

Fake Social Media Profile Detection

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Abstract

The proliferation of fake social media profiles has become a significant concern, posing risks such as, identity theft and any other malicious action as well as fraud, have become critically alarming. This project focuses on designing an integrated system that aggregates and presents information considered important to any social media account: activity patterns, connection history, and content authenticity. The system will help in providing a detailed profile analysis of account holders, thus enabling the users to identify suspicious accounts and report such accounts for further action by the authorities. The given solution will complement the safety of the platform, ensure informed decision-making, and contribute to the mitigation of such risks by eliminating fake accounts and malicious activities from the digital space.

INTRODUCTION

1.1 Overview

The rise of social media platforms, fake profiles have become more common and are being used usually to carry out malicious activities including information dissemination, scamming or phishing of unsuspected victims. And it is essential to ensure that these fake accounts do not pose a threat of integrity and security on online platform. We aim to create a more effective algorithm to identify fake social media accounts by comparing certain characteristics of the account history, such as user activity, mutual connections and content non-originality. With these features, the solution is able to quickly flag out any discrepancies and trigger alarms on suspicious transactions and generate detailed reports for deeper understanding. By reducing the number of fake users, the beefed-up solution would also help shore up online security and cut down social engineering risks, making for a more secure and reliable social media environment.

1.2 Problem Statement

The increasing presence of fake social media profiles used for scams, identity theft, and misinformation threatens user trust and platform security. This project aims to develop a system that gathers and presents information about fake social media profiles, allowing users to analyze suspicious accounts based on various parameters. This information can then be reported to the relevant authorities for further investigation and action against potential fraudulent activity.

1.3 Motivation behind the project

The number of fraud-related, scamming, and other malicious activity on social media sites warrants more pragmatic identification tools for suspicious accounts. The detection systems currently in place in a way do not give actionable insights or are out of the reach of common users and smaller organizations. I am inspired by a strong urge to provide users and security teams with a system that gathers relevant information on possibly fake profiles, in such a way that

the system empowers its users to take proactive measures by reporting these accounts to authorities, with the aim of increasing social media safety, containing the spread of malicious content, and helping to build a much safer internet place.

1.4 Objectives

The project aims at developing a system that will retrieve and display critical information on social media profiles, including activity patterns, connection histories, and originality of content. The users would be provided with the options to input target profiles, so that detailed reports showing suspicious behaviors or inconsistencies will be given. The project will aim to enable easier management and understanding of profile data through a user-friendly interface. It will also allow the system to report suspicious accounts to the right authorities for further follow-ups. The project will essentially improve general safety on social media by supporting efforts to detect and limit fake accounts as well as malicious activities.

1.5 Keywords

Social Media, Fake Profiles, Suspicious Activity, Profile Analysis, Connection History, Content Originality, Fraudulent Accounts, User Safety, Report to Authorities, Security

1.6 Conclusion

The emerging threat of fake accounts and online frauds calls for the need to develop a system that would gather and present critical information on social media profiles. This project, therefore, provides essential tools by detailing insights on profile behavior, connection history, and originality of content for users. Another effectiveness attribute is that the solution empowers users to report suspicious profiles to the authorities. Generally, the system aims to minimize malicious behavior and make the internet a safe place for all.

2. Review of Literature

Review of literature is an essential component of any research study that involves a systematic and comprehensive review of relevant literature and other sources of information to identify key themes, trends, and research gaps related to the research topic. In this case review on reveals significant developments in the field of cybersecurity and user authentication.

2.1. Literature Survey

1. "Fake Social Media Profile Identification and Report Using Machine Learning" This paper discusses the challenge to identify fake social media profiles using machine learning approaches. It studies differentiated models: supervised, semi-supervised, and unsupervised for research purposes. The paper narrates key features as well as the dataset used in differentiating between bots and real users. However, the paper indicates that because technology is very dynamic, fake profiles are always under a transformation process so that they remain continually challenging the detection systems. Since these methods have the aim of enhancing security as well as data privacy, data privacy and misinformation remain among the significant barriers to making social media more reliable and secure.

