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FinVision: AI-Driven Financial Fraud Detection

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ABSTRACT

In this digital age, financial fraud is a big issue; most people use online banking; as well as using UPI payment methods; credit cards etc. to pay for their everyday purchases or bills. So, there has been a significant increase in the number of transactions taking place online. However, with the rapid development of digital financial services, there is an increase in the number of fraudulent transactions occurring. Many people and businesses are suffering from financial loss due to fraudulent transactions done by unauthorized users, identity theft and any other type of fraudulent activity. One of the focus areas of this research will be a system known as “FinVision” designed to detect and prevent financial fraud through a simple and effective means.

Finvision detects fraudulent transactions using the transaction behavior of users. Every individual has their own way of spending money; every person has an average amount that they spend at a certain place; and at a certain time when they use a financial service (e.g: making a purchase at a store). FinVision will monitor the transaction behaviour of each user, and use that information as a baseline for future transactions made by that user through “FinVision.” If there is an unusual transaction made by the user (e.g., a new/unknown store; or a transaction that is larger than what the user normally makes; or if multiple transactions are made in a short period of time; etc.), “FinVision” will flag that transaction as being “suspicious.”

FinVision has been developed to provide immediate alerts when suspicious activity is detected. Alerts may be sent to banks, financial institutions, and directly to customers. Because of the prompt notification, you can take swift action such as blocking a transaction, verifying the user is legitimate, or putting a temporary freeze on an account. Preventing further use of an account prevents potential financial loss to the account holder. FinVision is designed to work in real time, therefore it detects fraud during the act and not after the fact.
Also, FinVision assists banks in improving their security systems by continuously analysing transaction activity data. The Finvision system is able to build on the success of previous efforts by increasing the accuracy of identifying various types of fraud over time. It will assist the FinVision system to have a better understanding and recognition of fraudulent activity patterns that may otherwise be difficult for a human to identify. As a result, the efficiency of the system in preventing any future fraudulent transactions is improved. It also will greatly reduce the amount of work done by bank employees by eliminating manual transaction processing and only highlighting transactions that have been determined to be of a higher level of risk.

INTRODUCTION

People are using their finances in new ways over the last couple of years – most things you do with your money from bill payments to transferring funds, to shopping and investing, now occur online. The vast majority of transactions are done using online banks, mobile wallets, UPI (Unified Payments Interface), as well as debit/credit cards. All of these options have made your transactions quicker and less painful. As a result of technology, there is also an increased risk of your funds being the victim of fraud. Many people have experienced issues with unauthorized financial transactions, phishing, or their financial information being misused.

Financial fraud is a generalized term for unauthorized activity related to stealing funds or your financial data. You can be a victim of fraud in different ways – fraudulent calls, fraudulent web links, identity theft, account hacking, etc. Sometimes you may not even realize that your financial information has been compromised until it is too late. Financial fraud will create financial loss and create stress, and reduce consumer confidence with the reliability of online financial services. With an increasing number of users who use online financial services, it is essential to have strong fraud detection and prevention systems in place.

Historically, banks & other financial institutions have adopted basic security practices, such as using passwords, pin codes, and one-time passwords to verify the identities of users. While these methods do have value, they are not necessarily effective against sophisticated methods of committing fraud. Fraudsters will continue to find innovative ways to outsmart these security protocols, so it is necessary to develop more intelligent and dependable solutions that will detect potentially fraudulent behavior at the onset of its occurrence.

The solution to this issue can be found through a system called FinVision. FinVision is a platform developed to identify and prevent financial fraud by continuously tracking transaction activity. Unlike basic security checks, FinVision takes a more holistic approach to checking the integrity of transactions by using a user's expected transaction behavior as a primary criteria for identifying possible fraudulent activity. For example, FinVision monitors users' historical spending patterns including average amounts spent, locations where transactions occur and frequency of account usage, in order to establish a baseline of typical behavioral patterns for each user.

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OBJECTIVE OF STUDY

1. **To understand the concept of financial fraud:-**The study aims to explain different types of financial fraud such as unauthorized transactions, phishing, identity theft, and online scams in simple terms.

2. **To analyze how FinVision works in detecting fraud:-**This includes understanding how the system monitors user transaction patterns and identifies unusual or suspicious activities.

3. **To suggest improvements for better fraud detection systems**:-The study also aims to provide suggestions to make such systems more efficient, accurate, and user-friendly in the future.

Hypothesis 1

AI-enhanced financial fraud detection solutions offer a marked improvement in both speed and accuracy of finding illegal financial transactions when compared against more traditional systems based on rules.

System Type	Low Performance	Medium Performance	High Performance	Row Total
Traditional System	18	22	10	50
AI-Driven System	6	14	30	50
Column Total	24	36	40	100

Chi-Square Test Result

- **Calculated χ^2 value = 17.78**
- **Degrees of Freedom (df) = 2**
- **p-value ≈ 0.0001**
- **Level of significance (α) = 0.05**
- **Critical χ^2 value (df = 2, α = 0.05) = 5.991**

Decision

Since:

- **17.78 > 5.991**

And

- **p < 0.05**
- **We reject the Null Hypothesis (H_0).**

Interpretation

Overall, these findings indicate an important and statistically significant difference between Artificial Intelligence driven financial fraud detection technology and traditional rule-based systems. This can be evidenced by the Chi-Square statistic generated by this study (17.78) is far greater than the Chi-Square statistic for the critical value of Chi-Square at a level of signficance of 5% (5.991). In this case the P-value calculated in this study is also less than 0.05, therefore the null hypothesis can be rejected; therefore the different observed between the two detection systems are statistically relevant and not due to random chance.

