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Chapter 7: Customer service automation in finance using natural language processing and artificial intelligence chatbots

7.1. Introduction

The increasing demand for online customer service at lower costs and with reduced time to resolve a problem drives finance companies to think about their customer engagement strategies in new ways. Websites, mobile apps, kiosks, text messaging, live chat, social contact channels have improved customer experience and allow customers to reach out to companies most easily; yet many customers still prefer human interaction. At the same time customers expect the same level of service at any time of the day, any day of the week. Service agents cannot be the solution here, so companies look to customer service automation as a viable solution. Automating service requests can greatly reduce operational costs, enhance customer experience, and better utilization of human support resources for more complex queries (Brandtzaeg & Følstad, 2018; Chatterjee et al., 2020; Accenture, 2021).

Artificial Intelligence, Natural Language Processing, and Chatbots allow agents to augment their work and greatly improve the customer experience at lower costs. Many companies are using Chatbots in their customer communication strategy, and enhancing their systems continuously to improve their customer experience. The various communications channels where customers reach out to companies are continually growing. Each channel acting more as a silo, companies cannot take a unified view of their customers. Servicing customers on different channels using multiple agents is inefficient, requiring a higher number of support staff. Existing systems require considerable time to be trained by customer service department specialists, but companies are constantly increasing their customer base, and expecting staff not only to respond to customer queries in a timely manner, but also respond accurately, and respond

"Now". AI and Chatbots help you not only to better manage the volume, and variety of customer inquiries but also improve resolution quality and speed, so the experience is seamless for the customer (Deloitte, 2019; McTear, 2020).

7.2. The Role of Natural Language Processing in Finance

Natural language processing (NLP) is a branch of AI that focuses on the interaction between computers and humans through natural language. The ultimate aim of NLP is to allow computers to understand, interpret, and manipulate human language so that people can converse with the systems in the same way that they normally converse with each other. The journey of NLP began in the 1950s with simple tasks such as machine translation, and has evolved over time to tackle complex issues. NLP can enable computers to transcend the barrier of understanding human language, thus opening the doors towards more efficient means of communication. The next step in the evolution of NLP is to create programs that perform the common-sense tasks that people perform without effort. Due to the growing influx of textual data in the financial domain, the applications of NLP are also increasing. Today, researchers are developing NLP applications which span the entire area of financial economics ranging from capital market behavior to corporate governance to corporate finance. Given this specialization of NLP systems for finance, it is imperative that they understand the nuances of the financial domain that make it different from other domains. Our work builds on the growing synergy between NLP and investments, and particularly on the evidence that firms engage in meaningfully different levels of information ambiguity. We begin our discussion by outlining the challenges, opportunities and existing gaps in using NLP in finance. We then elaborate on the tasks for which NLP has traditionally been used for finance – tasks ranging from sentiment analysis to more esoteric areas like informatics and discussion and debate. Our goal is to review the current use of NLP in trading and provide a blueprint for what it is, its limitations, its future potential and why it is important for money managers to understand.

7.3. Overview of AI Chatbots

Chatbots can be defined as Artificial Intelligence tools that simulate conversation through auditory and/or text methods, providing automated customer support 24/7. AI Chatbots can effortlessly manage basic customer queries, filling a gap normally reserved for cheap non-AI automated interfaces. This is noteworthy since chatbots are able to resize cost to the business while maintaining a high level of customer experience and privacy. Businesses implementing AI powered chatbots have generated and supported various advantages such as cost-effectiveness, productivity growth, and service quality.

Virtual agents take on a number of different names like interactive voice response Telephone Bots, Chatbots, or Dialogflow; the name largely depends on the medium of request, possible delivery method and channeling agent chosen by the company. Requesting Chatbots, Chatbots written in the form of Twitter accounts that respond to directed messages, requesting a Phone Bot, a chat or chat request followed by a phone dialing for conversation with the agent on a specified telephone number; delivering an IVR, a Bot In Charge of the telephone conversation, delivering a voice call with messages automated from the Website, Facebook Page and its Messenger, willing a Chatbot stored on the originating Web Site, stored on the Messenger service that enables interaction with the Messenger Chatbot. These examples illustrate the high diversity of both self-consideration and request-generation interfaces, which has emerged into the very general and current technology commonly referred to as Chatbots.

7.4. Benefits of Automation in Financial Services

Automation has changed how we operate in our day-to-day lives and is gradually being accepted in multiple sectors. However, in finance, risk and compliance with the relevant laws and regulations have been areas that have been staunch about sticking to their traditional ways of working until date. This has made the customer service process in finance tedious and expensive. Increased technology adoption during the current pandemic has brought this area into perspective and many institutions are realizing that automation and technology solutions could actually make service more efficient and customer friendly.

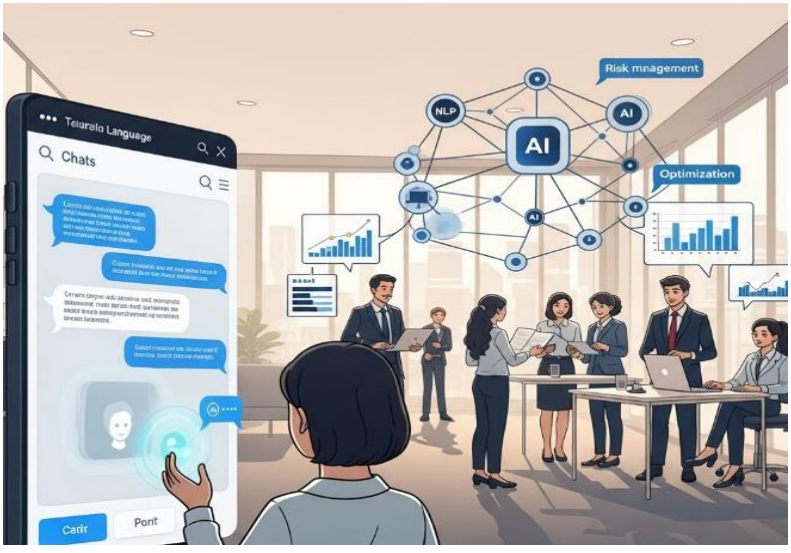

Fig 7.1: New Era of Customer Experience in Banking

The pandemic has made companies realize that they can operate with a fraction of their traditional workforce while also supporting their customer base through virtual or automated means. While companies are now evaluating options of both operating models, hybrid and/or full automation will become a mainstay, thereby supporting the cost for companies and experience for the customer.

In the traditional model, the cost for a financial company to service its customers has been a huge percentage of their asset value. Any delay in response to query resolution means that the costs continue to escalate. By adopting automation and chatbots, the service cost is reduced and a customer need not wait hours or days to get a response for their query. Technology solutions are available where all possible queries of a customer can be pre-empted and automated accordingly. For specific queries where a customer has had prior interactions, the chatbots can collect specific parameters and direct the user to the right team, reducing their time spent on transferring systems or talking to multiple associates in a business.

7.4.1. Cost Reduction

Artificial intelligence technologies have been used in customer service to optimize costs and performance for many years. Certainly, the recently rising star (and relatively traditional) AI technology for contact centers is the so-called "bot". These AI systems have made their way into contact centers with a vengeance over the last two years and they are there for a quite logical reason: they can be extremely cost-efficient. Contact centers are often among the largest cost buckets for frontline support and so it is no surprise that companies begin to look into extreme solutions to reduce those costs.

