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Impact of Machine Learning on Consumer Purchase Intent: An Insight into Business and Ethical Perspectives

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ABSTRACT: The emergence of e-commerce in India has been considerably supported by machine learning (ML) technologies, a subset of AI infrastructure which enables the system to learn without programming. From personalised product recommendation to customer assistance, machine learning plays a pivotal role in identifying the purchasing behaviour of customers now a day. These advanced systems of market research contributing significantly in the in identifying the taste and preferences of the customers and act accordingly even without the help of a systematically developed software or programme. This article look into the relationship between some important machine learning features and customer purchase intent of online customers based on their purchasing behaviour. This study primarily examines the influence of machine learning (ML) in designing the purchasing intent of customers. A randomly selected 60 persons across different demographics act as the respondents to develop a statistically relevant data using - Chi square test. The findings of the study suggest that the key ML features have an influence over the purchase intent of the customers. These results are crucial for the digital business platforms for upgrading and enhancing the AI enabled infrastructure for finding better market solutions and developing a potential customer base for the future.

KEYWORDS: Machine learning, AI, purchase intent, digital platforms, consumer behaviour, online customers,

I. INTRODUCTION

The last two decades were marked by the profound impact of the emerging technology of machine learning (ML). ML is a branch of AI, which is an abbreviation of artificial intelligence, encompasses ML, which, in turn, is concerned with the design and creation of automated systems capable of discerning and processing intricate patterns within datasets. The key distinctions between machine learning algorithms lie in the volume of data they require and the degree of manual effort involved in training them. In addition to ML's computational efficiency, it being adaptable to many different problem areas increases its importance. In the digital age, the areas like business, education and health care are considered to be the prominent beneficiaries of ML.

In the digital age, the business organisation have undergone a profound a transformation, majorly fuelled by the data driven technologies. Ranging from browsing pattern to social media interactions ML is capable of developing a customer data base through profiling which can be used in targeted marketing and customised product outreach. It's beneficial for firms as well as customers in terms of time and money and resources. The term purchase intent means the likelihood that a customer would buy a particular product based on number factors. It may seem easy to choose one product over others, but in fact the decision is influenced by various psychological factors that play a crucial in the buying process.

Now a day the product's accessibility, information and availability are considered to be some important features in the buying decision of a customer. Using their self-designed mechanism, ML digitally enhances and facilitates these features through recommendations, customised pricing, and real time queries using chat bots etc. This data base can be used in customer profiling which will facilitate a numerous options to the sellers to reach their targeted customers. Along with benefits the ethical problems like privacy, surveillance, data misuse, consent has also to be addressed. The chances of potential algorithmic manipulation, has further extended the ethical concerns. In the absence of a well-defined rules and regulations, and appropriate authority, it is imperative to assess the implications of ML in the buying behaviour of a customer. It should be closely monitored and evaluated for better outcomes. This article explores how ML features shape the customer on digital platforms where billions of customers are actively engaging in product searches and making their purchasing decision. It also investigates how the ML features influence the conversion of a seeker in to customer, based on the behaviour data and digital interactions.

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II. LITERATURE REVIEW

The integration of machine learning into digital commerce has fundamentally reshaped consumer decision-making processes by enabling hyper-personalized product exposure and predictive targeting. Prior research highlights that algorithmic recommendation engines serve as cognitive aids, guiding users through vast assortments and subtly influencing preference construction (Jannach & Adomavicius, 2016; Gómez-Uribe & Hunt, 2015).

The interplay between machine learning and consumer psychology is well-documented in global studies (Jannach & Adomavicius, 2016; Zhang et al., 2020). Recommendation systems have emerged as a powerful tool to convert browsing behavior into purchases (Schafer et al., 2001).

Chatbots and virtual assistants have shown significant promise in replicating human-like interaction (Huang & Rust, 2021), thus reducing customer hesitation in completing transactions. However, concerns about dynamic pricing and perceived fairness remain underexplored, particularly in price-sensitive markets like India.

III. OBJECTIVES OF THE STUDY

- To identify the impact of Machine Learning in purchase intent.
- To investigate the influence of Machine Learning features in designing the purchasing behaviour.
- To evaluate the ethical and business implications of Machine Learning in consumer decision making.

IV. METHODOLOGY

The primary data using a structured questionnaire was used for the data collection. The sample size of the survey is limited to 60 individual customers, identified via random sampling method. The 60 respondents categorised in to three groups based on their screen time i.e. Low, Moderate and High. Each respondent was asked to mark their frequency of purchase choosing from four options i.e. Rarely, Occasionally, Frequently and very frequently.

