challenge. It requires a delicate balance: personalizing customer interactions without disproportionately extending handle times.

For companies, the objective is clear—refine AHT without compromising on service quality. Achieving this necessitates a strategic overhaul of CRM processes and systems, often

calling for technological advancements that can parse through complexity with the finesse of human-like understanding yet with the speed and precision of a machine.

Navigating this delicate balance is where the potential of machine learning becomes intriguing, promising not just incremental improvements but a paradigm shift in managing AHT within CRM systems

Reducing Average Handle Time is not just a metric to be optimized; it's a strategic lever that can propel an organization towards greater customer loyalty and operational excellence. In a market where consumer patience is thinning and demand for rapid service is escalating, efficiency becomes synonymous with satisfaction. By curtailing AHT, businesses not only enhance customer experience by providing quicker resolutions but also amplify their operational throughput. This can lead to significant cost savings as more calls are handled with fewer resources, and agent time is optimized for quality engagements. Essentially, minimizing AHT can create a ripple effect that elevates the entire customer service landscape.

Machine learning emerges as a beacon of innovation, offering a transformative solution to the perennial AHT challenge. By harnessing vast datasets, machine learning algorithms can decipher complex patterns and anticipate customer inquiries, facilitating swifter resolutions. This technology empowers CRM systems to become more than repositories of customer data, transforming them into predictive engines that guide agents through the most efficient pathways to problem resolution. The implications are profound: a reduction in AHT not only through faster query handling but also by preempting issues and automating routine tasks, thereby allowing human agents to focus on interactions that truly require the human touch.

2. Understanding Average Handle Time

Average Handle Time (AHT) is a pivotal metric in customer service, quantifying the average duration of a single transaction from the customer's initiation of the call to its resolution, including any hold time and after-call work that the agent may undertake. It's calculated by adding the total talk time, hold time, and after-call work, then dividing by the number of transactions handled. This metric serves as a barometer for operational efficiency and customer satisfaction, offering insights into the performance of customer service teams and the effectiveness of CRM systems.

2.1 The Significance of AHT

AHT is more than just a number—it's a reflection of a company's operational health and customer-centricity. In fast-paced service environments, a lower AHT suggests that customer queries are being resolved quickly and efficiently, potentially leading to higher customer satisfaction and loyalty. Conversely, a higher AHT might indicate underlying issues in process efficiency, agent training, or CRM system effectiveness, which can result in frustrated customers and increased operational costs.
Factors Influencing AHT

Several key factors can impact AHT, including:

- Agent Training and Expertise: Well-trained and knowledgeable agents can resolve issues more quickly, reducing AHT.
- Complexity of Customer Inquiries: More complex issues take longer to resolve, inherently increasing AHT.
- CRM System Usability: Efficient CRM systems streamline data retrieval and entry, aiding agents in resolving calls faster.
- Operational Policies: Certain policies, like mandatory security checks, Call Routing via IVR, End of Call Summarization can add to the handle time.

Understanding these factors is crucial for identifying areas of improvement and strategizing on how to reduce AHT without compromising the quality of service.

2.2 Role of Machine Learning

Machine learning stands at the forefront of transforming customer service dynamics, particularly in reducing Average Handle Time (AHT) within CRM systems. At its core, machine learning analyzes vast amounts of data, learning from patterns and behaviors to make predictive decisions. In the context of AHT, this technology is instrumental in identifying the most common queries and issues faced by customers, enabling CRM systems to provide quicker, more accurate responses.

One of the key strengths of machine learning is its ability to automate routine tasks, such as ticket categorization, routing, and even providing standard responses to frequent questions. This automation significantly reduces the time agents spend on each call, allowing them to focus on more complex queries that require human intervention. Furthermore, machine learning algorithms can offer real-time suggestions to agents based on the current conversation, drawing from a comprehensive database of resolved cases. This not only speeds up the resolution process but also enhances the accuracy and quality of the response, contributing to a better customer experience.

Additionally, machine learning contributes to a continuous improvement cycle within CRM systems. By constantly analyzing interactions and outcomes, it identifies trends and suggests areas for efficiency gains. For example, it can highlight knowledge gaps in agent training or pinpoint inefficiencies in the CRM interface that, once addressed, can lead to further reductions in AHT.