Most leading banks have invested heavily in contact centers in the hope of making it simpler for their customers to communicate with them. The banks have introduced IVR systems that are designed to identify the general nature of a problem or question and to direct it to a specialized department that can best solve the issue. But these systems are very expensive, and customers increasingly do not have the patience to be transferred from one department to the next. So banks have desperately gone searching for the holy grail that will solve their contact center cost problem while also giving their customers an easier and faster way to complete their requests. Bots may be that final solution – at a cost that is a fraction of the existing contact center costs.

The reason for the greatly sagging costs is simple: bots can automate some of the most boring and ugly customer contacts that were previously undertaken by call center operators. These are among the most expensive customer contacts, and banks have long had a rich motivation via customer complaints to reduce or even eliminate them. Bots can handle issues 24/7 and require minimal human intervention.

7.4.2. Improved Efficiency

Most businesses have peak hours associated with customer inquiries. When done manually, customer service can be a labor-intensive function during peak hours. An obvious solution to this is reducing the number of agents answering calls at busy times with the introduction of interactive voice response and intelligent automated chat on digital platforms. Tracking ups and downs in customer inquiries at various points in time, it is possible to ascertain the business hours with minimal requirements for CSRs. For most businesses, an estimated 20% of customer queries accounting for close to 90% of call volume will be eligible for automation. By employing AI chatbots and natural language processing technology, companies are making it possible to automate these commonly asked queries. Such applications won't offer solutions for everything, but for a large chunk of routine queries that aren't even of the highest value within customer service, but take up a huge amount of human labor and time, customer service automation can make customers happy by improving response times and at the same time save the organizations significantly.

This frees up the remaining CSRs to better utilize their time and their superior skills on the non-routine complex and high-value inquiries. These complex and non-routine inquiries usually need longer responding and sometimes multiple touchpoint processes via chat and phone, where human empathy is a plus. While financial institutions have typically instituted higher rates of first-contact resolution compared to other industries, the availability of intelligent virtual agents equipped with natural language processing to script and guide customers through detailed troubleshooting can drive first-contact resolution rates even higher. Additionally, greater productivity from fewer but better-trained human contact center agents can drive improvements in customer satisfaction scores over time by better a website customer experience.

7.4.3. Enhanced Customer Experience

Companies in the Financial sector compete mainly on two points: price and customer service, both aiming for customer retention. Since price competition is not sustainable, financial service organizations focus on providing better customer service. With the introduction of technology and self-service solution automated Chatbot, customers prefer contacting companies through these channels instead of calling. Customers need not wait for long periods for the company to respond to their queries. Convenience drives customers to use Chatbots for interactions. And companies are also investing in these technologies, as Chatbots save time and money for both companies and customers. But Chatbots are not only done for cost savings or convenience. They are also used to proactively engage customers. Companies can take use of Chatbots to interact with customers for products and services. Financial service providers use Chatbots to obtain

the required information from customers and suggest suitable products. They act as, - Product & service recommendation engine, - Product and service issuers, - Customer service assistants, and, - Customer engagement engines. However, the greatest benefit Chatbots bring to the Financial Services sector is through its use in Customer service automation.

The Financial services industry has a high level of interaction with customers. Customers contact banks frequently during the day, be it for a balance enquiry or a funds transfer issue. A major share of the operating cost is due to Customer care. Chatbots help automate most of these interactions and allow human agents to handle the high-value calls. Mission-critical support staff will have more time available to respond to high-value issues, moving customers and businesses towards increased trust and engagement. With the modern chat interface and instant response times, Chatbots are able to delight customers. There is an immediate gratification for customers, customer issues are easily resolved, leading to happy customers and brand loyalty. By using Chatbots in Financial Services, banks will be able to create a channel which feels less transactional and more relationship-oriented.

7.5. Challenges in Implementing AI Chatbots

Chatbots are difficult to build due to several technical challenges. Data privacy issues are important in finance because of the sensitivity of the data involved. Unreasonable user expectations regarding their capabilities as AI becomes more prevalent also hinder their widespread adoption.

Today's chatbots cannot be expected to engage in conversations as a human would. Especially in finance, there are many tasks that may seem easy to users, but cost millions to build to a satisfactory level. The technology is still limited in many respects. Notably, building a chatbot that can handle multiple topics, maintain context and carry out sophisticated tasks is still an unsolved problem today. Users may appear willing to accept task-based design constraints, but they are still easily disappointed. Chatbots still face challenges in recognizing entities, performing out-of-task requests, maintaining a conversational context, understanding humor or sarcasm, providing a correct response, and general usability concerns. Multimodality is another unresolved problem.

Chatbots open a plethora of data security and privacy issues. In finance, collecting and processing personal data of customers is seen as serious violation of regulations. Users need to be made aware of all terms and agreements if such data will be shared with third parties. However, organizations still risk facing sanctions for unintentional disclosures. Chatbots will need to be able to comply with these intricate and diverse set of regulations. Additionally, chatbots can trivially save user conversations for training and

performance purposes. Such anonymized data could reveal sensitive user data, necessitating their secure disposal. This could potentially deter companies from adopting superior chat-based services.

The more advanced intelligent chatbots become, the closer they get to human capabilities and the more other types of chatbots will be ignored by users. However, user acceptance is not simply a product of naturalism in conversations. Users may feel uncomfortable engaging in conversations with AI chatbots because it is more metaphorical. Because humans cannot see the AI's flaws, they may be deceptive. It is simpler and less stressful for users to engage in a conversation with a chatbot which is clearly not human. In finance, services are often used for crisis needs, but service accounts for only a tiny fraction of customers' daily interactions with a provider. Thus, the temptation to accept lower-quality chatbot conversations in return for the 24/7 availability of AI may not be sufficient.

7.5.1. Technical Limitations

In the field of artificial intelligence (AI), chatbots are among the most well-known applications due to their widespread availability and use. These service agent programs are being deployed on companies' websites, allowing them to replace human operators to resolve queries from online users. An immense consortium of businesses and financial services was early attracted by the fact that chatbots would avoid customer support tasks performed traditionally by live agents. Such functionalities are time-consuming and labor-intensive. The burgeoning availability of AI chatbots promise lowered operating costs, better turnaround times, tailoring services through customization, and response consistency. They have been trained for a wide range of tasks, including implementation of popular messaging apps. Major financial services have engaged in playing the proverbial devil's advocate by investigating possible flaws in AI chatbots and examining the nature of services banks are able to deliver via chatbot and how customers' expectations and experiences shape chatbot interactions. Such companies have deployed several experimental approaches, ranging from no real services to simple links to extensive services. Services that banks have tested thus far include branching menu, face recognition, mole and oil plant recognition, and simulated telephonic authentication.

Despite the great promise of employing chatbots in sensitive spaces, such programs do suffer, as do all AI implementations and related systems and robots, from numerous limits that tend to restrict their actual effectiveness. The three principal classes of limitations are technical limits imposed by chatbot capabilities, legal limits imposed by privacy and data protection laws, and social acceptance limits imposed by the human users possibly dissuading them from using chatbots of any sort. Although significant progress has been made in AI in recent years spurred on by research using deep learning,

important technical limits on chatbots remain. Program capabilities and functions are very restrictive at present. Only very limited types of end-user requests can be competently processed and the knowledge built into them is very meager. Perhaps more importantly, the generalized and actual learning function of chatbots does not exist yet even in leading industrial implementations.