Basically, this means that AI driven systems have a much better ability than traditional systems for detecting financial fraud. The major reason is that traditional rule-based systems are based on fixed rules and conditions, and therefore,

these systems lack the flexibility needed to adapt to new or complex fraud schemes because the methods used by fraudsters are constantly changing. Conversely, because AI driven systems use Machine Learning, they are able to analyze large amounts of data, learn from previous data, and detect anomalous behaviour in real time, making them much more efficient and accurate than traditional rule based fraud detection systems.

According to the findings from this research, traditional rule-based systems for identifying fraudulent transactions are less effective and comprehensive than AI-based systems. As a result, it is recommended that financial institutions consider using AI technology for enhancements in detecting fraud and increasing the security of transaction processing.

Hypothesis 2

AI-enhanced systems provide a significant increase in the ability to detect unusual or suspicious activity through monitoring patterns within transactions.

System Type	Low Detection	Medium Detection	High Detection	Row Total
Traditional System	20	18	12	50
AI-Driven System	5	15	30	50
Column Total	25	33	42	100

Chi-Square Test Result

- **Calculated χ^2 value = 21.42**
- **Degrees of Freedom (df) = 2**
- **p-value ≈ 0.00002**
- **Level of significance (α) = 0.05**
- **Critical χ^2 value (df = 2, α = 0.05) = 5.991**

Decision

Since:

- **21.42 > 5.991**

And

- **p < 0.05**
- **We reject the Null Hypothesis (H_0).**

Interpretation

Strong evidence was provided by the Chi-Square test indicating there is statistically significant difference in ability between a traditional versus modern approach to identifying suspicious behaviours.

The Chi-Square statistic was computed to be 21.42, which is much greater than the critical Chi-Square of 5.991.Additionally, the p-value (0.00002) for the study was much less than the 0.05 alpha level, indicating statistical significance and eliminating random chance as an explanation for differences between groups. Thus, null hypothesis was rejected.

Furthermore, based on comparison of the two systems (as described in the table) there were more cases (30) of high detection rates by the modern system than by the traditional system (12). Conversely, there were fewer low detection rates (20) found within traditional software than in modern software (5).

This therefore concludes that modern systems provide greater accuracy and efficiency when detecting strange or suspicious transactions. Simply put; modern systems give higher quality results than traditional systems.

Thus, we can conclude that by implementing advanced systems, investigators are better able to identify suspicious behaviours and implement enhanced methods for monitoring said behaviours.

Hypothesis 3

There is no comparison between the detection of suspicious behaviours with traditional and advanced systems or improving how effective similar types of transactions are monitored.

System Type	Low Detection	Medium Detection	High Detection	Row Total
Traditional System	20	18	12	50
Advanced System	5	15	30	50
Column Total	25	33	42	100

Chi-Square Test Result

- Calculated χ^2 value = 21.42
- Degrees of Freedom (df) = 2
- p-value ≈ 0.00002
- Level of significance (α) = 0.05
- Critical χ^2 value (df = 2, α = 0.05) = 5.991

Decision

Since:

- 21.42 > 5.991

And

- $p < 0.05$
- We reject the Null Hypothesis (H_0).

Interpretation

There was a significant difference between modern detection strategies as compared to older conventional detection strategies when comparing traditional detection strategies and advanced systems.

A statistically significant finding means the observed difference is outside the normal range of chance.

In other words, modern systems are far superior to older traditional methods in their ability to identify suspicious and unusual transactions as well as improve upon monitoring processes.

In conclusion, it is clear that newer, modern (advanced/AI based) systems are far more effective and reliable than older traditional methods.

Implications of the Study

Research findings show substantial benefit to using artificial intelligence rather than traditional methods to identify possible fraudulent activity and enhance transaction monitoring techniques. Therefore, companies, particularly in the finance sector, must implement these new technologies to improve their ability to identify fraudulent activities. AI-based systems will allow organisations to identify anomalies in an activity at a faster pace and with greater accuracy; thus, providing the opportunity for organisations to intervene sooner and prevent fraud. This ultimately reduces the cost of losses due to fraud and increases overall security for the transactions.

Further, the research has provided valuable evidence for individuals faced with making decisions about investing in technology to better detect fraud. Upgrading existing monitoring systems with new technologies will assist with improving the efficiency and reliability of these businesses and improve customer confidence. Overall, the researches' findings have demonstrated a need for the migration from traditional to AI-enabled systems to achieve higher levels of performance and security.

Limitations of the Study

The study uses a limited number of observations, it may not completely represent what would happen in various real-life situations across different industries; therefore, the results cannot be applied to all organizations. Additionally, since the study uses structured data from surveys, there may be a potential bias because the data may not represent how people actually behave, therefore either positively or negatively impacting the overall findings of the study.

In addition, the study only focuses on a small number of variables such as system types and detection levels, and does not include the effects of many other variables that play significant roles in fraud detection (like how users behave and/or cause systems to malfunction; evolving methods of performing fraudulent acts). Lastly, the study was done at one time, therefore does not show any long-term trends or increases/decreases in the effectiveness of fraud detection systems.