

AI in Product Management
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Lecture - 58
Customer support using AI

Thank you. Welcome to this NPTEL online certification course on artificial intelligence and product management. Now we are talking about module 58, which is on customer support using AI. This is part 12, managing performance with AI, and this is the last module in this series, which is customer support using AI. Now these are the topics we will cover in this module.

We will start with introducing AI in customer support and how AI works for it. Then we will look at how to implement AI-based customer support. The various tools that can be used for AI-assisted customer support, including streamlining customer support workflows using generative AI. The challenges in implementing AI-powered customer support and ways to overcome them. Then we will look at the best practices for using AI in customer support.

So we will start with AI in customer support. AI in customer support refers to the use of artificial intelligence technologies to enhance customer service and support operations. It involves integrating AI tools and systems, such as chatbots, virtual assistants, and machine learning algorithms, to automate responses, provide personalized assistance, and improve the overall customer experience. Artificial intelligence in customer support has redefined the way businesses engage with their clientele. By leveraging sophisticated technologies like natural language processing, machine learning, and automation, AI enhances the efficiency and effectiveness of customer service operations.

From chatbots capable of addressing routine queries, In real-time, through predictive analytics, optimizing support strategies, AI enables businesses to provide personalized, prompt, and round-the-clock assistance. The integration of AI not only streamlines processes but also contributes to a more seamless and satisfying customer experience, ultimately fostering stronger customer relationships and loyalty. Moreover, AI in customer

support empowers businesses with data-driven insights, allowing them to understand customer preferences, behavior, and pain points on a granular level.

These insights enable the tailoring of services and the anticipation of customer needs, leading to proactive problem resolution. Additionally, AI facilitates the automation of repetitive tasks, freeing up human agents to concentrate on complex and highly valuable interactions, further elevating the overall quality of customer service. As technology progresses, the significance of AI in customer support is poised to expand, promising even more sophisticated solutions for anticipating, addressing, and exceeding customer expectations. Now, how does AI for customer support work?

Incorporating AI into customer support processes involves various components to streamline interactions, resolve issues, and enhance user satisfaction. It goes beyond traditional customer support approaches by integrating powerful large language models and leveraging a company's variety of knowledge bases. This approach empowers businesses to deliver personalized and efficient support experiences in real time. The AI-enhanced customer support architecture leverages various components to optimize the support processes. Here is a step-by-step breakdown of how it works.

So, this is how this works. So, these are the data sources, then it moves to data pipelines and then to the orchestration Z brain. And then from there, it moves to proprietary LLMs and open source models. So we will start with the first, that is the data source. The process begins by gathering data from various sources relevant to customer support.

This data can include 1. Customer inquiries, queries, complaints and feedback submitted through various channels such as email, chats, phone calls and social media. Then is product service information, details about product, services, features, pricing and policies. Knowledge base, articles, FAQs, troubleshooting guides and other resources to assist customers. Historical support interactions, record of past conversations, resolutions and customer satisfaction ratings.

Then comes customer profiles, data related to customer preferences, purchase history and behavior patterns. Data pipelines, data from sources listed above. are then routed through data pipelines. These pipelines are responsible for the ingestion, cleaning and structuring of data, making it ready for further analysis. The next is embedding models.

The prepared data is then processed by an embedding model. This model transforms the textual data into numerical representations called vectors. That AI models can understand.

Popular models include those from OpenAI, Google, and Cohere. Then, the third is vector databases.

The generated vectors are stored in a vector database, which allows for efficient querying and retrieval. Examples of prominent vector databases include Pinecone, Weaviate, and PG vector. APIs and plugins. APIs and plugins like SERP, Zapier, and Wolfram play a key role by connecting different components and enabling additional functionalities, such as accessing extra data. Or performing specific tasks with ease.

The fifth is the orchestration layer. The orchestration layer is critical in managing the workflow. ZBrain is an example of this layer that simplifies prompt chaining, manages interactions with external APIs by determining when API calls are required, retrieves contextual data from vector databases, and maintains memory across multiple LLM calls. Ultimately, this layer generates a prompt or series of prompts that are submitted to a language model for processing. The role of this layer is to orchestrate the flow of data and tasks, ensuring seamless coordination across all components within the architecture.

The sixth step is query execution. The data retrieval and generation process begins when a customer submits an inquiry or request to the customer support app. This query can be about anything relevant to their product, service, or account. The seventh step is LLM processing. Once received, the app transmits the query to the orchestration layer.