7.5.2. Data Privacy Concerns

A current pressing issue is how organizations can develop and implement AI chatbots while ensuring the required legal protection of user data and other privacy concerns. This assumption is based on the GDPR article on privacy by design which states that organizations shall have in place technical and organizational measures which are effective in implementing the data protection principles. Without purposeful measures to ensure data protection, the trustworthiness of a newly introduced service may be negatively affected even before its launch. Trust towards a newly introduced technology is an important determinant in using a new service or software. A previous study confirmed that the relationship between trust and intention to adopt emerging technology in the context of Fintech services including AI chatbots is significant.

Data privacy is seen as a major determinant in technology-use and service-adoption decisions. In the case of using AI Chatbots in Finance Service, privacy concerns can be mainstreamed into two main dimensions, actual risk and perceived risk. The first one covers the idea that actual authentication or unauthorized access by hackers can lead to negative events, such as data loss. The second one explains the idea that any end-user imagines and believes that a hacker can take possession of their accounts or login data which could lead to negative consequences. Building the customer's relationship around the privacy aspect is extremely challenging. The research indicates that, while financial services companies are perceived to be leaders in AI adoption in general, people are still reluctant to use AI to engage with these brands. Data security and privacy concerns continue to hinder the financial services industry from adopting AI for more purposes. In particular, more than 76% of the consumers who do not want AI in financial services have concerns about data security and privacy.

7.5.3. User Acceptance

A sub-branch of the acceptance theory, the Unified Theory of Acceptance and Use of Technology (UTAUT) adds to and discusses 4 main aspects that lead to user acceptance, namely Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Each of these aspects relate well to user acceptance of chatbots in general and hence, financial chatbots in specific. In detail, Performance Expectancy relates to

the degree of acceptance by users on getting additional advantages in their tasks by using the technology, where this aspect is expected to have a strong impact on user acceptance. It can be stated that for the specific area of financial chatbots, users are expecting help for specific tasks no questions asked meaning that their whole experience has to be beyond what they've been looking for in terms of performance since finance is there to manage personal economic situations, which usually require them to have experience and additional knowledge on what's going on. Users who have to deal with finance issues usually search info but are overloaded, by examples such as choosing recommendations for funds but with the investment decisions guiding them constantly changing, this leads to the need for a helping hand.

Various methods have been proposed to overcome these issues with user acceptance, which basically focus on the development and guided bonding of the model given by users to the chatbot with the most prominent one being a guided conversational approach. It can be questioned if it is really needed to guide users through the specification of their financial situation by conversation in order for users to bond with the chatbot. Exploring if there are special architecture designs, especially for financial use cases, such chatbots could learn the modeling of their users without additional help, by learning so-called intents based on how users converse with them over time, meaning training the chatbots on observing financial use cases.

7.6. Case Studies of Successful Implementations

The following is an analysis and examination of popular examples of chatbot implementations in customer service within the financial sector. The companies selected represent key segments of the financial services sector and include a banking institution, an insurance provider, and a global investment company. By reviewing specific implementations and with a focus on the success of these initiatives, insight is provided about current chatbot operational characteristics, relevant challenges, and best practices. The hope is to provide an effective guide for other financial organizations looking to pursue similar strategies.

Bank of America rolled out a wide marketing campaign for the chatbot it called Erica in 2018. The chatbot restores to customers within the bank's mobile application financial information and provides digital assistance with processing transactions such as bill payments, fund transfers, and credit score inquiries. Erica also provides advice about the banking institution's services including credit cards and loans. Bank of America reports that more than seven million clients have engaged with Erica since release.

The company has stressed the importance of human control over the chatbot, with Erica identifying naturally when a customer inquiry is too difficult for her to process. When

asked to perform a task like phone fraud detectors during hours they are closed or forgot a login code, Erica was able to independently recognize this inability. In those events, Erica transferred the client to a 24-hours-per-day, seven-days-a-week telephone interaction system.

Bank of America's Erica is one of the most successful chatbots made available by any financial institution. The chatbot is intuitive and provides a variety of functions. Most importantly, Bank of America has been proactive in ensuring customer satisfaction through increased accuracy and correct messaging.

7.6.1. Banking Sector

The banking industry offers many opportunities for natural language processing innovations and already deploys a great deal of automation. In the banking sector, conversations about missions and existing services are a logical first touchpoint for conversational experiences. For banks, these operations only represent a small proportion of actions when taken individually, but their very large quantity makes them costly. In addition, the answers often require humans to mobilize, especially when the answer is no longer available in a simple knowledge base. The largest banks have chatbots on their websites, particularly to facilitate navigation and answer questions on products.

These bots are used mainly to manage alerts or provide information such as operating hours or information stored in product brochures. Requests are often passed through machine learning filters or question-answering engines before being routed to back office services. European banks have launched an initiative on financial chatbots, who speak multiple languages, as do their server solutions. The goal is twofold. First, the chatbot aims to answer frequently asked questions about video on the web. Then, it aims to learn specific snippets for each of the banks in the network and be able to answer in real time using both knowledge bases. Bank chatbots are triggered by keywords but do not yet integrate the concept of dialogue. Financial institutions also use a customer 360° platform based on deep learning and a combination of answers to automated emails from companies and by hand. The platform aims to automatically classify customer requests and generate real-time answers in multiple languages.

7.6.2. Insurance Industry

The adoption of virtual insurance agents has been slow compared to the banking vertical, however, insurance is set for significant change driven by the affordability and promotion of mobile devices. The unique complexity, uncertainty, and diversity of

customer requests in the insurance industry leads to frequent customer frustration when dealing with traditional customer service channels. Simple customer queries such as How can I buy this policy? or When is my last payment? are often the trigger for customers to seek out a chatbot rather than the traditional call centers or websites. Additionally, the insurance industry faces other challenges; a significant percentage of insurance executives claim that their focus on customers is one of the top three barriers to profitable growth. Other challenges are digital and demographic disruptions, as new distribution channels are diminishing the importance of traditional agents in the overall insurance business. By embracing customer service automation solutions that leverage NLP and AI, insurance companies can streamline communication across business functions, provide better service, and often complain about the inconvenience of having to contact various departments, such as collections, customer service, claims, and underwriting, to complete a single task.

One insurtech startup focused on making insurance accessible for all is an online technology-driven company that is building the global insurance platform, empowering companies to offer the fastest and fairest insurance products in the world. The company uses AI-driven sentiment analysis to identify whether a particular claim or insurance-related customer interaction will result in a positive outcome and a secure connection, or a negative outcome, such as loss of money and trust. By automating those claims that are known to result in a negative outcome for both parties, the company helps the insurance firm focus their human resources where they are the most needed while recovering money from fraudulent claims.

7.6.3. Investment Firms

An investment firm that uses chatbots is the French online bank Boursorama, a subsidiary of Société Générale. It was the first bank to develop a chatbot that works by NLP. The chatbot, named "RoboBoursorama", uses machine learning to converse with customers in a natural way. RoboBoursorama can respond to 90% of clients' questions and handles between 150 and 270 daily requests. This cybersecurity bot can also deal with operations that are commonly used by many clients and provide contextualized advice. It focuses on ease of use by suggesting several questions to guide the conversation for those not accustomed to natural language use. More recently, Boursorama has shifted towards a hybrid mode, integrating both chatbots and human advisors. The bank is now testing the addition of voice at the checkout level. As with Boursorama, investment firms have been working with chatbots for quite some time. Other companies have also brought them on. In these firms, the bots usually answer FAQs or carry out simple operations via the customers' account, such as transferring money from one fixed deposit account to another or looking for online tax documents

using on-demand chat services. A few investment firms are taking it a step further by proposing personalized and/or investment service bots. For example, one bot can recommend users specific investment strategies depending on their age and financial goals.

