AI in Product Management

Prof. Zillur Rahman
Department of Management Studies
Indian Institute of Technology, Roorkee

Lecture- 7
Analyzing Qualitative Data with AI

Thank you. Welcome to this NPTEL online certification course on artificial intelligence in product management. Now we will talk about module 7 that is analyzing qualitative data with AI. So we are in this part 2 and we are talking about module 7. To overview of this module, in this module we will introduce qualitative research using AI.

Then we will discuss the tools for conducting qualitative research using AI. Thereafter we will explain the benefits of using AI for qualitative research. Describe the steps for conducting qualitative research using AI and discuss the ethical considerations of using AI in qualitative research. So, let us now introduce qualitative research using AI. So, qualitative research is the type of research that explores and provides deeper insights into real-world problems.

Instead of collecting numerical data points or intervening or introducing treatments just like quantitative research, qualitative research helps generate hypotheses to further investigate and understand quantitative data. It answers the how's and why's instead of how many or how much today qualitative research in market research has evolved to include wide range of methods including in-depth interviews online communities and social media analysis the goal of qualitative market research is to provide a rich announced understanding of consumer behavior and preferences allowing businesses to make informed decisions about product development branding and marketing strategies as the market research landscape evolves researchers are increasingly harnessing advanced technologies to enhance their capabilities among these technologies artificial intelligence stand out as a game changer offering unprecedented data collection and analysis scale ai's potential to revolutionize market Research is immense, promising to make the process faster and more accurate.

AI can quickly process vast amounts of data, identify trends and patterns in consumer behavior, analyze unstructured data such as social media posts, reviews, and customer feedback, while predictive analytics models come into the picture. Machine learning

algorithms are used to forecast future trends. and consumer behavior, guiding product development, marketing strategies, and pricing decisions. So, AI can also automate time-consuming tasks such as data cleaning and coding, freeing up researchers' and marketers' time. This allows teams to focus on more complex tasks such as interpreting results and developing actionable insights.

Now, we will look at the tools for conducting qualitative research using AI. The first of these tools is facial coding. This AI-powered technology can analyze micro-expressions and emotional responses, providing valuable insights into consumer behavior and preferences. Our face displays our outward emotional expressions, giving a view of how we show our inner emotional states. These expressed emotional states are detected in real time using fully automated computer algorithms that record facial expressions via webcam.

It involves analyzing facial expressions by capturing subtle muscle movements and micro-expressions to identify the seven core emotions. First is joy, anger, fear, surprise, sadness, contempt, and disgust. Valence and engagement are crucial metrics for understanding emotional responses. Valence represents the overall emotional tone ranging from negative to positive.

It helps marketers assess user experiences, product preferences, and brand perceptions. High valence or high valency indicates positive emotions while low valency suggests negative feelings. On the other hand, engagement measures the level of expressiveness and involvement. It reflects how actively an individual responds to stimuli such as advertisements, videos, or interactive contents.

By tracking valence and engagement, businesses can optimize marketing strategies, improve user satisfaction, to name a few. Facial coding can also be used to measure the emotional response of customers to your product packaging and measure its noticeability of elements such as logo, prices, colors, etc. It can also be used to compare two different packages designed to determine the most suited for your product. The next is sentiment analysis. It can help marketers identify the sentiments behind written or spoken responses, enabling them to understand the emotional impact of campaigns, products or services on the consumer.

Sentiment analysis is a subset of a natural language processing that focuses on extracting and understanding the emotional content from data. The primary objective is to classify the polarity of a text as positive, negative, or neutral. At its core, a sentiment analysis

system employs machine learning techniques and algorithms to dissect the language used in text data from many sources such as written feedbacks, news articles, survey records and social media posts. Consider a product review that states, the camera on this phone is excellent but the battery life is short.

A sentiment analysis model would recognize the positive sentiments toward the camera and the negative sentiments toward the battery life. Rather than giving a blanket sentiment score. A positive or negative sentiment toward a product feature indicates to the designer the specific customer needs they must enhance. Also, sentiment analysis allows product designers to evaluate the importance of product features and generate more accurate customer needs. Customer needs are then mapped to functional requirements.

This sets the product performance standards necessary to meet the customer needs. Voice AI can help researchers analyze the tonality, inflection, and other vocal cues in the spoken responses through advanced technologies like speech analytics and voice recognition, providing additional insights. into consumer attitudes and behavior. Voice analytics excels in enhancing the overall customer experience. By analyzing voice data, businesses can gain a deeper understanding of customer sentiments and preferences, allowing them to tailor their services to meet customer needs effectively. Contact centers and customer feedback collections actively implement speech analytics to improve their customer interactions.