2. "Analysis and Detection of Fake Profile Over Social Media using Machine Learning Techniques" This research discusses the increasing issue with fake profiles on social media sites, both created by people and "bots". It highlights

the importance of security solutions in the fight against malicious activities. The paper based on profile character analysis and content-based detection techniques provides a hybrid model that combines both methods to analyze a given problem. It is an attempt to better detect and classify spammers and offers practical implications regarding future implementation of the model. The overall discussion regarding the evolving security landscape in online media and the need for continuous monitoring as well as updates to the model is also significant.☐

3. "Fake Profile Detection Using Machine Learning" This paper revolves around the issue of fake profiles within major social media portals like Facebook, Instagram, and Twitter, identifying threats in user security and data privacy through bots and fraudulent accounts, citing an urgent need to develop high-speed detection techniques to counter these malicious actors. This proposed machine learning model was a machine learning model trained to learn over the TwiBot-20 dataset, which achieved 87% in detecting false or bot-created accounts. The whole paper is structured into sections: literature review, methodology, and results.

4. "Fake Profile Detection on Social sites" This paper delves into the growing issue of fraudulent accounts on social networking platforms. This paper sought to design a framework that can distinguish between authentic and spurious profiles according to different techniques of classification, such as Random Forest, Support Vector Machines (SVM), and Artificial Neural Networks (ANN). It verifies the profile via automation through its framework, thereby improving the security of million-user platforms without the oversight of humans. This innovation can most significantly enhance the credibility and integrity of online social networks.

5. "Deep Learning Approach to Social Media Fake Account Detection" The paper attempts to address the emerging trend of appearance on fake accounts in popular social media sites such as Facebook and Instagram. It then touches on some much more complex and diverse advanced machine learning techniques than the ones mentioned above: namely, Random Forest, NLTK or Natural Language Toolkit, and Recurrent Neural Networks or RNN for fraud detection. The system enhances the accuracy of detection and improves its performance in identifying fraudulent activities by adding ensemble learning along with Random Forest. The distinction between real interactions and fake profiles is made by analyzing the usage patterns and anomalies of users, thus describing a holistic approach toward improving the security of the platform.

6. "Malicious Profile Detection on Social Media: A Survey Paper" This survey paper aims to review the growing problem of fake profiles on some popular social media like Facebook, Twitter, Instagram, and LinkedIn. It puts forward the increase in social media crimes associated with such profiles, letting disease-causing features spread false and fake news, coupled with fraudulent activities. The authors systematically collate multiple research efforts on spotting the fake profile, and hence present a holistic overview of methodologies used to determine the authenticity of user profiles, thereby making a precious contribution toward dealing with this challenge in the digital realm.

7. "Fake account detection on social media using random forest classifier" This research responds to the urgent need to identify fraudulent profiles on social media that perpetrate data theft and spread misinformation. It compares and evaluates three machine learning algorithms, Random Forest, Logistic Regression, and Decision Tree, to determine which best identifies the fake accounts. According to the results, the accuracy of Random Forest classifier is found to be the highest, and therefore, it can serve as a fully robust anti-malicious activity solution for social networking sites.

8. "Enhanced Social Media Profile Authenticity Detection Using Machine Learning Models and Artificial Neural Networks" This study tackles the issue of fake engagement on social networks by testing the performance of seven more sophisticated machine learning algorithms, reaching an accuracy of 93% with the Decision Tree Classifier. Against overfitting and for increasing the robustness of the models, this paper presents GANs that include K-Fold Cross-Validation. The paper also examines the model GAN-ANN that introduces Batch Normalization, and they make use of synthetic data for performance as well as generalization and further focus on the scalability and predictive accuracy across various machine learning frameworks.

9."Fake Profile Detection on Social Networking Websites using Machine Learning". This study illustrates the necessity of identification between a genuine and a spurious social networking profile owing to risk security concerns in this context of social networking. The presented methodology combines superior gradient boosting algorithms and techniques in Natural Language Processing for detecting better accuracy in the identification of a fake account, in particular, with timestamp data types. The study further in depth analyzed the interaction of various machine learning approaches towards multi-feature time series data for development of better detection methods on such platforms.