7.7. Future Trends in Customer Service Automation

In conclusion, customer service automation in the finance industry, especially with the utilization of AI and NLP, is no longer on the horizon, it is with us, here and now. There is no denying the fact that AI is set to change the landscape of customer service department in finance for the better, with lower profit-loss margins. This essay explored a range of use-cases of automation in the FSMC department including having a unique chatbot for KYC, NLU/NLP-based customer service helpdesks, OCR-assisted chat transcription, Long-Short Term Memory networks for fraud detection as well as chat automation in fintech apps. The journey to deploy these automation technologies in the FKYC vendor tech stack, while not completely smooth, is ongoing. The future of customer service automation in finance is bright. We expect to see further advancements in NLP that will enable technology to realize human-level understanding of all forms of human languages. When this happens, humans and machines will work better together in this vertical. This will happen via greater market education and tech enablement, since NLP APIs will become even cheaper and easier to use, and via greater ability for technology to solve new use cases with no labelled data. Customer service helpdesk ticketing will still be a successful use case but especially if it contained bank customer typing units and messages from problematic tickets. More banks will set up customer service call recording and utterance testing capabilities to do error analysis. Having live customer service call log files and monthly performance reports that list questions that confuse the bot will help bots be web scrapers. The key elements of traditional call center operations will still remain relevant.

7.7.1. Advancements in NLP

Natural language processing technologies are moving at a record pace, as recent announcements from key players demonstrate. While there are still essential challenges to solve, large language models are making it increasingly viable to handle customer inquiries in natural language fully automatically across different channels — voicemail, chat, social and in the future also video. Seizing on the innovation, user experience companies are proposing products enabling enterprises to get onboard fast into the new LLM world and offering a shortcut to existing intent classification and paradigm-based NLG solution. In parallel, existing application and solutions providers' businesses are

growing. Providers are seeing increased demand for customer service automation software, for use cases in both customer-facing and employee-facing support, as enterprises from various sectors are looking not only to deflect support volume but also to improve support operations and reduce costs.

For enterprises looking to augment their customer service support operations or LLMs, specializing service automation, whether implementing a chatbot or automating email responses, new solutions from established service automation solution providers and newcomers make implementing LLM-based solutions easy. As technology continues its advancement, companies are starting to realize and enjoy the benefits of increased conversational AI deployments. Having appropriate customer intent data to build systems capable of serving twenty-five to eighty percent of incoming queries within a week of implementation, brands that are deploying conversational AI along with intent classification in for Customer Service face competitive advantages compared to brands that are not leveraging technology.

7.7.2. Integration with Other Technologies

Advancements in NLP have propelled the capabilities of AI chatbots, now enabling them to handle increasingly complex conversations. Nevertheless, there exist scenarios where it may be ineffective or even impossible to manage conversations using a single communication channel, or where the usage of a single technology could not provide a satisfactory experience for the end users. In such contexts, an effective integration of AI chatbots with other Customer Service (CS) technologies may be needed.

In particular, for some tasks corresponding to frequently asked basic information (checking the account balance, branch opening hours, etc.), the first level of support can also be provided by Interactive Voice Response (IVR) systems. However, rather than replacing IVRs, AI chatbots can be integrated with the existing IVR systems to provide a unified customer experience across all customer service channels. Essentially, this integration enables to expand the capabilities of the users for information requests with natural language.

The superior capabilities of AI chatbots can also be integrated with VOIP/telephony technologies by associating them with call routing functions. For instance, once an AI chatbot “understands” that the issue requires the attention of a live agent specializing in a specific subject, it can trigger routing call instructions to hotline users via the call/VOIP system in use. A proof-of-concept of such integration was presented as a hybrid chat-calling system, where the customer chooses to switch to calling mode from chat. More sophisticated arrangements allow the chatbot to trigger the call transfer seamlessly, also while the customer is connected on the line. Such hybrid chatbot-VOIP systems are in

use in several sectors, allowing CS/tech support calls to be directed toward humans only for more specific user needs. Both options can increase the overall efficiency and reduce costs while ensuring a satisfactory user experience.

7.8. Ethical Considerations in AI Chatbots

Despite the broad applicability of chatbots, their use has been controversial and has invited criticism. These criticisms could be classified under the following two broad headings: the fact that chatbots might exhibit bias leading to anti-social behavior and the lack of transparency and accountability in chatbot decision-making processes, thus making it impossible to hold anyone accountable in case of undesirable outcomes of their use.

A positive evaluation of an AI chatbot's performance is that the response it gives a user is what the user expects or desires the chatbot to give. In its simplest form, this denotes that the correct intent behind the user's utterance has been identified and the proper action has been chosen based on that intent. However, there are many instances in the working of chatbots where they have, against all expectations, given bizarre and seemingly erroneous outputs. Such chatbot responses are termed "toxic" or biased and represent a form of ethical failure in their operation. This representation of ethical failure may be troublesome in customer service. A user seeking help might receive insensitive or superficially fulfilling anti-social help which might lead to bad outcomes for these users.To take a concrete example, let us say the action of a chatbot is to deny a home loan to a user based on an analysis of historical data and make no further recommendations. Without the necessary context or explanation as to what has led it to arrive at this decision, it's impossible for anyone to take any remedial action. The reason behind such action is important for two connected types of issues. The first is to allow users to go beyond the behavioral level of the chatbot to figure out what is going wrong in case of a problem and the second, to encourage the chatbot designers to examine their systems for any possibilities of harm hidden by bad outcomes. This issue of lack of confidence initially arose with chatbots powered by machine learning, whose inner workings were opaque. While this transparency issue has been addressed to some extent, scrutiny of some available models shows that they have developed harmful capabilities that remain hidden despite employing workarounds.

7.8.1. Bias in AI Models

In this section, we will examine the ethical challenges of customer service automation in finance using AI chatbots and their possible solutions. The problems specifically include bias in AI models, transparency, and accountability and can be generalized to

various automation scenarios using AI, such as finance, health services, and many more. Bias has appeared in various AI models, such as facial recognition, biometrics, and video classification. Different demographic backgrounds (gender, education, income, and ethnicity) can lead to biased geolocation predictions using the model. Findings of bias in AI and predictive analytics in finance indicate that models are complex and static and cannot adapt to the user, and there is no incentive mechanism for a service provider to design non-biased models and keep them up to date. Moreover, device data (location, device tracking, etc.) are biased due to the increasing usage of smartphones, tablets, and wearables. Problems include lack of datasets in special demographics, lack of demographics modeling for specific usage, and few inexpensive, quick, and privacy-preserving techniques to balance bias in parameter estimation, to keep devices private. Bias in AI model outputs could lead to negative effects on both users and vendors. In a finance chatbot scenario, for example, if a consumer's credit decisions are judged unfairly biased based on their age demographics, it may lead to a risk of losing their life savings and reduced trust in financial institutions. Bias justification directly impacts vendors as well due to possible lawsuits, publicity, fines, and loss of customers.

