Automated Customer Service for Retail with AI

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1. Introduction

Over the past few years, technology has evolved at an exponential rate and has played a pivotal role in reshaping interactions between businesses and customers across varied industries, including retail. As a consequence, retailers today face a deluge of options when it comes to interacting with and serving their customers. Retailers, however, face the significant challenge of addressing the expectations of customers by providing efficient support services just as quickly as the market is producing options. Furthermore, many customers prefer to "Do-It-Yourself" solutions and rely on self-service options to find what they are looking for. Consequently, retail customer service is moving from individual service channels, like phone agents, to multi-channel solutions that include website customer service components. However, the current self-service options are limited by the effectiveness of keyword-based search functionality that can often confuse if a user's spelling or expectation is different from the data language, lack of personalization, deeper insights, and limitations in search depth.

Retailers require customer service solutions that support these three factors: the retailer's operations with superior and affordable customer support, the customer demand for quick and comprehensive answers to questions, and the market demand to retain customer brand loyalty. This paper explores the potential of the application of self-teaching algorithms, such as artificial intelligence, to learn and automate end-to-end retail-level query response. Based on this analysis, we offer a framework for the remaining structure of this paper. In this regard, automation has opened up new avenues through artificial intelligence for retail customer care through conversational commerce, natural language processing, speech recognition, and virtual personal assistants. The most powerful and scalable retail offering of this trend is that of the chatbot ecosystems, which provide an automated medium for dialogue interactions with clients by processing text or speech. Customers who received their contact preferred solutions on first interaction and used automation channels as a first line of attack often showed a higher level of customer satisfaction. This increase in satisfaction with successful

first-interaction resolution directly impacts an organization's brand loyalty through the reduction in churn. In summary, the use of chatbot ecosystems enables retailers not only to deliver timely and accurate first-try solutions but also to process and handle large volumes of customers simultaneously, providing an area for reduced costs in administration.

1.1. Background and Significance

Consumer demand for simplicity, speed, and value has driven technological development in the retail sector over the last few years. Customers are used to accessing strong digital and mobile facilities through leading retailers. AI and machine learning offer the promise of transforming commerce services in unique ways. They can decrease costs, intensify inventories, understand more about consumer behavior, and offer services that are more distinctive and satisfying. A few years ago, many retail teams set up and maintained contact centers to provide clients with support services and product information. Customer expectations and behavior are changing quickly with the rise of the internet and the increase of digital retail.

A key influencer in this movement was the expanding digitization of the wider environment. Approximately 45 percent of the world's population was online in May. With increasing internet usage, consumers used an increasing number of digital channels, which involved being able to reach their favorite merchants. Another trigger has been the fast adoption of mobile technology in the wider world. Young adults are the main owners of these smart mobile devices, and they played a crucial part, eventually influencing the way businesses should communicate about smartphones in their interaction policies. Another pattern is the change in the chain of continuous interactions between the consumer and the trade. These can be anywhere from the first interaction to the first purchase, before, during, or after their purchases with a company, like pre-and post-purchase support. In essence, this shows a single consumer's "consumer experience" and thus highlights a common focus of many buyers. It also underlines the fact that vendors and large-scale organizations that are prepared to adapt to customer interactions can expect to achieve customer satisfaction, enhance loyalty to the brand, and profit from the continued shopping of their recruited customer base.

1.2. Research Objectives

In evaluating the current automation potentials of customer service systems, the first question this work addresses is whether there will be any significant benefit over the next few years, i.e., if a great opportunity in terms of increased efficiency and cost reduction hidden in customer support will be exhausted. It will also be of interest to improve the focus of service automation. The fact that online shops are potential candidates for early adopters of automated service innovation, due to their similarity to real retail scenarios, motivates the investigation of opportunities in the retail environment. The primary goal of the thesis is therefore to find challenges and motivations for customer service automation in retail.

