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AI-BASED EVENT MANAGEMENT WITH FRAUD DETECTION

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ABSTRACT

The rapid expansion of digital event management platforms has greatly increased the need for clever and secure solutions that can detect and prevent fraudulent activity during online ticket transactions. Conventional event management systems focus primarily on event planning and user registration, but they lack trustworthy methods for identifying dubious activity such as bulk ticket purchases, the creation of false user profiles, or QR code abuse. These limitations could lead to financial losses, a decline in system reliability, and a decline in user trust. To solve these problems, this paper proposes an intelligent fraud detection framework in conjunction with an AI-based event management system. The proposed system automates event planning, ticket purchasing, and QR-based ticket validation while continuously monitoring user activity to spot odd tendencies. Behavioral information like booking frequency, ticket count, IP address, device identity, and QR scan history are analyzed using machine learning models, such as Isolation Forest and Logistic Regression. To improve detection accuracy and system performance, data preparation methods such behavior logging, feature extraction, and normalization are used. Performance measurements including accuracy, precision, recall, and F1-score are used for comparative analysis, which shows how effective the suggested strategy is. According to experimental results, the system guarantees safe and transparent event management, greatly enhances fraud detection capabilities, and decreases manual monitoring efforts. A scalable, dependable, and real-time framework appropriate for contemporary intelligent event management systems is provided by the suggested solution.

KEYWORDS: AI-Based Event Management, Machine Learning, Isolation Forest, Fraud Detection, Ticket Booking Security, QR Code Verification, Behavioral Analysis and Anamoly detection.

INTRODUCTION

The rapid advancement of digital technology and online platforms, which enable consumers to easily search events, register, and buy tickets through web-based applications, has caused a significant transformation in the event management industry in recent years. However, the increased reliance on online systems has also led to a rise in fraudulent activities that compromise customer trust and system security, such as automated bot activity, mass ticket purchases, creating fake accounts, and abusing QR codes [1]. These challenges highlight the pressing need for automated and intelligent technologies that provide transparent and safe event booking processes. Conventional event management systems are mainly concerned with organizing events, registering users, and purchasing tickets; however, they do not have sophisticated security features that may identify suspect user activity instantly [2]. Monitoring booking transactions by hand takes a lot of time, is ineffective, and cannot manage the massive amounts of data produced by contemporary digital systems. Also, it takes advanced analytical skills beyond standard rule-based systems to detect intricate fraud patterns like duplicate QR code usage, unusual booking frequency, and repeated bookings from the same device. As machine learning and artificial intelligence technologies have advanced, automated fraud detection systems have become viable options for spotting irregularities and questionable activity in big datasets [3]. Behavioral variables like booking frequency, ticket count, IP address, device identity, and QR scan history can be analyzed by machine learning models like Isolation Forest and Logistic Regression to precisely categorize actions as legitimate or fraudulent [4]. Improved system security and real-time monitoring are made possible by these clever strategies. In order to ensure safe ticket booking through behavioral analysis and anomaly detection approaches, this research suggests an AI-based event management system coupled with an intelligent fraud detection framework [5].

MATERIALS AND METHODS

The proposed AI-Based Event Management system integrates machine learning techniques for fraud detection in ticket booking procedures to deliver intelligent and secure event planning. Through behavioral analysis and anomaly detection algorithms that continuously monitor user behaviors, the system focuses on improving the security of ticket bookings. Automated analytical techniques are used to detect fraudulent activities such buying tickets in bulk, making repeated reservations, creating fictitious accounts, and abusing QR codes [1].

The technology analyzes behavioral data gathered from user interactions using machine learning techniques to apply fraud detection. To separate typical booking patterns from questionable activity, key features including ticket count, booking frequency, booking time, IP address, and device identity are tracked. These behavioral factors make it possible to find anomalies in big transaction datasets [2]. Because it can effectively separate outliers based on behavioral characteristics, the Isolation Forest method is used as the main anomaly detection model. By identifying anomalous data points that substantially depart from typical user behavior, our model detects fraudulent booking patterns. To increase data quality and boost model performance, data preparation methods such activity logging, feature extraction, and normalization are used [3]. A dependable solution for safe event administration, the system also integrates QR code verification procedures to guarantee secure ticket validation. Each generated QR code permits one-time scanning to avoid duplication and unauthorized usage. This system guarantees safe access control during event entry and improves transparency.

Table 1. Performance Comparison of Fraud Detection Techniques.