One approach to solve the problem is to gather more and diverse data samples and enlarge datasets. However, gathering diverse data samples becomes harder due to conversation and communication constraints and privacy and security issues. The services and financial products are biased to the specific group and thus can lead to biased results. Hence, a bank should either build and maintain a chatbot for each user group (e.g., demographic backgrounds) or earn good rewards from customers to provide recommendations that minimize the bias in its AI model. Bank resources may be inadequate to achieve the goal.

7.8.2. Transparency and Accountability

Transparency and accountability are essential principles of the ethical use of AI, as they help to foster trust and public confidence in humans, organizations, the government, and the systems themselves. While it is generally accepted that AI models are too complex for individuals to understand, explainability of complex AI processes, as well as compliance documentation, are key parts of responsible AI systems. The ability to demonstrate internal accountability mechanisms is invaluable to help AI providers and vendors prove that ethical practices are assumed and practiced through every stage of the AI lifecycle. Applied in fintech, AI chatbots may cause direct concern in customers because of the financial implications of a faulty AI decision. In these cases of high-stakes models, having interpretable explanations is a necessity and, therefore, auditability through external explanation methods consistently used over the entire AI lifecycle are mandatory for chatbots, banks, and other organizations adopting them.

Chatbots have been in the financial market for a few years now, but the innovations they bring to Customer Service processes are suffering from an ethical blackmail in hindsight. Because of the unique finance service environment – where trust and responsibility must be at the core of any interaction -, chatbot implementation need to focus on internal, constructive reflection and documentation, demonstrating decision-making accountability. Financial institutions will need to engage into more proactive storytelling and will need to be their info guides until the companies are felt accountable and the customers served.

7.9. Regulatory Frameworks Governing AI in Finance

Natural Language Processing and AI chatbots are already the focus of regulatory consensus in the financial sector since they are typically integrated with underlying services that are clearly subjected to pre-existing regulation. For instance, Knowledge of Your Customer and Anti-Money Laundering laws, which target lenders, private banks, notaries and other actors that intermediate between investors, money and companies, impose on them a duty of vigilance and to verify that the resources that investors use to purchase financial products come from legal activities. Similarly, the prospectuses that investors must have to consult before investing in startups, as well as various regulations including the Suitability Rule that govern the conduct of Banks, Intermediaries and Fund Management Companies, impose pre-established content obligations. These regulations will remain essential for the protection of consumers and investors, since companies that utilize chatbots to provide customer service in finance cannot substitute their responsibility for the content of the answers, and for the quality of the service provided, with AI.

On the other hand, other aspects of AI systems, especially chatbots, are likely to be potentially harmful for consumers and citizens, such as the choice of data on which such systems are trained or the transparency of the algorithms and of their underlying models. In addition, AI systems may also conduct themselves autonomously, making decisions without human supervision, and be responsible for the decisions they take and their consequences. To the extent that the use of artificial intelligence by financial actors modifies the way services are provided to consumers of financial products, then new regulatory needs may arise in order to protect consumers and citizens from harmful consequences. These new regulations are likely to be aimed at addressing both market dysfunctions and market failure related to the services provided by bots, as well as at ensuring fairness and protecting essential user rights and freedoms.

7.9.1. Current Regulations

The financial industry is one of the most regulated sectors, with legislation and supervision dating back to the Great Depression. In more recent years, the implementation of Basel III required countries to pass numerous regulations aimed to strengthen their financial systems following the Global Financial Crisis. As a result, a plethora of new regulatory requirements emerged, which contributed to the creation of a no-wall environment, increasing the amount of regulation that banks and AMs are subject to. Among the most relevant regulations, we find suitability and scalping rules, cybersecurity laws, fitness standards, and Client Data Protection laws.

The SEC and the CFTC implement numerous regulations for the finance industry, where both agencies have a regulatory "say" on the activities performed for AMs and HFTs. Both agencies have broad authority to regulate INTs that provide advice for a fee. In this sense, the SEC has established a framework that addresses the obligations and duties imposed to Investment Advisers providing advice with respect to securities accounts and needs of private investors under the Investment Advisers Act of 1940.

Fig 7.2: Revolutionizing Customer Service in Banking

The CFTC primarily regulates commodity trading advisors for acts regarding commodity interests under the Commodity Exchange Act. Commodity trading advisors must register with the CFTC and become members of the National Futures Association. In addition, in the United States, the Commodity Exchange Act of 1936 requires that

commodity pool operators and commodity trading advisors act in the best interest of commodity pool participants or customers. The act demands these advisors and operators disclose all material facts relating to the commodity pool's business and risks associated with the pool's trading strategy. Also required is a description of the operational and financial arrangements for the operation and management of the commodity pool.

7.9.2. Future Legislative Trends

The use of AI, especially Generative AI technologies, in various fields has exploded in use over the past two years. These models show extraordinary capabilities in generating text and images while performing pattern recognition tasks such as generating, completing, and implementing computer programming. These developments raise important legal questions about how to fit these revolutionary technologies into our existing regulatory and legal structures. Regulation of issues related to fact checking the veracity of content, copyright, ownership, and potential for abuse and harm are critically necessary. The major area of concern in finance is how do we regulate for wealth management and financial advice? How do we regulate the equivalents in executing trades, including high-frequency trading, and compliance? As mentioned earlier, there are no existing regulatory structures specifically governing the use of equivalents in Finance.

Moving forward, it is likely that we will see the development of hard laws such as regulations and statutes regulating specific use cases in finance. Additionally, we will also see guidelines developed by governmental and non-governmental actors for establishing best practices and use cases in finance. Finally, we should not forget the role of market forces in regulating the use in Finance. Financial institutions are particularly sensitive to public perception and corporate reputation, and news about irresponsible companies will lead to massive public outcry and a ditching of the company and its products, preventing companies from being able to attract or retain employees or customers. This is particularly dangerous in the case of software-driven technology companies relying on the sale of technology products and services to protect or actively engage in responsible use of similar tools and therefore avoid reputational backlash.

7.10. Best Practices for Deploying AI Chatbots

Although creating AI chatbots may take less time than ever, deploying them is a different matter. Because they interface with real users and have smart algorithms at their disposal, chatbots influence real-life conversations and interface with users' minds. This is what makes deploying chatbots a very distinctive and sensitive task. Poorly designed UI, UX, and language can have a huge negative influence on users and their impression of the

skills of the company deploying the chatbot, as well as the effectiveness of chatbot interaction: users might simply avoid using the chatbot in the future or have negative impressions they share among their friends, co-workers, and online communities. Because the chatbot product is closely related to the company products, consumer trust and investments in chatbot UX and UI are crucial for successful chatbots.

UX describes the overall experience of the user during the task flow achieved through the application, with a clear focus on the user. UI deals with concrete tools, elements, interactions, and design of the application being used by the user during the completion of the task flow. These applications are usually described in interaction design that specifies precise details of users' actions and experiences, together with detailed screenshots representing the interactions. UX needs to be designed and created for chatbots, but it is usually not specified or created. By doing so, chatbot deployment becomes a much easier and smoother task. This enables seamless integration of chatbots in various companies' mobile apps and websites. Moreover, with the help of UX, it avoids possibilities of creating chatbots that lower the feeling of trust by the users of the company, affecting their perception of the capabilities of the company.

7.10.1. User-Centric Design

Many organizations fail to appreciate tangible usability during the strategy, deployment, and testing phases, which can lead to an unsuccessful AI implementation. Simply uploading a script that consists of FAQ-style question-answer pairs misses the beauty of the technology. Accepting users' voice nuances and speaking characteristics, as well as guiding them through the dialogue flow, helps to create memorable conversational moments. Therefore, we recommend adopting a customer-centered approach and cadence to implementing AI.