Retail and customer service experts suggest adopting a cooperative stance towards AI, evaluating product and user characteristics that would facilitate successful implementation. It is proposed that shopping models, which usually characterize shopping for goods in a tangible context, may impact the use of AI-motivated service agents in a typical online shop environment where goods are presented in a virtual context. While AI may add positive value, particularly productivity-enhancing value, to a customer self-service capability, current research indicates that general resistance to AI-based customer service assistance is present among those who use it. Therefore, the aim of this thesis is to investigate how automated customer service features, and AI in particular, can be finely balanced with the customer experience offered in an interactive environment to provide substantive benefits to both the customer and the retailer. Specifically, we seek to identify the potential barriers to adoption for consumers and to detail advice to retailers that may engage or assure the consumer. Moreover, we will examine and discuss the more general challenges that retailers face in automated customer service provision.

2. Theoretical Framework

1. Introduction This research focuses on evaluating the use of automated customer service in retail. Automated systems based on machine learning and AI enable fast and efficient interaction between retailers and customers, providing information, troubleshooting problems, and taking orders. Within retail, a number of theories can be used to build a foundation for understanding how customers choose and perceive technology. Because automated customer service relies on digital interactions, customer feedback data can be easily obtained and utilized to make improvements and understand their preferences. Given

the nature of these technologies, questions around how they interact with customer preferences, learning, privacy, and trust are also appropriate. A model that outlines the best uses of AI in management can help guide the evaluation.

2. Theoretical Framework The following section lays out the fundamental concepts we use to approach the research. Customer interactions and feedback models provide a basis for our arguments and evaluation. The expectation-confirmation model, self-efficacy, and TAM provide a theoretical foundation for understanding customer interaction and preferences, while the theory of privacy calculus and trust discuss customer expectations and perceptions of privacy issues surrounding technology. Even if a retailer were to provide assurances of the privacy of the information, the tools required to run the machine are still susceptible to attack. Customers who are informed about this challenge may think their private information is at risk and opt not to utilize the platform. The less the user knows, the better off everyone is: ignorance can be bliss.

2.1. Machine Learning and Artificial Intelligence in Customer Service

Subsection 2.1. Machine Learning and Artificial Intelligence in Customer Service

Machine learning and artificial intelligence can improve customer service interactions. In retail, the most visible application is likely chatbot- and virtual assistant-based communication. Training data for these systems contains paraphrase-transformed inquiries. Thus, the system is able to map customer inquiries to the same meaning more accurately. Developing generative chatbots using transformed training data can further improve systems by focusing the network architecture on parameter sharing between related questions. The intent of the AI module is to interpret and understand the customer inquiry and provide an appropriate response. This can involve, for example, using classifiers, bag-of-words text matching, and/or pre-built functionality from other cognitive services as part of an AI service module. A broader community of customer service operations professionals emphasizes so-called data-driven approaches, which incorporate artificial intelligence. Some service components use machine learning models and algorithms to improve responsiveness in a number of fields. Some draw on customer data for enabling personalization of customer experiences.

More complex but related algorithms are capable of learning patterns and providing a segmentation of the involved users. This is an essential aspect because there are some users that behave in a predictable way, making complex but stable plans for optimizing operational costs. Other users can be very unpredictable and should be treated in a more reactive way. In detail, these models are able to generate user profiles per type of action. AI allows the brand to consider different client profiles in accordance with their digital behavior and profile information. In addition, the brand is able to make predictions, process information, find relevant connections, analyze data, and network. The AI is learning and developing continuously, updating models, generating further actions and behaviors, and adding information to knowledge based on digital platform data, leading to further automation. It presents personal and relevant information to users. The objective of this tool is to make the daily digital interaction with platform developers, the web team, and project managers easy, time-efficient, and effective in order for the brand to evolve. In conclusion, investing in AI is especially useful for retail operations and brand strategy to make the business more time-efficient in a fast-changing digital world, gathering useful data and insight from the digital interactions users have with the network.

3. Current Trends in Automated Customer Service

Trends in Automated Customer Service for Retail As regards customer service, there are a number of movements pushing major retailers to move towards automation. Customer demands are increasingly digital, with virtual and in-app customer service experiences becoming quintessential. This has brought about the current gold rush of retailers using chatbots for customer service. Without reading the newly projected demand for digital self-service, customer service teams have hired armies of robots to filter inbound customer requests. Retailers are eager to adapt to their evolving customer base with omnichannel human and AI support. Chatbots have become advancements in customer service efficiency and speed. Beyond the customer service business, retailers are also exploring the best methods for including advanced AI programs in customer service. Accelerated by the pandemic's sales boom in digital shopping, businesses are looking to acquire more sophisticated, AI-driven customer service support for their clients. As a result, more companies are acquiring AI-driven customer service platforms, indicating a strong shift towards further automation in the customer service sector. In the future, customer service is expected to be built into a variety of

applications, allowing for more automated, humanized interactions with a rising tide of digitally sophisticated customers. Retailers are using automated customer service programs to sell to customers. These tools are being leveraged in a number of different scenarios, from taking in and handling customer inquiries to driving cross-sell opportunities. The shift to further automation is an issue facing today's venture investors, as major retailers and providers make the necessary changes.

