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Analysis of Factors Influencing User Trust in Machine Learning-Based Information Recommendations

Nabila Indah Safitri¹¹Bhayangkara Jakarta Raya University, Bekasi, Indonesia, nabilaa.indah31@gmail.comCorresponding Author: nabilaa.indah31@gmail.com¹

Abstract: Trust in machine learning-based recommendations can be influenced by various factors. One such factor is information quality, which encompasses the relevance, accuracy, completeness, and timeliness of the provided information. System transparency also plays a role, as users often require explanations regarding the rationale behind specific information or recommendations. Another relevant factor is perceived usefulness the user's perception of how beneficial a recommendation is in meeting needs or completing a task. Perceived ease of use, user experience, and perceptions regarding data security and privacy also factor into the formation of trust in recommendation systems. This study employs the Systematic Literature Review (SLR) method to identify, examine, and analyze prior research findings regarding the factors influencing user trust in machine learning-based information recommendations. A review of various studies on machine learning based recommendation systems reveals that user trust in information recommendations is not formed solely by the technology's ability to generate accurate suggestions. Instead, user trust emerges from the interaction between the system's technical aspects, information quality, the transparency of the recommendation process, and the user's own experiences and characteristics.

Keywords: User Trust, Machine Learning, Information Recommendations

INTRODUCTION

Advancements in information technology have driven the adoption of machine learning across various digital systems, including information recommendation systems. Machine learning based recommendation systems analyze user data such as interaction history, preferences, search behavior, and user characteristics to generate information deemed relevant and aligned with user needs. Such technology is implemented across diverse digital platforms, ranging from e-commerce, social media, and entertainment services to academic information systems and news providers (Halimah et al., 2025). The system's ability to provide personalized recommendations is a crucial factor in enhancing the relevance of the information received by users.

However, a recommendation system's capacity to generate relevant information does not automatically guarantee user trust in the recommendations provided. User trust is a critical factor, as users evaluate whether the system's recommendations are reliable, meet their needs,

and are derived through a process that is understandable (Husain et al., 2018). Low levels of trust may lead users to disregard system recommendations, even when those recommendations are technically highly relevant. Conversely, sufficient trust can encourage users to accept, utilize, and act upon the recommendations provided by the system.

Trust in machine learning-based recommendations can be influenced by various factors. One such factor is information quality, which encompasses the relevance, accuracy, completeness, and timeliness of the provided information. System transparency also plays a role, as users often require explanations regarding the rationale behind specific information or recommendations. Another relevant factor is perceived usefulness the user's perception of how beneficial a recommendation is in meeting needs or completing a task. Perceived ease of use, user experience, and perceptions regarding data security and privacy also factor into the formation of trust in recommendation systems (Zain & Utami, 2025).

These issues demonstrate that evaluating recommendation systems solely based on technical aspects such as model accuracy or algorithmic performance is insufficient. Human factors, particularly user perception and trust, must also be considered. A system with strong technical performance may not achieve optimal acceptance if users do not understand how it works or if they doubt the quality of the information it generates (Syarifuddin et al., 2025). Therefore, research into the factors influencing user trust is essential to gain a more comprehensive understanding of the acceptance of machine learning-based information recommendations.

Numerous studies on recommendation systems have extensively addressed aspects such as algorithmic performance, personalization, and recommendation accuracy (e.g., Wijaya & Yuniarto, 2024; Azizah & Rozi, 2024). However, there remains scope to examine the relationship between recommendation characteristics and user perceptions in shaping trust in system-generated information. Specifically, an analysis is needed that integrates factors such as information quality, perceived usefulness, ease of use, transparency, and security and privacy all of which potentially influence user trust. Such a study is crucial given the continuous evolution of technological characteristics and user interaction patterns alongside the rising adoption of artificial intelligence-based systems.