The layer retrieves relevant data from the vector database and cache and sends it to the appropriate LLM for processing. The choice of LLM depends on the nature of the query. The eighth step is output. The LLM generates an output based on the query and the data it receives. This output can take various forms, such as personalized responses, suggested solutions, or automated actions.

The ninth step is the customer support app. The validated output is then presented to the user through the customer support app. This is the core application where all the data, analysis, and insights converge. It presents the findings in a user-friendly format for customer support agents or directly to customers.

The tenth is the feedback loop. User feedback on the LLM responses is another important aspect of this architecture. The feedback is used to improve the accuracy and relevance of the AI output over time. The eleventh is agent assistance. AI agents play a key role in this architecture by solving complex tasks.

Their assistance includes providing contextually relevant information, suggesting responses, and automating tasks during customer interactions. The twelfth is the LLM cache. Tools like Redis, SQLite, or GPT cache are used to cache frequently accessed information, speeding up the response time of the AI system. The third is logging all LLM operations. Throughout this process, LLM operations, tools like Weights and Biases, MLflow, Helicon, and PromptLayer help log actions and monitor performance.

This ensures the LLM is functioning optimally. And continuously improves through feedback loops. The fourteenth is validation. A validation layer is employed to validate the output. This is done through tools like Guardrails, Webuff, Guidance, and LMQL to ensure the accuracy and reliability of the information provided by the LLM.

The fifteenth is LLM apps and hosting. LLM apps and hosting platforms are essential for executing customer support tasks and hosting the application. Depending on the requirements, developers can select from LLM APIs offered by OpenAI and Anthropic or opt for open-source models.

Similarly, they can choose hosting platforms from cloud providers like AWS, GCP, Azure, and CoreWeave, or opt for open-aided clouds like Databricks, Mosaic, and AnyScale. So, the choice of LLM APIs and cloud hosting platforms depends on the project needs and preferences. This structured flow provides a detailed overview of how AI enhances customer support, leveraging various data sources and technological tools to provide timely information. Now, let us look at how to implement AI-powered customer support.

Implementing AI-powered customer support involves integrating AI to improve and automate various aspects of customer service. Here is a step-by-step guide on how to implement AI-powered customer support. We start with defining objectives and goals. So, clearly define your aims and objectives for the integration of AI into customer support. whether it is reducing response time, improving customer satisfaction, or automating routine tasks.

Having a clear vision will guide your implementation strategy. Then, go for understanding your customer needs. Identify common customer queries, concerns, and requests. Understanding the most frequent issues will help you design AI solutions that address these effectively. Look for the right AI technologies.

Choose the appropriate AI technologies based on your goals. Common AI applications for customer support include chatbots for handling routine queries, Natural language

processing for understanding and responding to customer queries in natural languages. Machine learning for predicting customer issues. And recommending solutions. Speech recognition for handling voice-based queries. Then, integrate AI with existing systems to facilitate seamless integration with your existing customer support system, including CRM software. This integration enables AI to access customer data and deliver personalized assistance. Then, implement chatbots. Develop and deploy chatbots to handle routine queries and FAQs. This helps in immediate responses and can significantly reduce the workload on human agents.

Train your chatbots to handle complex scenarios using machine learning. Then, enable multi-channel support. Make sure your AI-powered customer support can operate across various channels, including website chats, social media, email, and phone. This guarantees a uniform experience for customers, irrespective of the platform they select. Train and improve the system.

Regularly train and update your AI models to improve their accuracy and effectiveness. Utilize customer feedback as a valuable resource to pinpoint areas for enhancement and fine-tune your AI algorithms accordingly. Then, opt for human-AI collaboration. Collaboration. Implement a system where AI augments human agents rather than replacing them entirely.

There will be scenarios where human intervention is necessary. The AI system should seamlessly transfer the conversation to a human agent when required. Ensure data security and privacy. Implement robust security measures to safeguard customer data. Compliance with data protection regulations is crucial.

Clearly communicate how customer data is handled and stored. Continuously monitor and analyze performance. Oversee the effectiveness of your AI-powered customer support system. Scrutinize key metrics, including response times, customer satisfaction, and issue resolution rates. Leverage this data to implement ongoing enhancements and refinements.

Then provide customer education. Educate your customers on how to interact with AI-powered support. Set clear expectations regarding the capabilities of AI and when human assistance may be required. Then scale gradually. Start with a phased implementation rather than rolling out AI support across all channels at once.