3.1. Use of Chatbots and Virtual Assistants in Retail

Over 80 software companies are offering different chatbot and virtual assistant platforms as of 2019. Although chatbots and virtual assistants have applications in a variety of domains, they play a vital role in retail by enhancing traditional customer services in the following ways:

1. Handling Customer Queries: Chatbots can handle a wide variety of queries with ease and comfort. They offer a suggestive approach and, in many cases, are capable enough to provide a one-shot solution to user queries. 2. Real-time Assistance: In addition to query resolution, chatbots act as an assistance machine by aiding the user. This assistance could vary from locating a product to assisting the user in making an online payment. 3. 24/7 Service: Chatbots are available round the clock throughout the year. This enables global-style customer support that is convenient for all kinds of customers. 4. Reduce Time-to-Transaction: Real-time assistance is useful in converting a regular customer into an opportunity. Most chatbots are programmed with tendencies to act as up-sellers.

Casey's General Store launched its first gasoline chatbot in 2018, Ford started focusing on a chatbot to assist its customers with shopping 24/7, Burberry launched its virtual bot with Operation Art of the Trench, and Louis Vuitton has started investing money in building skilled AI vendors that are growing revenue between 10% and 15% per customer usage. H&M also boasts an AI virtual assistant through its platform Kik. The 7-Eleven store chatbot routinely handles 3,000 to 5,000 queries per day with 80% to 90% accuracy. It can also copy the store manager's style and has succeeded in lifting the average spend for e-commerce sales above the $50 mark with incentives as bonuses. Several retailers or chatbot systems that have been built for retail use have tangible results to share. Besides early research, academics have scarcely studied the area of chatbots as it pertains to retail stores. We will discuss the

commercial successes with chatbots in the section below. We also cover the major challenges that face chatbot technology in this domain. The future of chatbots in retail seems assured as the technology and practices both mature.

4. Implementation Strategies

The proper strategy of implementation will give a retailer the best services available. The proper approach shows that the retailer has a strong intent and is well-aligned with the business objectives of the service. The role of this particular strategy is to manage the regular data gathering and thorough processing that are crucial for AI training models. Only those models that are best suited to the specific complexities of the retail situation should be used. Essential is the method of training the model. Continuous growth is achieved through monitoring the operations by a KPI and retraining the model using this specific operation's feedback.

This strategy is likely to function well if executed and allows the model to develop its retail presence. Successful deployment: This segment concentrates on the measures that should be taken to productively automate customer service. Retailers' goals of seamlessly integrating into their business model must be carefully planned. The automation goals planning worksheet should be filled out to guarantee that you are targeting essential automatable consumers with a high likelihood of achievement. Retailers must collect enough data from customer reviews and feedback to meet the characteristics of each retailer's unique intentions. The datasets must be preprocessed to a point at which they can be used in a variety of models. A suitable model should be chosen that reflects the operation of the retailer—one model decreases prediction error for one retailer despite increasing prediction error for all other retailers. The method has been shown to be capable of fulfilling retailer needs. A training process should be established that allows the method's parameters to be fine-tuned. The metric should be used to assess the results. Clustering should be avoided because it is costly. Retrain the process by continuously retraining and learning using operations reviews and data.