10."Fake Instagram Profile Identification and Classification using Machine Learning" This paper discusses the misuse of Instagram by forming fake profiles. It suggests designing an automated system

for the detection of fake profile IDs using supervised machine learning algorithms. The paper will cater to the security needs of Instagram users by predicting and classifying fake accounts. Fake ID profiles are stored in a data dictionary and so create ease for the government to operate against fake accounts. Several experiments are conducted for comparing different types of algorithms so that their performance levels may be ascertained while training the datasets.

2.3 Comparative Analysis

Sr No.	Name Of The Paper/Book	Insights	Contributions
1	Fake Social Media Profile Identification and Report Using Machine Learning	Explores the identification of fake profiles using decision trees and random forests, focusing on specific features like activity patterns.	Demonstrates system accuracy while highlighting challenges in scalability for larger datasets.
2	Analysis and Detection of Fake Profile Over Social Media using Machine Learning Techniques	Discusses detection using SVM and KNN, focusing on profile activity, follower counts, and network connections.	Shows high detection accuracy and emphasizes the importance of feature engineering for improving prediction accuracy.
3	Fake Profile Detection Using Machine Learning	Proposes a framework leveraging Logistic Regression and Random Forest, analyzing user behavior and profile metadata.	Yields impressive results for binary classification but requires refinement to minimize false positives.
4	Fake Profile Detection on Social Sites	Employs machine learning techniques to detect fake profiles on various platforms, combining behavioral and metadata features.	Discusses the need for collaboration with platform APIs for accessing real-time data.

5	Deep Learning Technique to Detect Fake Accounts on Social Media	Introduces a deep learning model analyzing user posts and activity patterns using CNNs.	Demonstrates improved accuracy in detecting fraudulent profiles, although struggles with noisy and incomplete data.
6	Malicious Profile Detection on Social Media: A Survey Paper	Explores multiple techniques for identifying malicious profiles, comparing machine learning and deep learning approaches.	Suggests hybrid models could improve detection rates while addressing limitations of individual methods.
7	Fake Account Detection on Social Media using Random Forest Classifier	Develops a Random Forest-based classifier evaluating user behavior metrics to detect fake accounts.	Indicates high accuracy rates for identifying malicious accounts while highlighting challenges with real-time detection and scalability.
8	Enhanced Social Media Profile Authenticity Detection Using Machine Learning Models and Artificial Neural Networks	Focuses on improving fake profile detection using a combination of machine learning and ANNs, enhancing the ability to differentiate between real and fake accounts.	Shows how ANNs paired with other algorithms improve detection, with data preprocessing remaining a critical challenge.
9	Fake Profile Detection on Social Networking Websites using Machine Learning	Presents a machine learning-based approach using classification techniques like Random Forest and Decision Trees to detect fake profiles.	Evaluates profiles based on activity levels and interaction patterns, showing promising results but facing challenges with dynamic and evolving profile behavior.
10	Fake Instagram Profile Identification and Classification using Machine Learning	Addresses fake profiles on Instagram, analyzing user behavior and content features.	Reports high detection accuracy but struggles with continuously evolving fake profiles and dynamic content generation on social media platforms.

2.3.1 Table Of Comparative Analysis

2.4 Conclusion

In summary, the research papers and approaches presented here provide a comprehensive review of detecting malicious social media profiles with the help of machine learning techniques, deep learning methods, and different high-scale approaches, including decision trees, random forests, and CNNs. The methods do depict promising accuracies toward identifying fraudulent accounts. However, there are challenges attached to scalability, feature

engineering, real-time detection, and the management of dynamic and continuously changing fake profiles. Further developments of detection systems in directions of improving collaboration with social media platforms, data preprocessing, and models should be in place for the elimination of gaps that such a system faces today.