Based on these issues, this research is titled "Analysis of Factors Influencing User Trust in Machine Learning-Based Information Recommendations." The study aims to identify the factors affecting user trust levels and to analyze the relationship between these factors and trust in the recommendations provided by the system. The findings are expected to contribute academically to the study of user trust in machine learning-based recommendation systems while offering practical insights for system developers on designing information recommendations that are not only technically relevant but also acceptable and trustworthy to users.

Based on the background above, the research questions can be formulated as follows:

1. What factors influence user trust in machine learning based information recommendations?
2. How does recommendation accuracy affect user trust?
3. What is the quality and relevance of the information generated by machine learning?
4. How do user data security and privacy aspects influence trust in machine learning-based recommendations?

METHODS

This study employs the Systematic Literature Review (SLR) method to identify, examine, and analyze prior research findings regarding the factors influencing user trust in machine learning-based information recommendations (Suryani et al., 2023). The SLR method was selected because it enables researchers to gain a systematic overview of research

developments, frequently studied factors, relationships between variables, and opportunities for further research.

RESULTS AND DISCUSSION

Results

A review of various studies on machine learning based recommendation systems reveals that user trust in information recommendations is not formed solely by the technology's ability to generate accurate suggestions. Instead, user trust emerges from the interaction between the system's technical aspects, information quality, the transparency of the recommendation process, and the user's own experiences and characteristics.

A synthesis of the literature identifies several key factors influencing user trust in machine learning-based information recommendations: recommendation accuracy, system transparency and clarity, information quality, personalization relevance, perceptions of security and privacy, and user experience.

The Influence of Recommendation Accuracy on Trust

Accuracy is one of the factors most closely linked to user trust in machine learning-based recommendation systems. When recommendations consistently align with a user's needs or preferences, users tend to perceive the system as capable of understanding their behavioral patterns.

In the context of information recommendations, accuracy implies not only that the system provides factually correct information but also that the information aligns with the context of the user's needs. For instance, a news recommendation system that presents information matching a user's current interests can enhance the perception that the system is reliable.

However, high accuracy does not automatically guarantee high trust. Users may question recommendations if they do not understand the rationale behind them. Consequently, accuracy must be supported by other factors, particularly transparency and information quality.

The Influence of Transparency on Trust

Transparency is a crucial factor because machine learning systems typically operate through complex data processing. When users do not know why specific information is recommended, they may perceive the system as operating opaquely or being difficult to control.

Providing a simple explanation for a recommendation can help reduce user uncertainty. For example, a system might provide a note such as "recommended because you frequently read about technology topics" or "selected based on your search history." Such information provides users with context regarding how the recommendation was generated.

Transparency is also closely linked to the concept of explainability. Systems capable of providing explanations that users can understand have greater potential to build trust compared to systems that merely offer recommendations without explanation. Therefore, the development of recommendation systems needs to strike a balance between algorithmic complexity and the user's ability to comprehend the provided results.

The Influence of Information Quality on Trust

Information quality is a factor directly linked to a user's perception of the credibility of recommendations. Accurate, relevant, up-to-date, complete, and consistent information can boost a user's confidence in accepting recommendations provided by the system.

In machine learning-based systems, the quality of recommendations is heavily influenced by the quality of the data used. If the data serving as the basis for learning contains errors, is incomplete, or is irrelevant, the quality of the resulting recommendations may also suffer.

This demonstrates that trust in the system depends not only on the algorithms employed but also on the quality of the information serving as the system's input and output. In other

words, the implementation of sophisticated machine learning cannot fully guarantee user trust if the generated information fails to meet user needs.

The Influence of Relevance and Personalization on Trust

Personalization is a key characteristic of machine learning-based recommendation systems. These systems utilize data regarding user behavior, preferences, or interactions to generate recommendations that better align with individual characteristics.

Relevant recommendations can convey the impression that the system understands the user's needs, thereby enhancing the perception of the system's competence and reliability. Conversely, recommendations that frequently fail to meet user needs can erode trust and lead users to disregard the suggestions provided.