In essence, the role of machine learning in CRM systems is transformative, offering a pathway to not just reduce AHT but to elevate the entire customer service experience. Through intelligent automation and predictive analytics, machine learning enables businesses to achieve a delicate balance between efficiency and personalized customer care.

3. Steps for Implementation

Implementing machine learning to reduce AHT involves integrating AI models into CRM systems, training these models with historical data to recognize patterns, and continuously refining them based on feedback. Start small,

focusing on automating routine inquiries, and gradually expand to more complex interactions, ensuring the system's accuracy and effectiveness improve over time.

3.1 Customer Agent pairing

Stage 1. The customers voice call will be forwarded to the IVR system. At stage 1 the user will receive a welcome audio message [4] and be presented with the available J options. The user will use the keypad to make their desired choice that fits most their enquiry. Depending on the selection, this process can be repeated. It is assumed that the average duration time of this stage is t_{stage_1}

Stage 2. The user will be assigned to the corresponding N queues, one for each department. Finally, the user can communicate with the appropriate personnel. The average duration for this stage is assumed to be tstage2 . The average time duration of any call c at the call center is:

$$T^c = t_{stage^1} + t_{stage^2} \quad (1)$$

Let the total number of calls be C, the total average duration of all calls is:

$$T^{total} = \sum_{c=1}^{C} T^c \quad (2)$$

3.1.1 ML Based Pairing

Intelligent pairing can be achieved by classifying the call of each user before stage 1 and assigning the user to the correct queue department at stage 2. This is shown in red in Fig 1. By achieving that, the user can skip the time-consuming stage 1, and given a quick verification of the user they could directly forward the call to a department's queue, resulting in a faster service and an enhanced customer experience.

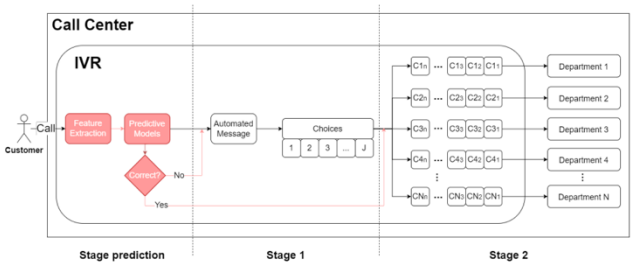

Figure 1: Proposed Solution Overview of Cx Call Procedure

3.2 End Of Call Summarization

In contact centers spanning various industries, meticulously documenting customer interactions is crucial. However, note-taking during calls can divert agents' attention, prove to be time-consuming, and at times, become a source of frustration. This is another source of uptick in Handle Time and adds to other prospective customers wait time.
Per study [1] Automatic call summaries offer significant benefits for both agents and managers in contact centers, enhancing productivity, minimizing distractions, and boosting overall operational efficiency. Agents are empowered to dedicate their full attention to the ongoing conversation, without the need to split focus between the customer and taking notes. This not only increases their engagement and concentration but also contributes to shorter call durations and reduces stress, as agents have fewer concerns during and after the call.

Furthermore, these summaries streamline the post-call process by negating the necessity for manual note taking. Contact center technologies that incorporate AI-driven call summaries often feature CRM integration, seamlessly logging calls and appending summaries automatically.

Moreover, the objectivity and comprehensiveness provided by AI-generated summaries surpass human capabilities, offering unbiased and detailed accounts of conversations. This is due to the AI's ability to capture every detail without the human propensity for error or omission, ensuring nothing is overlooked or forgotten post-conversation.

Recent study [2] [3] shows that 21% of the agent's time is spent on call summarization and related activity which contributes to significant $ in investment. and with mere ~100 agents in a call center the amount staggers around $2834 per day.

Per study [2] Business should use automatic call summarization when:

- Improve customer service quality and productivity.
- Reduce time on manual call summaries after each call
- Focus agents on solving customer problems.
- Improve accuracy of call summary data
- Enhance data coverage summary for mining and analysis.

3.3 Generative AI use for Agent Knowledge Base

When agents engage with customers over calls, they face the dual challenge of understanding the customer's issue and navigating the complexities of the CRM application to find an appropriate solution. A notable chunk of these customer issues tends to be repetitive, leading to a situation where agents spend a significant portion of their time addressing concerns they have encountered before. This redundancy not only affects the agent's ability to handle calls efficiently but also impacts the overall customer experience negatively.