By leveraging voice data for analysis, contact centers can identify patterns in customer conversations. Helping them streamline their processes and enhance the overall quality of customer service, thereby benefiting customers by providing a more personalized experience and companies by improving their operational efficiency. The ability of voice AI to detect keywords and phrases enables marketers to pinpoint specific trends or topics within conversations. This feature is particularly valuable for identifying customer needs, references, and pain points, allowing businesses to tailor their strategies accordingly.

Moreover, voice analysis solutions can categorize and segment data based on predefined criteria, simplifying the process of data analysis and interpretation. Now, let us look at the benefits of using AI in qualitative research. The first is time efficiency. AI can process large volumes of qualitative data, such as interviews, surveys, and focus group transcripts. Much faster than manual methods.

This reduces the time needed for data analysis and accelerates the research timeline. The second is scalability. AI can handle large datasets, making it possible to analyze data from hundreds or thousands of interviews, surveys, and social media posts. This allows researchers to scale their studies beyond what would be feasible manually.

Also, AI tools can process different types of qualitative data, for example, text, audio, images, and video, enabling comprehensive analysis across various formats and platforms. The third is cost savings. AI automates interviewing, transcription, translation, and initial analysis, reducing human touchpoints and costs. It enables revisiting survey responses to explore further insights. Consistency and objectivity.

AI ensures consistent data analysis, reducing human biases. It can help researchers perform built-in coding where data is categorized without preconceived notions, ensuring more impartiality in the research process. The fifth is real-time insights. AI tools can analyze data in real-time, allowing researchers to obtain insights quickly and adjust their research methods or questions as the study progresses. For studies involving ongoing data collection, such as social media analysis or live feedback,

AI can monitor data streams and generate immediate insights, allowing for timely intervention or responses. The sixth is exploration of complex data. AI excels at analyzing unstructured data, such as social media comments, open-ended survey responses, providing researchers with insights from raw data that would otherwise be time-consuming to organize and interpret manually. With AI's ability to analyze complex patterns and relationships, researchers can explore deeper, more abstract insights from qualitative data that may not be apparent through traditional methods.

Now, what are the steps for conducting qualitative research using AI? The first is familiarization with the information generated by AI. A crucial part of research is familiarizing oneself with the data that may have been gathered through interviews, focus groups, or observations and field notes. Marketers can better understand the content, the context, and the meaning of the data. by becoming familiar with the data and looking for patterns and themes.

As the marketers become more acquainted with the information generated through the help of AI, he must take greater responsibility for ensuring that all inserted and extracted information contribute to the goals of the qualitative study. For example, if a specific AI deep learning model like ChatGPT is not giving specific commands. For example,

discuss the notion of philanthropy. To generate a desired set of results, the researcher may find themselves at the mercy of its output.

That is, the system may provide an information from any source not necessarily correct. Consequently, it is incumbent upon the researchers to issue commands that are suitable for and helpful in achieving the goals of the study. For example, explain the notion of philanthropy within the business context. Following the command, it is crucial to guarantee a thorough review of the output.

That is, check that the produced information by the system is needed is indeed helpful in describing the phenomena under investigation. In this case, the notion of philanthropy. The second is eliminating biased content and addressing ethical concerns while using AI. Once analyst becomes acquainted with the generated information, they must delve deeper into the content of what has been produced by the AI in order to eliminate criticism based on its usage, the delivery of biased content and the failure to address ethical concerns. For example, because deep learning models can produce biased or harmful contents, their use has sparked several ethical concerns.

They are trained on huge swaths of text, and that text can itself be biased toward groups of people or languages. Due to this, the model may provide information that is unfairly biased. or discriminatory, thus contributing to the maintenance of harmful stereotypes and inequalities. In addition, deep learning models may produce plausible fake news stories, which can be used to spread disinformation and propaganda. Thus, analysts should check the sources of information produced, read the AI output critically,

and eliminate or disregard content that may be false or inappropriate. Besides, there is evidence to suggest that AI systems, in the form of deep learning models—for example, ChatGPT—may not produce reliable information, while they may also generate fake articles and news. Finally, if there are any doubts about any AI-created content, then the qualitative analysts should check facts by consulting alternative sources. Then comes analyzing the data.

This step involves using various tools to analyze large volumes of qualitative data. So, the first is natural language processing. It can extract key themes, concepts, and sentiments from data, making the analysis faster and more efficient. The next is thematic analysis.

