DSE 6311 – Data Science Capstone

Team Gamma

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EVALUATING AI’s ROLE IN CUSTOMER SATISFACTION AND RETENTION

Preliminary Project Proposal

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# Background & Question

## Question:

How does the overuse of artificial intelligence in customer interactions affect customer satisfaction, error rates, and cost efficiency, and at what point does it lead to negative customer sentiment and a decrease in loyalty or sales?

## Addressed Need:

This question addresses the challenge of finding a good balance between efficiency and customer satisfaction in AI-driven customer service. AI use is continually increasing within the business model specifically in addressing customer interactions. As this increase occurs, it’s important to identify when AI is beneficial to customer relationships, and when it’s harmful. This insight can guide companies in using AI effectively without risking customer loyalty or driving up costs due to customer dissatisfaction without losing the beneficial aspects of AI.

## Rationale:

This question is worth exploring because AI can offer major savings and efficiencies but relying too heavily on it may make interactions feel impersonal or ineffective which could alienate customers. Businesses can refine their approach to keep customer satisfaction high and continue to reduce errors by studying where the tipping point is between automation and human interaction. Even small adjustments to the use of AI could lead to long-term loyalty and reduce customer turnover, which can support broader business goals.

## Originality:

Many studies have looked at AI’s role in customer service but fewer have focused on identifying the exact point at which AI’s benefits are not efficient in improving the customer experience. We can obtain better insight into how much AI is appropriate and beneficial to customer interactions by finding this threshold. This would help companies set practical guidelines for AI use that genuinely enhances customer relationships.

## Hypothesis and Prediction

### Hypothesis:

While the implementation of AI in retail settings improves cost efficiency and reduces errors, excessive reliance on AI in customer service without human interaction will lead to increased frustration. This will ultimately lower customer satisfaction and retention, with a noticeable drop in loyalty once a threshold of negative sentiment is reached.

### Prediction:

Sentiment analysis of customer reviews and feedback will show a correlation between the level of AI usage and negative sentiment. Initially, moderate AI usage may improve customer satisfaction by streamlining processes and reducing errors. However, as AI overuse increases, particularly in customer service and decision-making tasks that require empathy or human nuance, customers will express frustration. This sentiment will intensify when the perceived lack of human support coincides with issues such as service errors or theft, leading to reduced sales and loyalty for companies that overly depend on AI.

# Data & Analysis

Data Source and Relevance:

The “Customer Satisfaction Response to Artificial Intelligence Tools Usage During Online Shopping” dataset has much of the data that we will need to analyze customer satisfaction and use of AI.

<https://figshare.com/articles/dataset/Customer_Satisfaction_Response_to_Artificial_Intelligence_Tools_Usage_During_Online_Shopping/24633105?file=43284342>

Key Metrics:

### Outcome Variable:

Customer Satisfaction (AI\_Satisfaction)

### Predictor Variables:

1. Demographic: Country, Generation (Age), Gender, Education, and Living\_Region
2. AI tools used: Chatbots, Virtual Assistants, Voice & Photo Search
3. Customer trust in AI: AI\_Privacy\_No\_Trust, AI\_Endorsement
4. Customers think AI improved experience (AI\_Enhance\_Experience)

Tentative Analysis Plan:

Our plan is to start with data cleaning & preparation to remove incomplete or irrelevant entries as needed. Then we will summarize the data with descriptive statistics to see trends in AI usage, demographics, and customer satisfaction. We will also use sentiment analysis and/or correlation analysis depending on availability of open-ended data, if open-ended responses are available in other data we will use sentiment analysis. We will use threshold analysis to identify the point when AI usage begins to correlate with increased negative sentiment and/or reduced satisfaction. We will also build a model to predict the likelihood of negative customer sentiment/satisfaction based on AI usage and other predictor variables.

### Pitfalls and Challenges:

One challenge is being able to interpret sentiment accurately and finding an open source dataset which has narrative data where we can analyze sentiment. Another limitation might be operationalizing the definition of “overuse” of AI to be accurate against other industry benchmarks.

## Assessing the Answer to the Research Question:

The question will be answered if we are able to see a clear relationship between AI usage levels and customer satisfaction and identifying the point where satisfaction decreases as AI usage increases.

## Hypothesis Validation:

The hypothesis will be supported if we identify that moderate AI usage positively impacts customer satisfaction and high usage correlates with negative sentiment. If there is no significant relationship between AI usage levels and satisfaction, the hypothesis can be rejected.

# Technical Details

## Coding Language: Python

## Other Resources:

If we continue with our plan to implement sentiment analysis, we will need to identify a source of open-ended narrative data about AI interactions.

## GitHub Link:

link

# References

Arora, S. (2024, August 29). *Sentiment analysis using Python*. Analytics Vidhya. https://www.analyticsvidhya.com/blog/2022/07/sentiment-analysis-using-python/

Kannan, Rathimala; Ramakrishnan, Kannan; Ersoy, Ayse Begum; Contu, Davide (2023). Customer Satisfaction Response to Artificial Intelligence Tools Usage During Online Shopping. figshare. Dataset. https://doi.org/10.6084/m9.figshare.24633105.v1

* 1. The dataset chosen fits the question very well. I think that the binary nature of the response might be a bit misleading. If there was data that gave the AI satisfaction on a scale it might be more appropriate and give a better picture of the actual landscape.
  2. The analysis plan makes sense as far as the process. Additional data is mentioned in the plan that is not mentioned in the chosen datasets which calls into question the approach a bit. The plan also indicates trying to find a threshold of when negative AI sentiment sets in but given that AI satisfaction in the provided dataset is binary it might be difficult to extract that information. I think if the dataset provided can be augmented with additional data the plan is solid.
  3. I think this question is fairly novel, while AI and its impact on customer satisfaction is a topic of debate, the studies on it have been very business driven from what I’ve found, and companies that are spending big on AI investment are likely to suffer from a bit of confirmation bias. This being an independent study, and one taking place after the AI boom of the early 2020’s makes it novel in my opinion.
  4. My major concern with this project is its scope, the dataset provided covers 3 countries which are likely to have very differing opinions of AI. AI might be “replacing” peoples jobs more in certain areas which is likely to influence how they rate their interactions with AI. Limiting the scope to a single country or splitting the data so that it treats each country separately would help alleviate this. The hypothesis and prediction are fine and align with what I too would expect though the prediction does leave out some factors, like a countries baseline approval of AI, which might need to be addressed. Assuming a 0.5 baseline might not be appropriate for this type of project.
  5. This project is definitely bold and exciting but might need a bit of tweaking and additional data to come to its full potential. Its for sure a project that I’m looking forward to seeing the results for.