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

**PEER REVIEW FEEDBACK:**

1. ***Dataset(s) Chosen****–Do you agree the datasets chosen are appropriate to the question? If so, why? If not, what kind of data would you suggest they look for instead?****(2+ sentences feedback)***

**I think the chosen dataset is somewhat appropriate to the question. I am a little concerned with the lack of numerical statistical values. What will be the threshold for determining the impact of AI on customer satisfaction? Will it be a binary output (0 or 1) or a range of values between 0 and 1? With the current chosen dataset, there might be a need for another one that is more statistically inclined instead of demographics based if the goal is to create a value threshold.**

1. ***Analysis Plan****– Are the analyses selected appropriate to answer their question? If so, why? If not, what other types of analyses should they be looking at instead?****(4+ sentences feedback)***

**The use of threshold analysis is appropriate for their research question. I am, however, concerned with the sentiment analysis. It is hard to truly gage customer satisfaction, so the use of threshold analysis and open-source data is important. Finding open-source data should be a priority moving forward, so as to handle the pitfalls mentioned for sentiment analysis. I like the end goal of having a threshold to determine customer satisfaction when AI is involved, it’s just the process of getting there with sentiment analysis that is tricky. If anything, I wouldn’t focus solely on that unless you find an open-source data that portrays what you want for it.**

1. ***Novelty of Question –****Do you think the question is novel? If so, why? If not, why not and is there a different angle or approach they could take to make it more original?****(2+ sentences feedback)***

**I think the question is original enough. As the group stated, analyzing AI effect on consumers is a bit novel. However, their approach is interesting and original for the question proposed.**

1. ***Concerns you have******–****Please address any concerns you might have from their proposal:****(4+ sentences feedback)***
   1. *What concerns or pitfalls do you foresee?*

**The pitfalls I foresee are the same ones the groups details in their proposal. Sentiment is hard to measure, and the group is aware of this and seems like they are already taking measures to handle it.**

* 1. *Is the project too ambitious? Not ambitious enough?*

**I think this project is just ambitious enough to not be overwhelming. It is an interesting topic, and I will be interested to see what factors of AI affect customer satisfaction. Especially if the group chooses to compare demographics, such as age, income, etc., that is available on their currently chosen dataset.**

* 1. *Do you foresee any problems in their hypotheses or predictions? Any underlying biases?*

**Their hypothesis is well-written and clear. Their prediction is equally as good. Both express the group’s thoughts and possible future results perfectly with detailed explanations. I see no underlying biases.**

* 1. *Do the authors make any critical assumptions, either about the data or their models, that they need to address?*

**I see no assumptions made that need to be addressed.**

1. ***Anything else you think will be helpful. (1+ sentences feedback)***

**This is a very thorough initial proposal. You seem to have a handle on your topic and the issues that may arise. I’m interested to see the end results! 😊**