4.1. Data Collection and Preprocessing

Data Collection and Preprocessing In the development of AI for retail customers, it is crucial to have access to a large amount of data, which can showcase a wide variety of usage scenarios and hence provide a better learning experience to NLP models. In addition, we regard more sources of information in this paragraph. First, customer data can usually be accessed in the form of transaction histories, complaints, chats with helplines, as well as social media postings related to products, services, and companies. Based on the quantity of information involved, formalized or semi-formalized models of customer satisfaction and dissatisfaction have been proposed. Nevertheless, we will focus on the data that is given when a retailer has access to social media postings and details of sales transactions. Ensuring the quality and accuracy of your data are now important prerequisites for the correct operation of any AI-based solution. Even if the company is provided with a large part of the data needed in a structured form, a time-consuming data cleaning process is usually inevitable. One important decision to take is if and how carefully individual samples need to be manually annotated. This decision is influenced by country-specific policies on data privacy and social restrictions. In general, we recommend recording some activities performed by the retailer in some detail, bearing in mind, however, that this will still allow market rivals to get a rough picture of the methods and tools used. It also shows that training AI models for customer problem-solving use cases implies that the available data can be used not only once but must be continuously evaluated based on the interaction of the model and the customers. In short, to develop such a system, it is important to first define the data sources and collection procedures, and then evaluate the quality of the resulting data. Data extracted from various sources must be finally aggregated and preprocessed to provide a data set that can be used for training the AI models.

4.2. Model Selection and Training

Model selection for automated customer service is the key to maximizing customer satisfaction and revenue. The selection criteria can include, but are not limited to:

Efficiency, which tends to be a top priority in retail applications, should be defined by business goals, such as choosing the model with the best performance on available computing resources.

Generalization aims at selecting the most reliable model that provides good performance on data it has never seen before. Diverse, noisy, and high-quality training data ensure that the

trained machine learning model can successfully respond to a number of customer questions and input types.

Data required for model training may influence architecture, algorithms, and procedures. Traditionally, the more data, the better, as a large amount of high-quality, diverse, and representative training data can drive better model development. It should be noted that pre-processing, choosing a format, and building a training set can be the most time-consuming. This can involve a few core processes, such as collecting and updating existing datasets, integrating real data with synthesized data, sampling from the training data to form input-output pairs, data labeling, and data augmentation.

Model training can be divided into two approaches: supervised and unsupervised learning. The main difference is that supervised learning requires input-output pairs, which are customer requests and the most correct and relevant responses generated by human agents or users, while unsupervised learning can be independent of the output and aims to reduce the amount of data labeling. The training process is a continuous improvement until the performance reaches a satisfactory level and should include at least three core stages: training to ensure the model learns as best as it can from available data, rejecting bad answers and storing sentences paired with a combination of strictly correct and acceptable answers, and monitoring models in production to detect anomalies and retrain with new relevant data. Model evaluation can help gather various key statistics as well as basic reasons for misbehavior, delivering valuable insights into customer needs and behavior. Model refinement should be done to adapt to new customer behavior and preferences in a continuous learning scenario. Interdisciplinary collaboration among data scientists and developers, user experience and visual designers, and interaction designers and retail professionals is necessary to ensure a successful training process.

5. Case Studies

The company was founded only three years ago but has already made significant headway in automating customer interactions with the retailers they work with.

The LWIS system can perform linguistic analyses of customer interactions in addition to using a machine learning model to detect anomalous customer behavior. This capability can

transform any retailer by drastically improving the way their customer service departments interact with the often hefty volume of online customers that engage on their website, while also eliminating the need for third-party project management software, and can be relatively easily integrated into existing customer resource management schemas.

The necessity of digitization in consumer relations, as well as retailers' exploding demand for AI-driven engagement tactics solutions, is also the underlying reason that the Lotte Department Store in Korea and others are using a mix of live chat and chatbots, enhanced by AI-assisted feedback tools to help customer support personnel further refine their ability to engage online with customers via chat. A retailer in Italy is also successfully using objective-driven chatbots to effectively converse with customers and clients in Italian, as well as conduct basic e-commerce transactions, including purchases of wine delivered directly from the vineyard.

As the case in focus, a significant and common pain point that displaced customer interactions present to retailers necessitating automation is taking a great deal of time to process. It's no wonder that such retailers are gravitating toward solutions such as chatbots, language processing, and advanced analytics in the verticals at which each of the companies reflect in these case studies is centered. Therefore, the lesson learned in this section is that a retailer's background, whether it be augmented customer relations or e-commerce, need not necessarily hinder them from embracing AI.