The learning curve for new agents is particularly steep. As CRM applications evolve, incorporating new features and functionalities, staying abreast of these updates becomes a formidable task for newcomers. This gap in knowledge and familiarity with the CRM system can inadvertently inflate the Average Handle Time (AHT), as agents take longer to resolve customer queries.

An innovative solution to this challenge is the integration of generative AI [7][8] technologies with the organization's knowledge base. By embedding a chatbot-like system that agents can consult in real-time during calls, agents are provided with immediate, AI-driven [9] insights and solutions. This not only aids in swiftly addressing customer issues but also ensures that agents are not bogged down by repetitive queries.

Moreover, this AI system can perform data analytics to identify common stumbling blocks within the CRM application, pinpointing specific areas where additional training is needed. It offers a twofold advantage [10] : firstly,

it enables targeted training efforts, ensuring that agents are well-versed in the aspects of the CRM they are most likely to use; secondly, it allows for the personalization of training programs based on the unique needs and learning patterns of different agents.

Consider the example of a telecom company that implemented such an AI-enhanced system. New agents were quickly able to handle calls about recurring issues, such as billing inquiries or service disruptions, by relying on the AI's suggestions. This led to a noticeable reduction in AHT, from an average of 8 minutes per call to just under 5 minutes. Furthermore, the system identified a frequent issue agents had with navigating the billing module of the CRM. As a result, a customized training session was developed, significantly improving the efficiency and confidence of the agents in handling related queries.

In essence, leveraging generative AI to synergize with an organization's knowledge base [11]and CRM system not only streamlines the resolution process during calls but also harnesses data analytics to evolve the training and development landscape for agents, making it more dynamic and responsive to the actual challenges they face.

4. Challenges and Consideration

To address the complexities of implementing machine learning (ML) solutions in reducing Average Handle Time (AHT) in CRM systems, we delve into various aspects that organizations must navigate. This exploration underscores the importance of a thoughtful approach to integrating advanced technologies:

The integration of ML algorithms into existing CRM systems presents technical challenges, requiring a seamless blend of new and legacy technologies. A critical consideration is the quality and structure of data fed into ML models. The accuracy of ML predictions is contingent upon comprehensive, clean, and relevant data. Organizations often encounter issues with data silos, inconsistency, and incompleteness, which can significantly hinder the effectiveness of ML solutions. Ensuring data integrity and implementing robust data governance practices are pivotal steps in overcoming these challenges.

Privacy and Ethical Concerns:
Implementing ML raises significant privacy and ethical considerations, especially in handling sensitive customer data. Compliance with data protection regulations, such as GDPR in Europe and CCPA in California, is mandatory. Organizations must navigate the fine line between personalizing customer experiences and infringing on customer privacy. There's also the ethical dilemma of AI transparency and the potential for bias in ML algorithms. Addressing these concerns involves adopting ethical AI frameworks, conducting regular audits for bias, and maintaining transparency with customers about how their data is used to improve service delivery.

Change Management and Training:
The adoption of ML technologies [5] [6] necessitates organizational change, requiring a shift in culture and processes. Resistance from employees, particularly those wary of automation leading to job displacement, poses a significant hurdle. Effective change management strategies, including clear communication, stakeholder engagement, and comprehensive training programs, are crucial. Training should not only focus on how to use the new systems but also on understanding the value of ML in enhancing job performance. Personalizing training to meet the varied needs of employees and creating a supportive environment for adaptation can facilitate smoother transitions.

Continuous Improvement and Adaptation:
The deployment of ML solutions is not a one-time effort but a journey of continuous improvement. ML models require ongoing monitoring, maintenance, and tuning to adapt to new data and changing customer behavior patterns. Organizations must be prepared to invest in the resources needed for these activities. Furthermore, as ML models learn and evolve, there may be unforeseen challenges and adjustments needed in CRM processes and workflows. Establishing a feedback loop between the operational teams and ML specialists can help in quickly identifying and addressing any issues, ensuring the ML solutions remain effective and relevant over time.

By thoroughly addressing these challenges and considerations, organizations can better position themselves to harness the benefits of ML in reducing AHT, thereby enhancing customer satisfaction and operational efficiency.