A strategic management consultancy outlined a unique approach to strategy: finding a pain point deep enough that someone would pay to solve it. Their description matched how we arrived at conversational service design for enterprise AI. User-driven design is the first of five tenets of conversational service design. In this case, "user" means the human at the other end of the chat rather than the brand who is hiring our AI to speak for them. Our simple take is that the best way to set an effective conversation flow is to let users take you there. Using natural language conversation logs, we can tell how people are talking about a specific help topic right now. In addition, to ease initial transition and adoption of the AI, we can identify favorably ambiguous questions that can be used to create a guided flow. Guided portions of the AI's chat offer users buttons or quick replies that help narrow the search for the answer. Using decision trees ensures the request flow is limited. Meanwhile, the AI can handle open banking queries through natural language looking at prior conversations, such as checking accounts balances,

direct deposit requests, and even deployments of recent activity alerts. The combination of guided questions with a lightweight fuzzy search built on prior conversations results in getting to the core issue of the request user quickly and increases satisfaction even in early versions.

7.10.2. Continuous Improvement

Deployment phase is not the final but just one step that involves consideration of its performance. These systems should be actively observed and monitored during usage. This is important for several reasons. The AI and the underlying NLP models are most often designed for industry or company-specific language and tasks. These models were trained with a certain dataset, and in the course of time with changing users and their behavior along with changing company offerings and objectives, the efficiency of the models might go down. With volume of usage, several snippets of data are to be collected to detect issues. A process has to be put in place to observe and review the bank interaction logs, and identify NLP failure cases and capture input data for prompt optimization. Reports should also be made on precision, recall, failure rates, and a mechanism to regularly see quality checks of banking intents and responses. Programs should be implemented for supervised learning approach for intent learning. A plan should be made to identify failed bots based on heuristics and update or retrain the bots. This would help in maintaining or improving precision, recall rates, and customer satisfaction. It would also allow for continuous unexplained action updates and prevent customers from being disoriented by the solution's unpredictability. The updates could be of frequent monitoring with capability of users or detection of intent failures through customer satisfaction feedback, or application of policies to reorder models based on probabilities.

7.11. Measuring the Success of Automation Initiatives

The goal of automating customer service for banks and financial organizations is to improve the quality of interactions with customers while increasing overall efficiency. It is important to note that automating customer service is just a means to an end and should enable the bank to focus on their core mission: to create satisfied customers. Measuring how successful automation is with respect to this objective is the key to justifying the investment in building and maintaining automated customer service.

Once customer service has been automated, what should be measured? While interesting facts like the number of calls that a bank omits and how much time the bank saves by not having to deal with incoming calls are certainly useful to know, neither of these metrics provides enough insight into how successful the automation has been. For

instance, a bank can reduce call volume by simply not answering the phone for a couple of days. This creates savings, but does nothing to improve customer satisfaction. Automated customer service is considered successful only if customer satisfaction increases as a result. Also, a bank might use automation to simply reduce the cost of operations, but this would come at the risk of creating dissatisfied customers.

The success of automated customer service systems should be measured in terms of the quality of service provided. Monetary savings can be quantified more readily than service quality. However, monetary savings become irrelevant if customers notice a decrease in service quality. It is indeed possible that customers might not notice a reduction. This is particularly possible when customers were either mostly communicating with the company through an alternative communication medium or were apathetic towards the service quality. However, if customers are frustrated with the service quality due to bad service or the lack of service, it is likely that the company will soon be informed of it, either directly or indirectly.

7.11.1. Key Performance Indicators

There are some key indicators established in customer service automation to measure the quality and performance of the automation initiatives, which is indicated below: Completion Rate: What percentage of customer inquiries are handled by the Virtual Agent without requiring escalation to a supervisor? High completion rates are a good indicator that the Virtual Agent is answering inquiries as intended and is having a positive impact on overall running costs for the enterprise. Failed Completion Rate: What percentage of customer inquiries, that were initially handled by the Virtual Agent, required escalation to a supervisor? High failure rates indicate the Virtual Agent may not be properly trained or configured to handle those specific types of customer inquiries. Training and fine-tuning of the Virtual Agent can help mitigate high failure rates. This metric can also be useful in determining if there are new tasks that the Virtual Agent should learn to improve completion rates. Service Level: What percentage of automated inquiries meet the defined performance timing goals? The performance timing goal is the average number of seconds it takes the Virtual Agent to respond to a customer after they initiate the interaction by asking a question. Performance timing goals for Virtual Agents are generally longer than for call center agents because customers expect the conversation with the Virtual Agent to take longer as they will be delivering more complex questions and sequences of questions than they normally would for an in-person or customer service telephone interaction. Wait Time: What is the average number of seconds users wait for a Virtual Agent response? While Virtual Agent wait times are typically longer than telephone or in-person service wait times, especially for complicated questions, wait times that are too long may indicate the need for Virtual

Agent modifications to expedite the delivery of faster performance. Too long wait times prompt customer frustration leading to the abandonment of the attempt to use service automation and providing feedback via supplementary methods.

7.11.2. Customer Feedback Mechanisms

Customer feedback mechanisms offer organizations a powerful means of quantifying the success of chatbot-driven customer experience delivery. Prompting customers to detail their satisfaction with chatbot interactions serves two primary functions: feedback loops for continuous improvement of the chatbot user experience and front-line indicators of overall success.

Chatbots rarely provide perfect answers. A successful chatbot isn't a perfect surrogate for human agents; rather, it is a lightweight solution for simple tasks that meet customer needs most of the time. Instead, it is a tool that is tuned to meet customer expectations for these minor tasks. Feedback from customers pointing out areas where the chatbot failed can greatly enhance the organization's ability to optimize for success.Turning to front-line indicators of success, customers have a choice: engaging with customer service agents, experimenting with unsupported queries, and hanging up. Would customers attempt to interact with a chatbot if they weren't comfortable that it would answer at least some of their questions? Would they try unsupported queries? Would they abandon the call before chatting, implying that they aren't confident that the chatbot will help? Some basic analytics can provide insight into these questions. Are the most common queries for the human service agent in the task area served by the chatbot and detracting from the operation's efficiency? Why are those queries being directed to the agent rather than the automated solution? Are customers reasonably confident in the capabilities of the automated interface? Are they willing to use it?

Understanding the customer's motivations for compliance is critical to minimizing abandoned calls. Understanding their selection of inquiry mode is similarly important to improving CSAT and NPS. These indicators can point to new task areas to explore deploying chatbots, while failure in one query mode can indicate problems either with the chatbot or the channel.

7.12. Integration with Legacy Systems

Integration of customer service automation with existing legacy systems is a complex, yet necessary, part of the task of system development. One of the compelling advantages of an automation solution with a chatbot at the service core is its flexible integration capabilities with all available data sources. Forming a data exchange channel with

existing legacy systems through microservices and API services makes it possible to solve the most complex and non-standard tasks with an automation solution. The main parameters of the channel are the principle of functioning of the communication channel, the data transfer protocol, message formats, frequency of data exchange, ways to request external systems for processing data. There is no single standard for the implementation of integration. Data exchange can be a two-way process or one-way, depending on the direction the data is transmitted. The frequency and sophistication of data exchange processes depend on the subject area of the company and the purpose of the automation solution.