5.1. Successful Implementations in Retail

Retailers Who Did It

Nordstrom, an upscale US retailer, implemented online and offline customer service automation using a machine learning platform for a fashion customer service chatbot called "Mona". Nordstrom used a semi-supervised paraphrasing method to maximize the reuse of existing training data. The work involved customer-interfacing systems and dealt with user-generated text, natural language understanding and generation, and personalization. Instead of solving problems at a specific technology level, this solution bridged discrete technology levels for an end-to-end system.

The retailer points to several challenges confronted by a combination of online and offline customer service. Nordstrom applies AdaNets and TFX as their technology stack for the ongoing management of automated customer help. The biggest lessons learned from the retailer case are how much this kind of automation really impacts customers. AI and bots are often discussed in a way that emphasizes the technology, but doing so would be a mistake in retail, since customer service operations might be as much an art as they are a science.

Grocery Retail

Smallgrove is a Netherlands-based online grocery retailer. The retailer's customer assistant uses many data sources to answer their customers' queries such as allergen data, recipe data, and product data. Their customer assistant is a pre-filled knowledge assistant and works without NLP, and the customer assistant can send product inspiration or give a recipe. The company used a platform to connect their systems, such as recipe data and products, in order to respond to the user's question. Another retailer, Picnic, offers the first 100% online supermarket in the Netherlands. They use a chat interface to allow people to order groceries. The Human in the Loop product scores the model's performance with a simple analysis and allows the Human in the Loop team to iterate and update. The company leverages a cloud service for small predictions and uses a dialog platform to scale up.

6. Future Direction

We have entered the next chapter where the evolution from 'just' AI has become a reality. Examples of emerging trends include the use of deep learning for enhanced personalization, specially designed robots that operate with a degree of self-proprietary mechanisms, and the expansion of NLP advancements with the potential to reduce the perceived lack of quality in communication by chatbots or researchers with language impairments. We also foresee a further and deeper integration of AI with the IoT. In the integration with retail and logistics, AI can be utilized for improvements in the supply chain through early predictive replenishment and dynamic pricing. Personalization and emotion recognition, if reasonable and accepted by the customer, could also be transferred to increase advertisement impact by adjusting the marketing material according to the customer's emotions. Advanced natural language processing will lead to autonomous customer service at a higher quality level through a further evolution of chatbots intertwined with a full understanding of the

interdisciplinary queries of the user. The challenges in the integration between automation technologies and IoT devices will predominantly be in ensuring technological alignment, such as semantic interoperability in exchanging information among devices. Moreover, further research would be required for the engagement of all potentially interested stakeholders, including authorities, end-users, robot and automation developers, and retailers, in recognizing and developing the potential. Consequently, focusing on the ethical aspects of these new technologies, such as privacy and the sustainability and ecological impact of implementing these devices at a large scale, is critical. Automation and developments in society always fluctuate as one seeks to maintain a competitive advantage. There are always jobs that may be lost or marginalized due to the advancement of technology. However, history has shown us that new occupations emerge from these processes of integration between human-human and human-machine interaction. The discussion regarding future customer service within retail may decrease in the number of general inquiries. However, discussions regarding future integrations and the emergent challenging inquiries will always exist. New understanding will be required when combining future integrations of AI with other apparatus. Further research is required to investigate how much our understanding of AI can be developed and the ways in which it can be transformed by integrating with other industrial applications.

7. Conclusion

Advances in AI and machine learning have already begun to transform customer service, finding increasingly granular ways to identify successful strategies for customer interaction and providing tools to both automate and guide human actions. Automated customer service in retail can be effective in providing efficient and effective service. The case studies show latent benefits to implementing operational strategies to ensure the effectiveness of the automated service system. Whether implemented in tandem or on their own, operational improvements in the management of automated service, such as the prioritization of longer communications, system response to topic switching, and more effective escalation strategies, synchronize behavioral bottlenecks with automated systems in such a way as to allow for a faster and more fluid shopping experience. However, automated customer service systems are exceptionally difficult to engineer because of the inability to forecast "unknown unknowns"—behaviors, signals, or features from either the user or the environment that are

unpredictable and either did not exist during the training data collection or were not recognized as causally relevant. As a result, retailers should approach automated systems cautiously and deploy them in systems with manual service support in order to calibrate the system's effects. Ongoing research should continue to address how to provide automated customer service in increasingly challenging and complicated retail settings.

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