However, personalization also has another side. The more user data utilized to generate recommendations, the greater the user's concern regarding how that data is obtained and used. Thus, personalization and privacy are interconnected aspects in the formation of user trust.

The Influence of Security and Privacy on Trust

Security and privacy are critical factors, particularly when recommendation systems utilize personal user data. Data such as search history, location, preferences, digital activity, and interaction patterns can be used to generate more personalized recommendations. Users may harbor concerns if they lack clear information regarding the types of data collected, the purposes of its use, the parties with access to the data, and the measures taken to protect it. Such concerns can impact the level of trust placed in the system. Therefore, recommendation systems need to provide data protection mechanisms and privacy information that are easy to understand. Transparency regarding data usage can help users make more conscious decisions regarding the extent to which they are willing to provide data to the system.

The Influence of User Experience on Trust

User experience plays a role in shaping trust in recommendation systems. Systems that are easy to use, responsive, and consistent and that provide appropriate recommendations can create a positive experience for users. Repeated usage allows users to evaluate system performance based on prior interactions. If a system consistently generates useful recommendations, trust can develop gradually. Conversely, repeatedly receiving irrelevant recommendations may cause users to question the system's capabilities. Thus, trust in machine learning-based recommendations is not formed solely during the initial interaction but evolves through ongoing usage experiences.

Interrelationships Among Factors Shaping Trust

Research findings indicate that these factors do not operate in isolation. Accuracy, information quality, transparency, personalization, security, and user experience are interconnected in shaping trust. For instance, a system might generate highly accurate recommendations, yet if users do not understand the rationale behind them, trust levels may not necessarily increase optimally. Conversely, a transparent system that produces irrelevant recommendations can also lose user trust. These relationships demonstrate that user trust can be understood as the outcome of a comprehensive evaluation of the system's capabilities, the quality of its recommendations, its decision-making processes, and the protection of user interests.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on a literature analysis regarding the factors influencing user trust in machine learning-based information recommendations, it can be concluded that user trust is a complex

aspect not solely determined by an algorithm's ability to generate recommendations. Trust emerges from the interplay of various factors, ranging from technological performance to user perceptions and experiences. Overall, user trust in machine learning-based recommendations can be understood as the outcome of the interrelationship between accuracy, transparency, information quality, personalization relevance, security and privacy, and user experience. Therefore, the development of recommendation systems should not focus exclusively on enhancing algorithmic performance but must also address aspects such as explainability, data protection, information relevance, and user needs. Such an approach is crucial to ensuring that the implementation of machine learning yields recommendations that are not only technically effective but also accepted and trusted by users.

Limitations

This study has several limitations that should be considered when interpreting the results. First, the study employs a literature review method; consequently, the findings depend on existing research that was available and accessible to the researchers. No primary data were collected directly from users of machine-learning-based recommendation systems, meaning that user perceptions and experiences could not be empirically observed within specific contexts. Furthermore, the study focuses on key factors namely recommendation accuracy, transparency and explainability, information quality, relevance and personalization, security and privacy, and user experience. There remain other factors that could potentially influence user trust such as platform reputation, risk perception, social influence, digital literacy, and individual user characteristics that have not been examined in depth.

Recommendations

Based on the research findings and the identified limitations, several suggestions are offered for consideration in future research. First, it is recommended that future studies utilize primary data such as surveys or interviews collected from users of machine learning-based recommendation systems. Gathering primary data can provide a more concrete understanding of user trust levels and the factors influencing them, based on direct usage experiences. Future research could also expand the scope of variables by considering other factors that may potentially influence user trust.

Author Contributions

The author's contribution to this research is divided into several main stages, including determining the research topic, formulating the problem, developing ideas, collecting data to analyzing the data, and then interpreting the results.

AI Disclosure Statement

The authors are solely responsible for the content, accuracy of the information, analysis, interpretation, and conclusions presented in this paper. All information obtained using AI was reviewed and reconciled by the authors with relevant literature sources before being used in the final manuscript.

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