As a rule, the integration of exchange data is realized using common service buses or script controllers. Data exchange can be implemented based on the use of message-oriented systems, solutions based on message brokers, directly using specialized modules, or implemented as self-assembly connectors. The easiest way to automate connected systems that support any of these methods is to use an integration platform. The use of such systems allows you to implement integration using developers specialized in message-oriented technologies. The internal modules allow you to use any integration approach, allowing you to save time, effort and money on troubleshooting and system maintenance.

7.13. Training AI Chatbots for Financial Services

Current state-of-the-art chatbots are typically pretrained on general data and then finetuned using additional data specific to financial services, in order to produce a task-oriented bot. This then needs to be integrated in the financial services environment so that it can understand data from both internal and external sources and deliver intelligent and personalized responses. Banks and insurance companies are increasingly engaging in the training and deployment of AI chatbots, especially for basic customer service tasks. But tasks become more complicated and lead to major problems when an organization overestimates the capabilities of chatbots. Organizations need experts to vet the operational efficiency of human and bot agents to determine when is the right moment for escalation. Some believe that over time, bots should be able to handle more complex tasks satisfactorily, but whether that will be the case is still a matter of dispute. Other challenges in the training of AI chatbots include production timelines, the size of the labor pool to manage bot deployment, the loss of control over how bots “speak” to customers, and their lack of human empathy and judgment.

Would-be financial services chatbots typically start with core intents that specify basic queries regarding account balance, recent transactions, order completion, appointment scheduling, and key interest rates among a few others. Data for developing training models is usually assembled through a variety of data collection methods, including

simulations, scraping, crowdsourcing, and company strategy documents. These are combined with the evolution of user behavior and utterances, which require regularly updating the training dataset of the chatbot at a certain timeframe. Repeating patterns are identified so that the chatbot can correctly recognize the associated challenge of an incoming query, and possibly suggest further clarifications. Questions are labeled by combining semantics, FAQ, decision trees, and other elements.

Data collection continues with the chatbot interacting with customers and learning from this unsupervised data as users clarify their requests, correct misunderstandings, and react to the chatbot's responses. Many companies that have had chatbots skimming their internal documentation for keyword search for long with poor success have begun recently employing supervised learning of sorted results for improving this function. In the meantime, more advanced chatbots continue being trained using response-based reinforcement learning, which requires deploying many different experimental chatbot flavors simultaneously.

7.13.1. Data Collection Methods

To apply Natural Language Processing (NLP) in AI chatbots in Finance, accurate, coherent, and sufficient training sets are requisite. Only with such annotated sets can modern AI techniques develop financial services chatbots. Financial institutions focusing on service provision find building and maintaining such a training corpus a challenge. Constructing data collections for a single domain can be done through different methods, each with its pros and cons. The most common ways of collecting data are: collecting data from real situations; collecting data from users; creating data from public or general collections; reusing already prepared content.

Customer Services, such as those provided in Finance, have the characteristic of their processes being based on repetitive, similar, or even identical questions from users. Because of the nature of human interactions and communication, neural-NLP methods build general, broad statistical models on general sets. These models, once created, are often used as-is. Any domain-specific task demands supervised fine-tuning for the particular purpose. Contrary to other supervised architectures, neural networks do not require devising a specific pipeline for domain adaptation.

When users interact with AI assistants, the bank operates their service logic while the assistants help to automate clients' questions. Typically, the process is carried out through internal systems supporting banks' sharing of collected information. Advantages feature low possible error margin, being spontaneous and reputable, and up-to-datedness. However, only queries written by the users typically annotated are language

models in charge of detection. Most chat logs are typically used on a "raw" basis together with language modeling tasks to capture their linguistic or stylistic taxonomy qualities.

7.13.2. Model Training Techniques

An AI Chatbot for finance is different from other general-purpose bots as it requires specialized training, particularly in finance. Specialized tasks such as Named Entity Recognition, which are very critical for the finance domain work differently in finance than in other domains. The training of our Financial AI Chatbot involves customized data preparation and training with domain-specific glossaries to solve all identified Business Use Cases. The Intelligence for that involves four aspects: Natural Language Processing, machine learning, explanatory intelligibility, and knowledge utilization. The objective is to train an AI Chatbot in a way that each of the business use cases defined above can be addressed with the least complexity to maximize classifier intelligibility while also reducing knowledge utilization. The five steps to making a financial AI Chatbot are, domain definition, use-case definition, glossaries preparation, model training/model building, and lastly testing and validation.

Finance domain definition and Business related Use Case definition is the most important focus area for our work. These are used to identify which NLP task to optimize for Chatbot training. In the finance domain, these tasks do the bulk of work needed to understand questions. Tasks such as Part of Speech Tagging and NER are very classifier-sensitive, and the Finance domain requires additional glossaries of company names, currency symbols, financial products, and locations. Hence, error rates are high, and the performance of these classifiers is not very high. For automated question answering, proper domain definition is crucial to the model. Hence, Finance also requires the creation of company, product, and location-based glossaries to help engineers build financial AI Chatbots. These glossaries appear to help increase accuracy.

7.14. User Experience Design for Financial Chatbots

Users rely on chatbots to help them complete their task, and are unlikely to approach the chatbot for a longer journey with multiple steps in a single interaction. Chatbots are an excellent complement to digital services and simple question answering tools, and the best pairing with chatbots is usually the FAQ page or similar label, where the users are likely seeking the answer to their very specific question. Advanced intelligent agents link seamlessly into the experiences across many digital channels including chat, email, SMS, voice, Social, etc. The user experience across the multiple channels, including chatbot, needs to be thought through from a customer experience point of view, ensuring that it gets them closer to the service they need. User experience design in this space

involves mapping out the user journeys, both on chatbots and across other digital channels. Chatbots focus on fast task completion: digital tools for answers to miscellaneous questions that would otherwise require human agents to help out. They help users mainly for customer service activities like logging a complaint, asking questions, checking account info and queries related to delivery tracking.

For large companies, when customers search for help on websites, customer service spends huge amounts of time and money on answering our most asked questions. The ideal chatbots answer simple questions on their own, while automating normal transactions, and excel at fast task completion. Trust is highly correlated with long-term customer loyalty, so that the experience must be structured around increasing customer trust. The bots must be friendly and chat-like while providing seamless help. By plotting user journey maps, UX focuses on aiding task completion across customer service channels, not just on the chatbot itself. For every atomized interaction, the design needs to be aware of the context: what brought the user to this step of their journey that the bot is engaged in? The roadmap for an individual interaction analyzes much more than the words being processed; Conversation design is an essential first phase in UX Roadmap.

7.14.1. Conversational Interfaces

While financial chatbots are relatively new, the systems they are based on have been around for decades. Missions like NASA's Apollo program used operator interfaces that today's users speak with and on behalf of machine listeners, processing natural language, speech and translating it into action and response. Speech APIs make it possible for consumer device manufacturers to integrate natural interaction into smartphones, tablets, smart televisions and wearable electronic devices. Several vehicle makers have similarly integrated natural user interfaces into their automotive platforms.

These systems are called conversational interfaces. Just as graphic user interfaces created a new category of products, enabling broad-based interaction with computers and expert systems that transform the workplace, intelligent conversational user interfaces designed with the financial transaction in mind open the door to conversational commerce. This chapter shows how conversational interfaces can automate basic customer service transactions, increasing service availability and reducing labor costs, to revenues, especially during peak demand periods of holidays, year-end investment decisions and tax season. Users seek and expect basic customer service support any time of the day or week; when they do not get it, they shift their business to competitors who do. Automation support throughout the daily and weekly cycle reduces responses to questions and moves customers toward self-service; automation during peak demand season provides the relief needed to keep business on track.

