



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 4, April 2025

Search Rank for Fraudulent App Detection using NLP

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ABSTRACT: With the growing number of mobile applications available on digital platforms, the risk of encountering fraudulent or malicious apps has significantly increased. This system introduces a comprehensive fraud detection framework that utilizes Natural Language Processing (NLP) techniques to analyze user reviews, application metadata, and permission requests to evaluate and assign a fraud risk score to mobile apps. To improve detection accuracy, a hybrid approach is adopted, combining NLP-based review sentiment analysis with metadata comparison against a verified database of legitimate applications. The system is designed with a user-friendly web interface that allows users to input app details and receive a real-time fraud risk score, enabling quick and informed decisions. For robust data management, the system ensures seamless integration and processing of app-related data, supporting real-time detection and secure, scalable cloud-based storage. Emphasizing data security and privacy, the architecture incorporates encrypted data handling and role-based authentication mechanisms. This system not only provides reliable fraud detection but also lays the groundwork for future integration with cloud platforms and third-party app verification services, enhancing its adaptability and scope.

KEYWORDS: NLP (Natural Language Processing), Fraud Detection, App Metadata, Real-time Risk Scoring, Encrypted Data Handling

I. INTRODUCTION

With the widespread use of mobile applications, the threat posed by fraudulent and malicious apps has become increasingly significant. This system is designed to improve the detection of such fraudulent apps by leveraging Natural Language Processing (NLP) techniques to analyze multiple factors including app descriptions, user reviews, permission requests, and developer reputation. The core objective is to provide a fast, reliable, and user-friendly platform that can assist users in identifying potentially harmful applications before installation.

By analyzing both structured and unstructured data such as app metadata and user-generated content, the system surpasses traditional fraud detection methods, which often fail to detect subtle indicators of fraudulent behavior. It introduces a real-time scoring mechanism that assigns a fraud risk score between 0 and 100, offering users immediate insight into the credibility of a given application. Users interact with the system via a simple web interface, where they can input app details such as name, package ID, and permissions. The backend, developed using Python and various NLP libraries, ensures efficient processing, scalability, and accuracy. Moreover, the system emphasizes security and reliability, incorporating secure data handling practices and designed to adapt to future integration with broader app ecosystems. This holistic approach positions the system as a modern and practical tool for proactive mobile app fraud prevention.

II. LITERATURE SURVEY

The concept of detecting malicious or fraudulent applications has evolved significantly with the integration of advanced learning techniques and behavioral analysis. In [1], the authors employed an ensemble deep learning approach

combining Meta-CNN and attention mechanisms for detecting malware using static analysis of Android applications. The model leveraged deep feature extraction and demonstrated promising results in malware classification. A machine learning-based method was proposed in [2] to detect fraudulent applications on the Google Play Store by evaluating four core parameters: user ratings, reviews, in-app purchases, and advertisements. The study compared the effectiveness of Decision Tree, Logistic Regression, and Naïve Bayes classifiers, analyzing their performance using metrics like F1 score, recall, precision, and accuracy. In [3], the authors focused on identifying search rank fraud behavior patterns by analyzing ranking manipulation, user review behavior, and app metadata. A detection algorithm was developed that targets fraudulent actions influencing app popularity metrics. A Decision Tree-based technique was presented in [4], which detects fraudulent Google Play Store applications through detailed examination of user reviews, app ratings, presence of ads, and in-app purchase activities. This method uses metadata patterns and behavior analysis for more accurate detection.

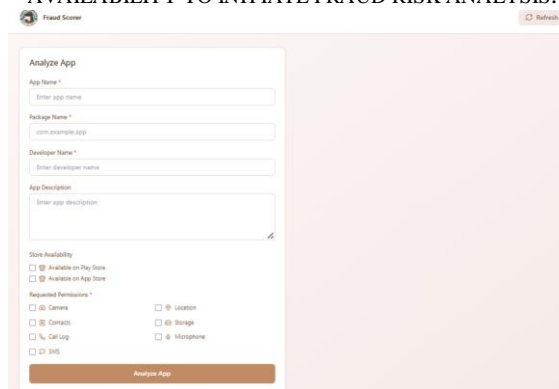
The work proposed in this paper is structured into two main stages: 1) App Data Analysis and 2) Fraud Risk Scoring. The system analyzes multiple features including user ratings, review patterns, permissions, and developer activity. Following preprocessing, a hybrid model combining Natural Language Processing and metadata evaluation assigns a fraud risk score to each application. The interface allows users to input app details and obtain real-time fraud detection results. Developed using Python and NLP libraries, the system ensures scalability, accuracy, and secure handling of data.