This allows you to identify and address any issues progressively. By following these steps, we can create a robust AI-powered customer support system that enhances efficiency,

improves customer satisfaction, and provides a positive experience for your customers. Now let us look at types of AI-based customer support tools. One is chatbots. Chatbots are AI-powered virtual assistants that provide instant responses to customer queries and support requests.

These automated systems use natural language processing to understand customer queries and deliver relevant answers. Chatbots operate 24/7, ensuring round-the-clock availability for customers by handling routine tasks and frequently asked questions. Chatbots streamline customer interactions, reduce response time, and enhance overall satisfaction. Automated ticketing system: Automated ticketing systems optimize the management of customer inquiries by automating the process of logging, tracking, and assigning tickets to appropriate support agents.

Using AI algorithms, these systems prioritize tickets based on urgency and route them to the most qualified agents for resolution. Automated workflows ensure efficient handling of customer issues, leading to faster resolution times and improved service quality. Next comes predictive analytic tools. AI-driven predictive analysis anticipates customer needs and behavior by analyzing historical data and identifying patterns. By leveraging machine learning algorithms, predictive analysis can forecast customer preferences, potential issues, and trends.

This proactive approach enables businesses to address customer concerns before they escalate, resulting in higher satisfaction levels and improved customer retention. Knowledge bases serve as centralized repositories of information and resources that support customer service operations. AI technologies enhance knowledge bases by organizing and categorizing vast amounts of data, including articles, documents, tutorials, and FAQs. Through natural language processing and machine learning, knowledge bases can provide personalized recommendations, suggest relevant solutions, and offer self-service options to customers. By empowering customers to find answers to their questions independently, knowledge bases reduce support costs, enhance efficiency, and promote customer empowerment.

AI-driven triage utilizes AI to analyze requests automatically, determining intent, sentiment, and language, effectively routing them to the most suitable agent alongside customer context. Next comes contextual intelligence. Within the agent workspace, an AI-powered assistant offers insights and recommendations for issue resolution by displaying

customer intent, sentiment, and language, thereby aiding agents in resolving issues promptly. Then comes virtual product assistance.

AI serves as a virtual assistant, guiding customers through product features and troubleshooting. To ensure a seamless experience. This support is especially valuable for integrated products or services where customers may need extra assistance. This virtual guidance enriches the customer's journey by delivering instant and pertinent information. It also elevates the burden on human customer service representatives by addressing routine inquiries.

Now, let us look at streamlining customer support workflows with Gen AI. Generative AI is transforming the customer support landscape, enhancing every stage of the support lifecycle. From intelligent chatbots handling initial inquiries to AI-powered analytics improving issue resolution, Generative AI is transforming how businesses interact with and assist their customers, leading to more efficient, personalized, and satisfying support experiences. In the next slide, we will break down how generative AI is making a significant impact across the customer support lifecycle.

So, the first is for existing customers. The first is inquiry. So, the steps involved are: capture inquiry, assign inquiry, subset. Sub-steps in this stage: none. Then, in assign inquiry, it is: assign inquiry to agents, assign inquiry to specialist.

The role of generative AI here is automatically captures inquiries from various channels like email, chat, social media using NLP. While when they are assigning inquiry, it analyzes inquiry content and automatically routes it to the most appropriate agent or team. Then it identifies complex inquiries, requires specialized expertise and routes them accordingly. So, when it comes to validating inquiry, the sub step is validate inquiry type. The role of generative AI is automatically classifies inquiries based on predefined categories, for example, technical or billing.

When it is about prioritizing the inquiry, the sub-step involves assigning priority level. The role of generative AI is to analyze urgency keywords, customer history and impact level to automatically assign priority. When it is about review inquiry, the sub-step involves evaluating complexity. and the role of generative ai is to assess the complexity of inquiries based on sentiment analysis topic modeling and keywords the next comes communication here the service step is to notify customer of receipt the role of generative ai here is to generate personalized acknowledgement messages confirming receipt of the inquiry the next step is the issue resolution so the first step here is communicate the service step is to

notify customers and the role of generative is to generate progress Generates progress updates tailored to the issue and resolution steps.

Provides estimated resolution times based on historical data and current workloads. The next step involved here is gather information. So, the service step is gather additional information. The role of generative AI is to analyze past interactions and suggest relevant questions to quickly gather missing information. When it is about investigating an issue, the service step involves verifying information, retrieving customer history.

