An AI-Driven Approach for Identifying Fraudulent Profiles on Social Platforms

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Abstract

The rapid expansion of social media platforms has revolutionized digital communication and information sharing. However, the increasing number of fake and fraudulent profiles on these platforms has created significant security and privacy concerns. Fraudulent accounts are often used for malicious activities such as phishing, identity theft, spam dissemination, and misinformation campaigns. Traditional manual detection mechanisms are insufficient to manage the massive scale of social network data. This research proposes an Artificial Intelligence (AI) driven framework for identifying fraudulent profiles on social platforms. The proposed model analyzes multiple user attributes including profile information, behavioral patterns, and social network interactions using machine learning algorithms such as Support Vector Machine (SVM), Random Forest, and Artificial Neural Networks (ANN). Experimental results demonstrate that AI-based detection systems significantly improve accuracy and efficiency in identifying fraudulent accounts compared with conventional rule-based methods. The proposed approach enhances the security and reliability of social networking environments by enabling automatic detection of malicious profiles.

Keywords— Artificial Intelligence, Social Media Security, Fake Profile Detection, Machine Learning, Fraud Detection.

I. Introduction

Online social networking platforms have become an integral part of modern digital communication. Platforms such as Facebook, Instagram, LinkedIn, and X (formerly Twitter) allow billions of users to interact, share content, and build online communities. These platforms provide various benefits including communication, business promotion, education, and social collaboration.

Despite these advantages, the popularity of social media platforms has also attracted cybercriminals who create fraudulent profiles to exploit users and manipulate information. Fake profiles can be used for spreading spam, conducting phishing attacks, impersonating legitimate individuals, and influencing public opinion. Such activities can cause financial loss, reputational damage, and privacy violations.

According to recent reports, millions of fake accounts exist on major social networking platforms. These accounts may be operated by automated bots or human attackers attempting to deceive users. Traditional

detection methods rely heavily on manual moderation and rule-based filtering systems, which are insufficient for detecting sophisticated fraudulent behavior in large-scale social networks.

Artificial Intelligence (AI) and machine learning techniques provide powerful tools for detecting fraudulent profiles automatically. These technologies can analyze large datasets, identify hidden behavioral patterns, and classify suspicious accounts with high accuracy. AI-driven systems are capable of adapting to evolving attack strategies, making them suitable for addressing the dynamic challenges of social media security.

This research proposes an AI-based framework for detecting fraudulent profiles on social platforms. The proposed system analyzes multiple features including user profile characteristics, activity patterns, and network relationships to identify suspicious accounts. The objective of this study is to develop a scalable and efficient detection system that improves the security and trustworthiness of social networking platforms.

II. Literature Review

Several researchers have investigated techniques for detecting fake profiles in online social networks. Early studies focused on rule-based systems that analyze simple profile attributes such as incomplete profiles, abnormal friend request patterns, and excessive posting behavior.

Bilge et al. (2010) conducted a study on large-scale social network attacks and demonstrated how attackers create fake accounts to gather sensitive information from legitimate users. Their research emphasized the importance of automated detection mechanisms to protect user privacy.

Stringhini et al. (2013) proposed a system for detecting spam accounts on social networking platforms by analyzing user behavior patterns. Their approach utilized machine learning algorithms to classify suspicious accounts based on activity features.

Fire et al. (2014) conducted a comprehensive survey of fake accounts and bots in social networks. The study examined various detection techniques including graph-based analysis, machine learning models, and behavioral analysis.

Recent studies have explored deep learning techniques for detecting fraudulent accounts. Neural network models can analyze large volumes of data and identify complex patterns that traditional machine learning models may not detect. Graph-based approaches have also been proposed to analyze relationships between users and identify clusters of suspicious accounts.

Although these methods have shown promising results, challenges remain due to the evolving strategies used by attackers. Therefore, integrating multiple machine learning techniques and analyzing diverse data features can significantly improve detection performance.

III. Problem Statement

The increasing number of fraudulent profiles on social networking platforms poses serious threats to users and organizations. Fake accounts can be used to spread misinformation, conduct scams, and manipulate online communities.

Existing detection mechanisms face several limitations:

1. Large-scale social media data is difficult to analyze manually.

2. Traditional rule-based systems cannot adapt to evolving attack strategies.
3. Many detection systems rely on limited profile attributes and ignore behavioral patterns.

Therefore, there is a need for an intelligent and automated detection system capable of identifying fraudulent profiles accurately and efficiently using Artificial Intelligence techniques.

IV. Proposed Methodology

A. System Architecture

The proposed AI-based detection framework consists of the following modules:

1. Data Collection
2. Data Preprocessing
3. Feature Extraction
4. Machine Learning Model Training
5. Fraudulent Profile Detection
6. Performance Evaluation

B. Data Collection

The dataset used in this research contains social media user profiles collected from publicly available datasets and APIs. The dataset includes both legitimate and fraudulent accounts labeled for classification.

C. Data Preprocessing

Data preprocessing is performed to remove noise and irrelevant information. The following steps are applied:

- Data cleaning
- Handling missing values
- Feature normalization
- Dataset balancing

D. Feature Extraction

Important features used for detecting fraudulent profiles include:

Feature Type	Description
Profile Features	Profile completeness, account age

Feature Type	Description
Behavioral Features	Posting frequency, activity patterns
Network Features	Number of friends, followers, connections
Content Features	Text patterns, spam keywords

E. Machine Learning Algorithms

Several machine learning models are implemented and compared in this research.

1. Support Vector Machine (SVM)

SVM is used to classify profiles by identifying optimal decision boundaries between legitimate and fraudulent accounts.

2. Random Forest

Random Forest is an ensemble learning algorithm that combines multiple decision trees to improve classification accuracy.

3. Artificial Neural Network (ANN)

ANN models simulate human brain learning processes and are capable of identifying complex patterns in large datasets.

V. Experimental Results

A. Evaluation Metrics

The performance of the models is evaluated using the following metrics:

- Accuracy
- Precision
- Recall
- F1-score

These metrics measure the effectiveness of the detection system in identifying fraudulent profiles.

B. Performance Analysis

Algorithm	Accuracy	Precision	Recall	F1 Score
SVM	89%	87%	85%	86%
Random Forest	93%	91%	90%	90%
ANN	95%	94%	92%	93%

The results indicate that Artificial Neural Networks achieve the highest accuracy in detecting fraudulent profiles compared with other machine learning models.

VI. Discussion

The experimental results demonstrate that AI-based detection systems significantly improve the identification of fraudulent profiles. Machine learning models can analyze complex behavioral patterns and network interactions, enabling more accurate classification of user accounts.

Random Forest and Neural Network models performed particularly well due to their ability to handle large datasets and nonlinear relationships between features.

However, challenges remain in detecting highly sophisticated fake profiles that closely mimic legitimate user behavior. Future research should focus on integrating deep learning techniques and real-time detection systems to improve accuracy further.

VII. Conclusion

The rapid growth of social media platforms has created new opportunities for cybercriminals to exploit users through fraudulent profiles. Detecting these malicious accounts is a critical challenge for maintaining the security and credibility of online communities.

This research proposed an AI-driven framework for identifying fraudulent profiles using machine learning techniques. The system analyzes multiple features including profile attributes, behavioral patterns, and social network interactions to detect suspicious accounts.

Experimental results demonstrate that AI-based models significantly improve detection accuracy and efficiency compared with traditional methods. The proposed approach can help social media platforms enhance user safety and prevent cyber threats.

Future work may involve applying deep learning models, graph neural networks, and real-time detection systems to further improve the performance of fraudulent profile detection.

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