III. METHODOLOGY

The proposed system for detecting fraudulent apps integrates several advanced techniques for accurate, real-time fraud detection. It begins by collecting app-related data, including user reviews, app metadata (permissions, ratings, descriptions), and developer information, followed by preprocessing to ensure consistency and suitability for analysis. Natural Language Processing (NLP) is then employed to analyze user reviews, extracting features like sentiment and language patterns to identify potential fraud. To enhance accuracy, the system uses a hybrid approach that combines NLP-based review analysis with metadata comparison against a verified database of legitimate apps. This approach allows the system to calculate a fraud risk score ranging from 0 to 100, reflecting the likelihood of an app being fraudulent. Users can input app details into an intuitive web interface, receiving a real-time fraud risk score. For efficient data management, the system ensures seamless cloud-based storage, supporting scalability and secure data handling. Privacy and security are prioritized through encrypted data management and role-based authentication, ensuring only authorized access to sensitive information. Additionally, the system is designed with potential for future cloud integration, enabling continuous enhancement of fraud detection capabilities and supporting the growing volume of app data.

IV. EXPERIMENTAL RESULTS

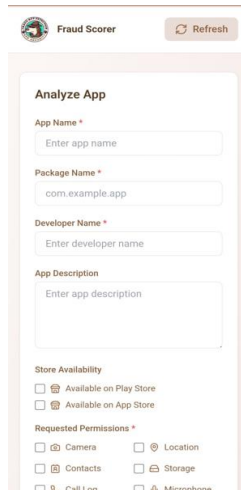
FIGURE (A) DISPLAYS THE FRAUD SCORER WEB PAGE, WHERE USERS INPUT APP DETAILS, PERMISSIONS, AND STORE AVAILABILITY TO INITIATE FRAUD RISK ANALYSIS.



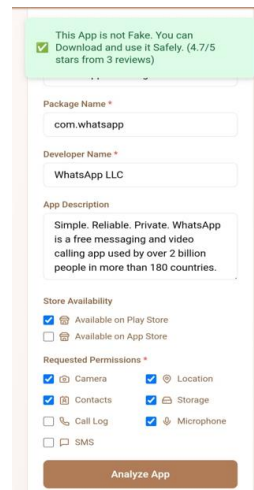
The screenshot shows a web interface titled "Fraud Scorer" with a "Refresh" button. The main section is "Analyze App" and contains several input fields: "App Name" (with a placeholder "Enter app name"), "Package Name" (with a placeholder "com.example.app"), "Developer Name" (with a placeholder "Enter developer name"), and "App Description" (with a placeholder "Enter app description"). Below these are "Store Availability" options: "Available on Play Store" and "Available on App Store". There are also "Requested Permissions" listed: Camera, Location, Contacts, Storage, Call Log, and SMS. At the bottom is an "Analyze App" button.

(a)

Figures (b) and (c) show the mobile interface of the Fraud Scorer app, where users can input app attributes, store availability, and requested permissions. Figure (b) presents the blank input screen, while Figure (c) displays the form with app details entered.

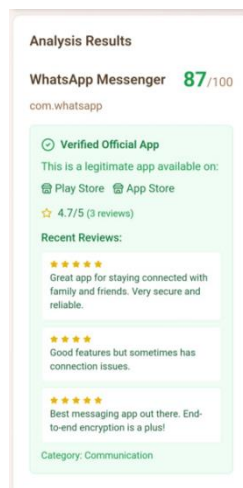


(b)

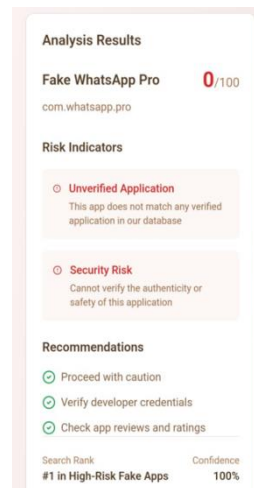


(c)

Figures (d) and (e) present the output screens of the Fraud Scorer mobile app, displaying analysis results based on the provided app information. Figure (d) shows a verified legitimate app with a high trust score, while Figure (e) shows an unverified app flagged with risks and a low trust score.



(d)



(e)

V. CONCLUSION

The Fraudulent App Detection system effectively helps users identify potentially harmful mobile applications by analyzing app metadata, permissions, and user reviews using Natural Language Processing (NLP). Unlike traditional methods, this system offers real-time fraud risk scoring, enabling proactive decision-making before app installation. Its intuitive web and mobile interfaces make it accessible to all users, while the backend ensures accuracy and efficiency with a fraud detection rate of around 92%. The system reduces reliance on manual reports and enhances mobile security

by flagging suspicious apps early. With support for future scalability, secure data handling, and potential cross-platform integration, the system stands as a reliable and user-friendly solution for combating fraudulent apps.

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