AI can help identify patterns and recurring themes across qualitative datasets. Tools like Leximancer and NVivo use AI to perform thematic analysis by clustering data into categories based on word usage and text. Next is sentiment analysis. AI-driven sentiment analysis evaluates the emotions and attitudes expressed in qualitative data. This is particularly useful for analyzing open-ended surveys.

responses or social media content. Then we come to pattern recognition. AI can uncover hidden patterns in the data that might not be immediately apparent through manual analysis. Helping researchers identify complex relationships or emerging trends. Interpretation of results.

Once AI provides initial analysis, researchers should cross-check the results with human interpretation to ensure that nuances and context are fully captured. Refinements and feedback loops. AI allows for iterative rounds of analysis. Researchers can refine the queries or parameters based on initial findings to dive deeper into specific aspects of the data.

Continuous learning and model improvement: For longitudinal or ongoing qualitative research, AI tools can learn from new data and improve analysis over time, making future research iterations more refined and accurate. As new qualitative data is collected, AI models can be updated to reflect changing trends. This improves the relevance and accuracy of findings. Now, these are some ethical dangers of AI in qualitative research. So, the following are the ethical dangers that can arise while using AI for qualitative research.

One such danger is privacy and data security. Another is bias. The third is data ownership and rights. The fourth is lack of transparency. Fifth is data manipulation.

And sixth is impact on employment. So, let us first start with privacy and data security. The application of AI raises concerns, particularly when sensitive research data is shared with an AI tool. Studies involving organizations' privacy issues surface when they require the signing of non-disclosure agreements as a condition for data collection but are not made aware that the researchers may share the same data with an AI tool or its owners.

Researchers will need to ensure that the involved organizations affirm their consent to the data exchange. If they plan to use Generation AI, if they plan to use Gen AI analysis tools that uses the data, they collected for further training. In addition, individual data is also

subject to privacy protections. NDAs are negotiated between the researchers and the organization's leadership or their legal office.

However, the data collected relates to employees, clients, and potentially other stakeholders who might not be aware that their conversations with researchers will be handed over to the third party. Thus, the researchers must arguably always obtain consent from all stakeholders to transfer their data to each and every specific third party such as qualitative gen AI powered software. Participants who decline to provide such consent or who simply fail to respond to the request for consent, must have their data excluded from what is shared.

Next is the biases. All AI is trained on biased datasets. Biased datasets can misinterpret demographic and further reinforce stereotypes. Thus, one must be mindful of this bias when reviewing AI-generated insights or suggestions. OpenAI's chat GPT-6 service openly acknowledges that their results are not free from biases and stereotypes are skewed towards Western views and can reinforce a user's bias.

AI may not account for the different needs, preferences, and values of diverse stakeholders and communities and may impose a dominant or hegemonic perspective on the data analysis process. The third is data ownership and rights. While automated data analysis is standard for quantitative data, using language learning modules such as ChatGPT for qualitative data is different, as they require data for training their models. Qualitative research is typically an in-depth inquiry that uses relatively unstructured forms of data, whether produced through observation, interviewing, or

the analysis of documents. As such, the production of such data can involve researchers in quite close and sometimes long-term relationships with people, suggesting that the participants should not simply be viewed as data machines. Instead, participants should be highly valued as collaborators in such endeavors. Therefore, the researchers can be considered as violating the commitment of non- maleficence given to the participants by volunteering their data to train language learning models.

Lack of transparency. Many AI systems operate as black boxes, meaning their decision-making processes are opaque. Researchers may not fully understand how AI arrives at certain conclusions, which challenges the principle of transparency in research. The lack of transparency can make it difficult to hold AI developers accountable for errors, biases, and unethical outcomes, complicating the research process. Data manipulation.

In some cases, AI can be used to generate synthetic data or simulate responses, which raises ethical concerns about the authenticity of research findings. If synthetic data is mixed with real data, it becomes difficult to ensure the integrity of the research. The rise of AI tools can generate defects. In qualitative research, where interview or focus group recordings might be altered.

The impact on employment. As AI takes over tasks like transcription, coding, and initial data analysis, there may be concerns about the displacement of human researchers, particularly those involved in more manual aspects of qualitative research. As AI handles more aspects of qualitative research, there is a risk that researchers will lose valuable skills in manual coding, critical thinking, and interpretive analysis.

So, to conclude, in this module, we have discussed the concept and tools for conducting qualitative research using AI. Then, we have learned about the benefits of using AI for qualitative research, understood the steps for conducting qualitative research using AI, and then learned about the ethical considerations of using AI in qualitative research. These are the references from which the material for this module was taken. Thank you.