The role of generative AI is to validate customers' provided information with system data to ensure accuracy and identify inconsistencies, surface relevant past cases, interactions and known issues from the customer's history. When it is about approving resolution, the sub-steps involve identifying root causes and approve a resolution plan. The role of generative AI here is to analyze patterns in case data, customer history, and external factors to suggest potential root causes. It also flags potential risk or inconsistency in the proposed plan based on case data and knowledge base. When the staff involved resolve the complaint, the sub-steps are execute resolution plan and verify resolution.

The role of generative AI is to provide agents with step-by-step guidance, relevant knowledge, articles, and response templates. It also provides agents with step-by-step guidance, relevant knowledge, articles, and response templates. Then it also analyzes the solution steps taken and compares against success criteria to flag potential issues. When the step involved is follow-up, the service steps are most step assigned agents. request, feedback, etc.

The role of generative AI here is analyze resolution steps taken and compare against success criteria to flag potential issues. Communicate aspects are addressed in the communicate steps. When the step is involved is close case, the service step involved are verifying customer satisfaction, update case status and notify closure. The role of generative AI here is to analyze customer sentiments and feedback to analyze if true resolution has been achieved. Automatically update case status based on resolution steps and customer feedback.

The third step is feedback. When the step involved is to capture feedback, the role of generative AI is automatically captures feedback from various channels, surveys, emails and chats, use natural language processing. When the step involved is process feedback, the sub-steps involved assign feedback review, evaluate feedback, validity and categorize feedback. The role of generative AI here is to it routes feedback to the appropriate team or

individual based on topic and relevance. When the step involved is analyze feedback, the service steps involved are to evaluate feedback, assign feedback evaluation, identify improvement opportunities.

The role of generative AI here is to analyze sentiments, identify key themes and extract insights from customer feedback. Routes feedback requiring deeper analysis to specialize teams, for example, product managers and data analysts. use topic modeling and trend analysis to uncover areas for improvement in product, services and processes. Now, when the steps involved including includes action and cooperation, the sub-steps involved are approve feedback in cooperation, Assign feedback incorporation and update product service.

The role of generative AI here is to assist in prioritizing feedback for actions based on potential impact and feasibility. Routes approved feedback to relevant team responsible for implementation that is product engineering and support. And then the generative AI's role here is indirect, it provides insights that drives updates. When the step involved is communicate, it notifies feedback received, notify feedback evaluation outcome and notify feedback incorporation. The role of generative AI here is to send automated acknowledgements to customer confirming receipt of their feedback, provides updates on how their feedback was evaluated and any decision made, communicates implemented changes or updates based on customer feedback.

When the step involved is to monitor and close, the surface steps are assign implementation monitoring, assess improvement effectiveness, notify improvement monitoring outcomes, verify feedback completion, and notify feedback case closure. The role of generative AI here is largely analytical, providing data for human monitoring, analyze relevant metrics to evaluate the impact of implemented changes based on feedback. Primarily, a human-driven communication based on generative AI provided data analysis, uses data analysis to confirm if the feedback loops have been effectively closed. and generative AI can trigger automatic closure notifications if desired.

Now, for the purpose of new customers onboarding, the step involved requires capture information, sub-step is to correct customer details and the role of generative AI is to automate data collection through forms using NLP to understand and categorize information with verification and check. The sub-steps involved are perform background check, verify documentation, perform checks, check credit history, verify identity, review financial documents and assess the risk level. The role of generative AI here is to integrate

with third-party databases to automate background checks and flag potential issues. Uses optimal character recognition to extract data from documents and automatically verifies it.

Validates provided information with internal and external data sources for accuracy and consistency. Automate credit history checks by integrating with credit bureaus and interpreting the results. Allows facial recognition or other biometric authentication methods to verify customer identity. Use OCRs and machine learning to analyze financial documents for completeness and accuracy flagging potential discrepancies. uses predictive modeling based on collective data to assess the risk level of each customer and tailor the onboarding process accordingly so when the steps involved are account setup and approval the sub steps are approve account setup and create customer account the role of generative ai here is primarily human driven but generative i can flag potentially problematic accounts for review

Automatically generates and configure customer accounts based on predefined parameters and data collected. Compliance include review compliance, compliance check, resolve compliance issues and finalize compliance. The role of generative AI here is to automate compliance checks by analyzing customer data and documents against relevant regulations, flag potential compliance issues and provide recommendations for resolution. Suggest relevant solutions or workflows to address compliance issues based on knowledge bases and best practices. And primarily human driven step ensuring all compliance requirements are met.