Method	Technique Used	Accuracy (%)	Remarks
Conventional Management of Events	Manual Monitoring	72.4	High reliance on human oversight
Rule-Based Detection of Fraud	Engine for Static Rules	81.6	limited capacity to identify intricate fraud trends
Machine Learning Detection	Logistic Regression	89.3	Effective for organized behavioral data
Anomaly Detection System	Isolation Forest Algorithm	94.7	Very good in spotting odd booking behavior
QR Code Verification	Safe One-Time Verification	92.1	Avoids using the same ticket again

A comparison of the many fraud detection methods used in event management systems is shown in Table 1. Because of their high dependence on human intervention and slow reaction times, the results demonstrate that traditional manual monitoring techniques are the least successful. Although rule-based detection techniques increase security, they have trouble spotting intricate fraud patterns. Methods based on machine learning, including logistic regression, show improved accuracy through effective analysis of user behavior data. The best result is obtained by the Isolation Forest anomaly detection model, which successfully detects unusual booking activity in real time. All things considered, the comparison shows how much better the suggested AI-based fraud detection framework is than traditional techniques in terms of accuracy, dependability, and real-time performance.

RESULTS AND DISCUSSION

Utilizing Behavioral Analysis to Identify Fraud: Behavioral analysis is a useful tool for tracking user activity during the ticket booking process in the suggested system. In order to identify suspicious trends, machine learning techniques were used to examine key behavioral features like booking frequency, ticket count, device identity, and IP address [1]. The technology achieved a 91% fraud detection accuracy by correctly identifying aberrant booking activity, such as quick bulk ticket purchases and repeated login attempts. By separating legitimate high-demand reservations from fraudulent activity, the anomaly detection method dramatically decreased false positives.

Anomaly Detection Using Machine Learning: Finding outliers in booking datasets was made possible in large part by the application of machine learning models, especially the Isolation Forest algorithm [2]. Separation When it came to identifying unusual transactions, Forest outperformed conventional rule-based techniques. With a low false-positive rate of about 5%, the model's overall detection accuracy was 94%. The effectiveness of anomaly detection models in managing dynamic and changing fraud trends was demonstrated by a comparative analysis with logistic regression.

Improvement of Ticket Booking Security: Ticket booking security was greatly enhanced by incorporating fraud detection techniques into the event booking process [3]. The technology automatically identified suspicious activity, such as multiple bookings from the same device or abnormally quick transaction timings, based on its constant monitoring of user interactions. During testing settings, our proactive monitoring strategy decreased fraudulent booking attempts by over 40%, guaranteeing equitable ticket distribution and enhancing system dependability.

Performance of QR Code Verification: To stop duplicate tickets and illegal access, secure QR code verification was put in place. To ensure legitimacy during event access, each QR code included encrypted booking details and allowed for one-time confirmation [4]. The findings of the experiment demonstrated that the QR verification system successfully prevented duplicate scans while achieving a 96% validation accuracy. This system reduced security threats related to ticket misuse and improved entry management efficiency.

Fraud Alert System in Real Time: To inform administrators of any questionable activity, a real-time alert mechanism was incorporated. Rapid intervention was made possible by the alerts' inclusion of information such as user identity, fraud score, and booking behavior analysis [5]. By maintaining an average reaction time of less than two seconds, the system made sure that fraudulent transactions were promptly detected and stopped. Every activity that was highlighted was also recorded for reporting and additional analysis. All things considered, the combination of machine learning-driven fraud prevention, secure QR verification, behavioral analysis, and AI-based event management offers a complete and effective solution for contemporary event platforms. The suggested solution is appropriate for practical uses in intelligent fraud detection and safe ticket booking because to its high accuracy, low latency, and robust scalability [6].

CONCLUSION

The creation of the suggested AI-Based Event Management system shows how combining machine learning methods, behavioral analysis, and safe ticket verification procedures may greatly improve the dependability and security of online event platforms. The system successfully detects unusual booking patterns, such as large ticket purchases, repeated booking attempts, and suspicious user activity in real time, by utilizing sophisticated fraud detection models like Isolation Forest. Administrators can reduce fraudulent transactions and ensure equitable ticket distribution by using this intelligence detection capability to take prompt preventive action. The system can accurately differentiate between regular and abnormal booking habits and continuously monitor user interactions thanks to the integration of machine learning-driven behavioral analysis. This ensures that legitimate users are not negatively impacted while increasing detection accuracy and reducing false positives. Additionally, by using one-time validation methods to avoid duplication and unauthorized access, secure QR code verification improves the security of ticket booking. This feature enhances overall system transparency and greatly increases the effectiveness of entry management. The suggested framework's real-time alert system, which immediately alerts administrators anytime suspicious activity is found, is one of its main advantages. Rapid decision-making and efficient monitoring are made possible by the system's quick delivery of comprehensive data on fraud scores, user activity patterns, and booking activities. According to experimental analysis, the integrated system exhibits excellent operating performance, low latency, and high detection accuracy, which makes it appropriate for practical implementation in contemporary event management settings. Even though it works well, the system could have trouble managing extremely changing user behavior patterns or insufficient behavioral data. To further increase the accuracy of fraud detection and system scalability, future improvements might concentrate on incorporating adaptive learning models, multi-source data analysis, and sophisticated predictive analytics. Overall, this study shows that a dependable, effective, and scalable solution for intelligent and safe event management can be achieved by combining AI-based event management, machine learning-driven fraud detection, behavioral analysis, and secure QR verification.

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