3. PROPOSED SYSTEM

3.1 Block Diagram and Architectural Design

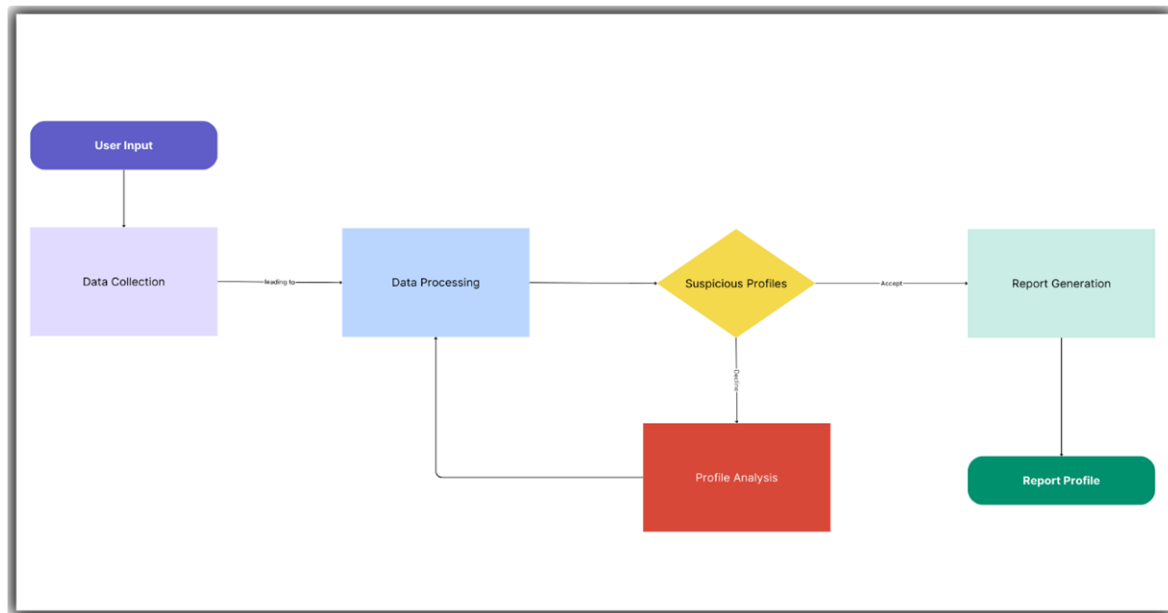


Fig 3.1.1 Block Diagram Of Functioning Fake Social media profile Detection

User Input: This component allows users to enter the social media profile ID they wish to analyze. It serves as the starting point for the entire process.

Data Collection: In this block, the system gathers relevant information from the specified profile, including user activity patterns, connection histories, and content originality. This data is crucial for assessing the authenticity of the profile.

Data Processing: This component analyzes the collected data to identify patterns and behaviors that may indicate whether a profile is fake or suspicious. It applies various algorithms to evaluate the reliability of the profile based on predefined criteria.

Suspicious Profiles: After processing the data, the system identifies profiles that exhibit suspicious characteristics. This block highlights profiles flagged as potentially fraudulent based on the analysis.

Profile Analysis: This part of the system provides a detailed overview of the flagged profiles, summarizing the findings from the data analysis. It displays critical metrics and indicators that contribute to determining the profile's authenticity.

Report Generation: In this context, this component focuses on presenting all relevant details about the suspicious profiles to the user in a user-friendly format. There is no formal report generated, but the system effectively displays all findings for user review.

Report Profile: This final component allows users to take action on the displayed profiles by reporting them to the relevant authorities or social media platforms. It provides an interface for users to submit their findings based on the displayed data.