7.14.2. User Journey Mapping

User journey mapping is a method that describes the process that a user goes through when engaging with a company's product or service, and the transactions involved in that journey. The goal of the user journey map is to capture the user's perspective of how they experience a product or service over time. This map is a key part of a user-centered design process because these user journeys represent the most common interactions from the user's point of view. Furthermore, user journeys highlight what aspects of a user's experience are the most satisfying and which aspects of a user's experience are not.

What users say and do in relation to a service does not always match the business process or internal flow since they may request different information in a different way or at a different time from the company's expected response. Therefore, by understanding a user's journey, opportunities arise to either enhance communication between the user and service or to change aspects of the service to improve the user's experience. User journey maps may continue to be used at various stages of product development. Identifying or learning how users journey through a service leads to traditional usability and task analysis as well as higher-level design thoughts about enhancing or changing the existing service or stopping a new product or service being developed.

User journey maps describe the current state of a user's experience; parallel design ideas create aligned new product ideas or service refinements based on the goals or user-pain points identified. When the product is ready for launch, the new journeys become training guides for sales and support teams or route maps for rollout. After a product or design is launched, the user journey functions as a key touchstone for keeping the user experience on track while refining and improving the product or service over time.

7.15. Impact of COVID-19 on Customer Service Automation

While it is recently predicted that the world will continue to work online after COVID-19, this does not seem the case with customer service domains such as finance. Workplaces have physically changed though, with an explosion of work-from-home which is expected to be with us for a while. For several decades, the finance customer service function relied on technology to some extent to deflect and automate several activities. Using simple interactive voice response technology backed by automatic speech recognition, a segment of inbound support calls encountered a menu-based response. Depending on the option selected, the customer could either continue to resolve simple queries or be routed through skilled customer service employees via on-screen routing.The impact of COVID-19 and longer work-from-home setups have caused these self-service channels to fail. The sheer increase in the volume of transactions affected by relief packages where the reimbursements were routed via third-

party payment processors caused dramatic spikes in failed customer experiences via the customer service function. The impact was even greater where the pure-play digital financial institutions just focus on the mobile app instead of a physical presence for customers. While self-service for a certain set of queries is still possible involving communication via messaging platforms, there is little or no appetite for a larger segment of customers, who demand speed and resolution through inbound voice calls.

7.16. Cultural Considerations in Global Deployments

Global deployments require consulting with culturally knowledgeable personnel in the various target markets. This includes pre-deployment cultural assessments to better enable the customer service automation to serve the target customers effectively and compassionately. Culturally sensitive business practices should be used at all times during each phase of the deployment and maintenance of services, assessing and anticipating user wants and customer-initiated customizations. Organizations must have an ongoing commitment to embedding the appropriate cultural parameters into the natural language processors, and to being proactive in having chatbots operate appropriately with users.

The pertinent issues involving culture begin with language. The use of unexpected language in the customer response may indicate a different cultural inspiration for the user-initiated chat. Language usage among user groups in a given culture are used to quickly and inexpensively distinguish among phenomenon types. If language, custom play, and animation mechanisms are accurately embedded into the correct cultural sandbox, it will be possible to deploy bots for the initial interactions that will emotionally engage and delight the public and insulate them from the media-measured backfires that have so damaged previous chatbot deployments. Our premise is that beginning interactions will be important moments in the relationship that each user has with the bank. If these interactions are positive, the customers are much more likely to trust and engage with that bank. If they are negative, the customers are likely to reject the tools, and be less willing to associate with the bank in the future.

7.17. Collaboration Between Humans and AI

No matter how intelligent and knowledgeable, for all its merits, an automated agent can never be a functional replacement for a human expert. It cannot have the experience, insights, and pattern-matching level of a human subject-expert. Therefore, enabling financial institutions to work in conjunction with both humans and AI in a collaborative environment is the best solution for effective and efficient customer service automation. AI-powered virtual agents, when designed for human-AI collaboration, provide practical

reasoning skills to financial institutions, helping them handle customer service requests with very high levels of efficiency. In such a collaborative environment, a virtual agent automatically handles routine customer service requests for personal financial management or transaction-related queries. For more complex product-centric, domain-focused inquiries that require human familiarity with the nuances of the particular case, the virtual agent matches the customer service request with definitive, human-defined, and conversation-turn-defined attributes. It brings the human-chat agent into the conversation at the correct conversation turn.

Fig : AI in Customer Service Statistics

In addition, enabling collaboration leads to better customer satisfaction. A primary goal of AI integration with human agents is to cut the waiting time associated with voice support, while ensuring customer requests complete resolution, whether through virtual assistants or contact center agents. The responsiveness of contact center agents can vary from minutes to days. Chatbots truly shine when they remove some of the load from human channels. In a hybrid environment, a chatbot's speed is balanced with a human agent's understanding. When both systems perform separately, the strengths and weaknesses in each round out their remediable shortcomings. When a chatbot is unable to apply a disclosed remedy properly, the Fix It function can transfer the ticket to a human agent, who will be handed the admission and remediation code for applying the bot-generated disclosure formulary.

7.18. Conclusion

In this chapter, we examined an important application of Natural Language Processing technology in Finance, specifically Chatbots for Customer Service Automation. Chatbots have seen rapid adoption in numerous industries such as Retail, Travel, Telecom and Banking for assisting customers in their purchasing journeys. With superior availability and lower costs, Chatbots are reshaping the customer services landscape. Developments in Natural Language Understanding and Generation have significantly enhanced the endurance and operations of Chatbots. As customers become more sophisticated and demanding, the technology related to the Chatbot as well as its process structure must become more complex. We surveyed the various types of Chatbots according to their capabilities and architecture, the various verticals of Finance in which Chatbots are in operation and discussed a set of use cases and their respective implementations. We proposed an industry-specific taxonomy of Chatbots and presented a development roadmap for organizations interested in building and deploying Chatbots. We discussed some of the challenges organizations face in realizing their envisioned Chatbot. We explored services from both established as well as emerging software product companies that provide organizations with platforms for effortless and rapid deployment of Chatbots. The different stages of Chatbot Implementation comprise Persona Design, Integration, Deployment and Monitoring.

Organizations are gradually adopting Conversational Commerce services for automating mundane tasks freeing their employees to focus on high-value, non-structured work. Customers and Users are provided seamless services using easy to implement and use interfaces reducing the need for call centers thereby significantly lowering operational costs. It's a win-win! While the journey of Chatbots has just begun, we are confident that these intelligent systems aided by continual developments in Natural Language Processing using Deep Learning techniques will make significant strides in the next few years.

References:

hatterjee, S., Rana, N. P., Tamilmani, K., & Sharma, A. (2020). Understanding the adoption of artificial intelligence in the banking sector: A study using strategic alignment maturity model. Journal of Enterprise Information Management, 33(5), 1091–1113.

McTear, M. (2020). Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots. Springer.

Brandtzaeg, P. B., & Følstad, A. (2018). Chatbots: Changing user needs and motivations. Interactions, 25(5), 38–43.

Accenture. (2021). AI and NLP in Financial Services: The Future of Intelligent Customer Service. https://www.accenture.com

Deloitte. (2019). AI and Chatbots in Financial Services: Enhancing the Customer Experience.