5. Conclusion

In the intricate landscape of customer relationship management, the pursuit of optimizing Average Handle Time (AHT) embodies a profound commitment to operational excellence and customer satisfaction. As we have explored, the integration of machine learning into CRM systems heralds a transformative era where efficiency and personalization converge to redefine customer service standards. This journey, while fraught with challenges ranging from technical integration to privacy concerns, holds the promise of unprecedented efficiency gains and a deeper, more intuitive connection with customers.

Machine learning's capacity to analyze vast datasets, predict customer inquiries, and automate routine tasks empowers customer service agents to focus on what they do best: delivering empathetic, personalized service. By reducing AHT, businesses not only enhance customer satisfaction but also unlock new dimensions of operational agility and cost efficiency. Furthermore, the continuous learning and adaptation of ML models ensure that CRM systems evolve in tandem with changing customer needs and behaviors, ensuring that businesses remain at the cutting edge of service excellence.

Looking ahead, the potential of machine learning in CRM extends beyond optimizing AHT. It paves the way for creating more intelligent, responsive, and customer-centric business models. As organizations navigate the complexities of implementation, the focus must remain on fostering a culture of innovation, ethical data use, and continuous improvement. The journey towards integrating ML into CRM systems is not merely a technological upgrade but a strategic initiative that encapsulates a vision for the future—a future

where technology and human ingenuity combine to create exceptional customer experiences.

In conclusion, the adoption of machine learning in reducing Average Handle Time is not just an operational necessity but a strategic imperative for businesses aiming to thrive in the competitive landscape of customer service. By embracing this technological advancement, companies can achieve a delicate balance between efficiency and personalization, setting new standards for customer engagement and loyalty. As we look to the future, the role of machine learning in enhancing CRM systems will undoubtedly continue to expand, opening new avenues for innovation and service excellence.

References

[1] Zendesk, "Average handle time (AHT): Formula and tips for improvement," Zendesk, Jan. 26, 2024. https://www.zendesk.com/blog/average-handle-time/

[2] Teneo.Ai, "Unlocking the power of intelligent IVR systems - teneo.ai," Teneo.Ai - Transforming Every Phone Call to a Love Story With Your Brand, Oct. 02, 2023. https://www.teneo.ai/blog/unlocking-the-power-of-intelligent-ivr-systems

[3] S. Shah, H. Ghomeshi, E. Vakaj, E. Cooper, and S. Fouad, "A review of natural language processing in contact centre automation," Pattern Analysis and Applications (Print), vol. 26, no. 3, pp. 823–846, Jun. 2023, doi: 10.1007/s10044-023-01182-8.

[4] "Interactive Voice Response using Sentiment Analysis in Automatic Speech Recognition Systems," IEEE Conference Publication | IEEE Xplore. https://ieeexplore.ieee.org/abstract/document/8441741

[5] K. Kellar, "7 Best IVR call routing Strategies for your business," AVOXI, Jan. 12, 2024. https://www.avoxi.com/blog/ivr-acd-call-routing-strategies/

[6] R. Pleasant, "Why should you use automatic call summaries?" CX Today, Sep. 27, 2023. https://www.cxtoday.com/speech-analytics/why-should-you-use-automatic-call-summaries-miarec/

[7] CloudHesive, "Automate Amazon Connect contact lens call summaries with AI | CloudHesive," CloudHesive. https://www.cloudhesive.com/blog-posts/contact-lens-call-summaries-automated-ai/

[8] L. Gutenberg, "How GenAI-powered auto-call summarization increases ROI and improves workflows." Available Online: https://blog.3clogic.com/genai-auto-call-summarization

[9] "4 Reasons to analyze and summarize CRM Data | Handoffs." https://www.handoffs.com/post/4-reasons-to-analyze-and-summarize-crm-data

[10] Forrester, "How Generative AI will Transform CRM's value," Forbes, Oct. 13, 2023. [Online]. Available: https://www.forbes.com/sites/forrester/2023/10/12/how-generative-ai-will-reshape-crms-value/?sh=49d4af865f64

[11] C. Dilmegani, "Generative CRM in 2024: Benefits, 5 Use Cases & Real-Life Examples," AIMultiple: High Tech Use Cases &Amp; Tools to Grow Your Business, Mar. 27, 2024. https://research.aimultiple.com/generative-crm/