3.2 ER DIAGRAM

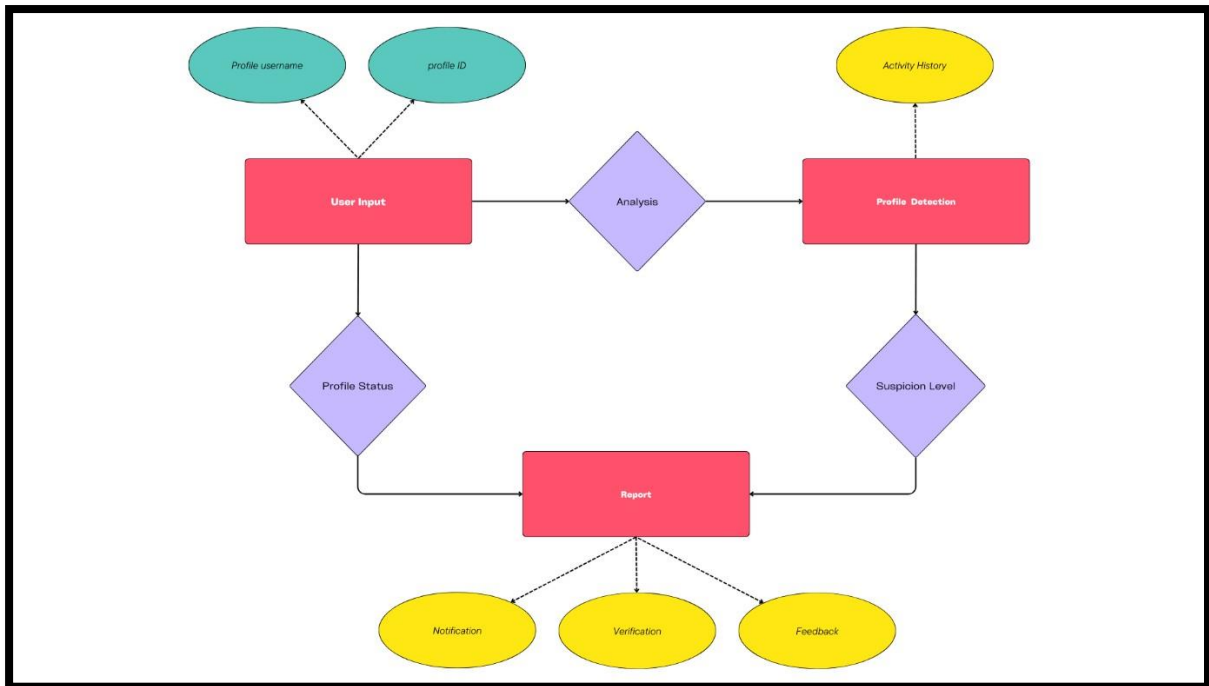


Fig 3.2.1 ER Diagram of Fake Profile Detection Interface

The ER diagram of the Fake Social Media Profile Detection System contains the important elements required for it to function. User Input captures input data from users to be analyzed. Profile Status reflects whether the profile is real, suspicious, or marked as a fake one. The Analysis component process activity history of the users for patterns characterizing fake profiles. Activity History contains history of all actions linked to each profile, while Profile Detection contains information about the basis upon which suspicious profiles are identified. Suspicious Activity contains all abnormal behaviors identified during analysis, thus generating Reports. Notifications alert users on the status of their profile or any required action. Verification monitors and verifies all flagged profiles while feedback is gotten from the user in respect of the detection process. This sort of a well-structured system will allow the easy detection of fake profiles and subsequently leading to their proper management within socialmedia platforms.

3.3 Methodology

This system's methodology begins by asking users input a profile ID they intend to analyze through an intuitive interface. The system then fetches relevant data, such as user activity patterns, connection histories, and content originality, from the profile through APIs or web scraping. Data collected will then be processed to retrieve meaningful insights from it such as detecting frequency of activities, anomalous behavior in the connection log, and checking for duplicate content. Suspected profiles with threatening characteristics are then highlighted as suspicious, and users are provided with an in-depth analysis containing key indicator variables. Relevant information is displayed by the system for users to review, and suspicious profiles can be reported directly through the interface. This reporting mechanism increases involvement among the users and makes the cyberspace safer. Additionally, the user's opinion about the credibility of the found profiles can also be utilized by the system to upgrade its algorithms and processes of data handling over time.