Variables:
Level of screen time (categorical)
Frequency of online shopping (Rarely, Occasionally, Frequently, and very frequently)

Statistical Tool Used: **Chi-square Test** was used to analyse the relationship between the key machine learning features and customer purchase intent based on their purchasing history.

Hypothesis:
Ho: There is no significant relationship between level of screen time and frequency in online shopping
H1: There is a significant relationship between level of screen time and frequency in online shopping

V. DATA ANALYSIS AND INTERPRETATION

Observed frequency table:

Level of screen time	Frequency of online shopping				
	Rarely	Occasionally	Frequently	Very frequently	**TOTAL**
Low	7	3	1	1	**12**
Moderate	2	3	14	11	**30**
High	1	2	7	8	**18**
TOTAL	**10**	**8**	**22**	**20**	**60**

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Test component	Results
Chi-square value ($\chi 2$)	23.66
Degrees of freedom	6
P value	0.0006
Test result	Null hypothesis rejected

Interpretation: Since the obtained p-value ($p = 0.0006$) is less than the 5% level of significance ($p < 0.05$), the Null hypothesis is rejected. This indicates a statistically significant association between the level of screen time and the frequency of online shopping.

VI. FINDINGS

- The significant association of variables in the statistical test shows that the frequency of purchase is directly proportional to the screen time of the customers. People who spend more time online tend to shop more frequently. This suggests that the continuous exposure to machine-learning-driven recommendations and ads can encourage the purchasing behaviour of users.
- Since machine learning operates based on the digital interaction of the customer, increased screen time enables the ML tools to gain deeper insights in to the customer behaviour. This is evident from the increase shopping touch points, which in turns encouraging “frequent” and “very frequent” purchasing patterns.
- The “Moderate screen time” group showed the highest level of frequent or very frequent purchases, indicating that even an average level of digital engagement is sufficient for ML algorithms to effectively profile customers, thereby significantly influencing their purchasing intent as screen time rises.
- It is evident that advanced ML models can yield higher purchase rates by reading the customer behaviour. Even with an average screen time, ML tools effectively converting the probable customer to a potential customer by refining and targeting. Moreover, greater exposure to the digital environment further stimulates higher spending from customers.
- It is clear that the customers are merely purchasing, unaware of ethical concerns. Due to this the customer’s autonomy in decision-making is reduced by the lack of algorithmic transparency and the influence of data driven tools which leave the customer clueless on how their choices and preferences are being influenced.

VII. SUGGESTIONS

- The statistical results project a significant relationship between screen time and purchase frequency. So that if the companies use more advanced AI data tools, they can reap the benefits of screen time and digital interaction in the customer profiling using ML algorithms and tools for better results.
- Investing in AI enabled analytical tools may help the businesses to identify customer behaviour accurately. This will help in understanding how customers perceive a product, their likelihood of repurchasing, and the probable time of their next purchase. Such information becomes crucial for timely interventions and strategic decision-making.
- Companies should shift towards more explainable ML models that can clearly communicate ‘why’ certain recommendations or ads are shown. Such a transparent model may allow users to act according to their taste and preferences rather than being unknowingly influenced.
- A more of customised ML models which allow users to adjust the level of personalization may help to retain the customer autonomy in purchase than not to get exploited by the psychological vulnerabilities or trigger impulsive buying.
- ML systems should be built on ethical aspects which may allow regular algorithmic audits to ensure ML systems comply with ethical and legal standards there by offer support-oriented recommendations, enhancing customer satisfaction, ethically.

VIII. CONCLUSION

The findings clearly indicate that machine learning (ML) has a measurable impact on the purchase intent in e-commerce platforms. As screen time increases, ML-driven systems gain deeper insights into customer preferences, facilitating precise profiling and stronger recommendations. Even users with moderate engagement are significantly influenced, indicating how effectively ML algorithms works and convert casual browsers into frequent buyers through personalized suggestions, targeted advertisements, and predictive interventions.

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However, this influence operates largely in the background, often without the consumer's full consent or awareness. The lack of transparency and ethical safeguards results in a feeling of being unknowingly monitored and raises concerns about diminished consumer autonomy, where choices are marked by algorithms rather than conscious intent. While businesses benefit from the enhanced data-driven strategies, the ethical aspects remain as a question.

Ultimately, the future of ML in e-commerce must create a fair alignment between intelligent personalization and ethical standards to the improve user experience by ensuring fairness, transparency, and privacy of the users. By adopting explainable models, which are more consistent in data handling norms, companies can develop more reliable and trustworthy platforms were customers are free to roam around. Instead of manipulating emotional responses and impulsive decision making behaviour, the companies should focus on advanced tools which allow more personalisation and customer autonomy over the buying decision which enhances customer satisfaction more ethically.

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