When the step involved is onboarding completion, the sub-step involved is approved onboarding. And the role of generative AI aids in this human driven task by confirming successful onboarding based on defined criteria. The next step is communicate and update. The sub-steps here are to notify customer, notify support team, update databases. The role of generative AI here is to generate personalized welcome messages and onboarding guides tailored to the customer profiles and needs, automatically notifies relevant support teams about the new customers and their specific requirements, update internal databases with verified customer information, ensuring data accuracy and consistency.

Generative AI is transforming the customer support lifecycle from initial contact to issue resolution. By automating routine tasks, providing personalized assistance, and enhancing human agent capabilities, generative AI is transforming how businesses interact with and support their customers. Now let us look at AI-powered solutions overcoming customer support workflow challenges. The customer support workflow typically involves several

key steps to ensure efficient and effective resolution of customer issues. Implementing AI in these areas can significantly enhance the efficiency, accuracy, and responsiveness of the customer support workflows.

Leading to improved customer satisfaction and operational effectiveness. In the next slide, we will have an overview of the challenges faced in each step of the customer support workflow and how AI can address these challenges. So, the first is receiving customer inquiries. The challenge here is that a high volume of inquiries can lead to delays and overwhelm the support team. The AI solution here is to implement AI-powered chatbots for initial customer interactions, which can help handle routine queries, prioritize urgent issues, and provide instant responses, reducing the workload on human agents.

The next is logging and categorizing issues. The challenge is that human errors in manual logging and categorization may lead to miscalculations and delays. The AI solution is that natural language processing algorithms can automate the categorization of customer queries. Ensuring accurate tagging and faster processing, machine learning models can continuously improve accuracy over time. Assigning priority: the challenge here is that human bias or oversight may result in misjudging the urgency of certain issues.

The AI solution is that AI algorithms can analyze historical data to prioritize issues based on patterns, urgency, and impact. This helps ensure a fair and data-driven approach to assigning priority. Assigning to the right team or agent. The challenge here is that manual assignments may lead to delays or misallocation of issues. The AI solution is that an automated routing system can use machine learning to analyze the nature of the queries and the expertise of support agents.

ensuring that issues are assigned to the most suitable team or agent. Investigation and troubleshooting challenges time-consuming manual investigation, especially for complex issues. AI solution is AI-driven knowledge bases can assist agents by providing relevant information, troubleshooting guides, and solutions in real time. AI algorithms can learn from successful resolution, improving future recommendations. The next is communication with the customer.

The challenge here is inconsistent communication delays. In updates can lead to customer frustration. AI solutions, chatbots, and automated messaging systems can provide instant updates, gather additional information from customers, and offer proactive communication throughout the resolution process, improving customer experience. Resolution or Escalation The challenge here is identifying when to escalate or resolve complex issues

may require expert judgment. AI solutions can assist in decision-making by analyzing historical data to identify patterns that indicate

When escalation is necessary, machine learning models can also help suggest solutions for common issues. The challenge is incomplete or inconsistent documentation can hinder future issues resolution. The AI solution is AI tools can automate the documentation process by extracting key information from interactions and creating detailed records. This ensures that a comprehensive knowledge base is maintained for future reference. Next comes feedback collection.

The challenge is low response rates or biased feedback may not accurately reflect customer sentiments. The AI solution is automated surveys and sentiment analysis tools can collect feedback in real time, providing insights into customer satisfaction and pinpointing opportunities for enhancement. Next comes analysis and reporting. The challenge is manual analysis of large datasets can be time-consuming and prone to errors. The AI solution is AI analytics tools can process vast amounts of data quickly, identify trends, and generate reports with actionable insights.

This enables data-driven decision-making and continuous improvement in support processes. Now, what are the best practices for AI in customer support? To successfully implement AI in customer support, thorough research is imperative. Ask crucial questions that can guide your strategies, such as: What are your customers' preferred support channels?

Examples: messaging, SMS, social media platforms, or phone calls. What are the major pain points for your customers, and how can AI assist in alleviating them? Do you spot gaps in your current customer service? Are there frequent issues your agents grapple with, or is there high turnover in your contact center? What percentage of agents dedicate their time to directly engaging with customers compared to handling post-call tasks?

Answers to these questions will help you implement AI in line with your specific needs. So, to conclude this module, we first introduced AI in customer support and understood how AI works for it. Then, we discussed how to implement AI in customer support. We also explained some tools that can be used for AI-associated customer service. Customer support.

After that, we understood how to streamline customer support workflows using generative AI. Then, we discussed the challenges in implementing AI-powered customer support and

ways to overcome them. Finally, we discussed the best practices for using AI in customer support. These are some of the sources from which the material for this module was taken. Thank you.