3.4 Conclusion

In conclusion, this system will play a vital role in controlling the proliferation of fake profiles on social media platforms as it will enable profile IDs to be used for the systematic collection of data pertaining to the behaviors of the users and the authenticity of the true content. It is an enabling policy measure in which users can assume responsibility for the detection and reporting of suspicious profiles, thereby creating a safer virtual space. It ensures continuous improvement with user feedback that has to bring further improvements in the system's ability to detect fraudulent activities. Ultimately, the project is not only to aid the protection of individual users but to add to the overall integrity and security of social media communities.

4. IMPLEMENTATION

Software Requirements

1. Programming Languages:

- Python: For building the backend logic, server handling, and API integration.
- JavaScript: For front-end user interface and handling real-time interactions.

2. Web Framework:

- Django (Python): For backend web development to manage routes, user sessions, and profile data.

3. APIs:

- Social Media APIs (Facebook, Instagram, Twitter, etc.): Used for fetching user profile data such as account activity, follower lists, and engagement.
- OAuth: For authentication and secure access to third-party social media accounts.
- Instagram API: For accessing user profile details, media, and follower metrics.

4. Database:

- PostgreSQL: To store profile data, user activities, and flagged fake profiles for future references.
- MongoDB: For caching frequently accessed profile data or handling high-speed data transactions.

5. Front-End Libraries/Frameworks:

- React.js: For building dynamic and responsive user interfaces.
- Bootstrap: For styling the front-end UI/UX.

6. Web Scraping Tools (If APIs are Limited):

- Scrapy (Python): To scrape user profiles and activity data from social media platforms where API access is restricted.

7. Monitoring and Notification Tools:

- Email Notifications: To send alerts when a suspicious profile is detected.

8. Version Control:

- Git: For managing code versions and collaboration among developers.

4.2 USE CASES

Python handles backend operations, executing server-side logic, managing API requests, and processing user data. It's crucial for ensuring the system runs smoothly.

JavaScript adds interactivity to the front end, managing real-time interactions such as flagging profiles or displaying alerts.

Django streamlines the backend, organizing the code structure and managing routes, user sessions, and data interaction. It provides the core framework for communication between the front and backend.

Social Media APIs (like from Facebook, Instagram, and Twitter) retrieve key user data such as account activity, follower lists, and engagement metrics. This provides the necessary information to assess whether a profile is fake.

OAuth allows for secure login and user verification, enabling secure access to third-party social media accounts while protecting user credentials.

Instagram API provides access to specific profile details, media, and follower information, helping analyze account activity and flag suspicious patterns.

PostgreSQL serves as the primary database, securely storing user profiles, activities, and records of flagged suspicious accounts for future analysis.

MongoDB is employed for caching frequently accessed data, ensuring faster access when the system handles high-speed transactions or needs immediate data retrieval.

React.js helps in creating dynamic user interfaces that respond seamlessly to user inputs, making the system visually appealing and responsive to various device screens. Bootstrap ensures that the front-end design remains consistent, mobile-friendly, and easy to use with predefined styles for forms, buttons, and navigation.

Scrapy is utilized when direct API access is limited. It scrapes the required data from social media platforms to collect user profile and activity data that otherwise might not be available.

Email Notifications send automatic alerts to administrators or system users when a suspicious profile is detected, ensuring timely action.

Git manages version control for the entire project, allowing for collaboration among developers and safe tracking of code changes.

4.3 USER INTERFACE



Fig 4.3.1 User Interface Of The Project

The UI is designed to facilitate user interactions, making it easy to perform tasks like initiating queries, viewing results, and taking actions based on the data collected.

Dashboard:

- ☐ A central hub displaying overall statistics of profiles analyzed, flagged profiles, and detection accuracy metrics.

Profile Search:

- ☐ A search bar allowing users to input usernames or profile links to check for authenticity.

Profile Analysis Page:

- ☐ Detailed view of profile information, including account activity, follower metrics, and a risk score indicating the likelihood of the profile being fake.

Report Section:

- ☐ An easy-to-use form for users to report suspicious profiles, including a description of the concerns.

Notification Center:

- ☐ Alerts and notifications about detected suspicious profiles, along with updates on reports submitted by users.

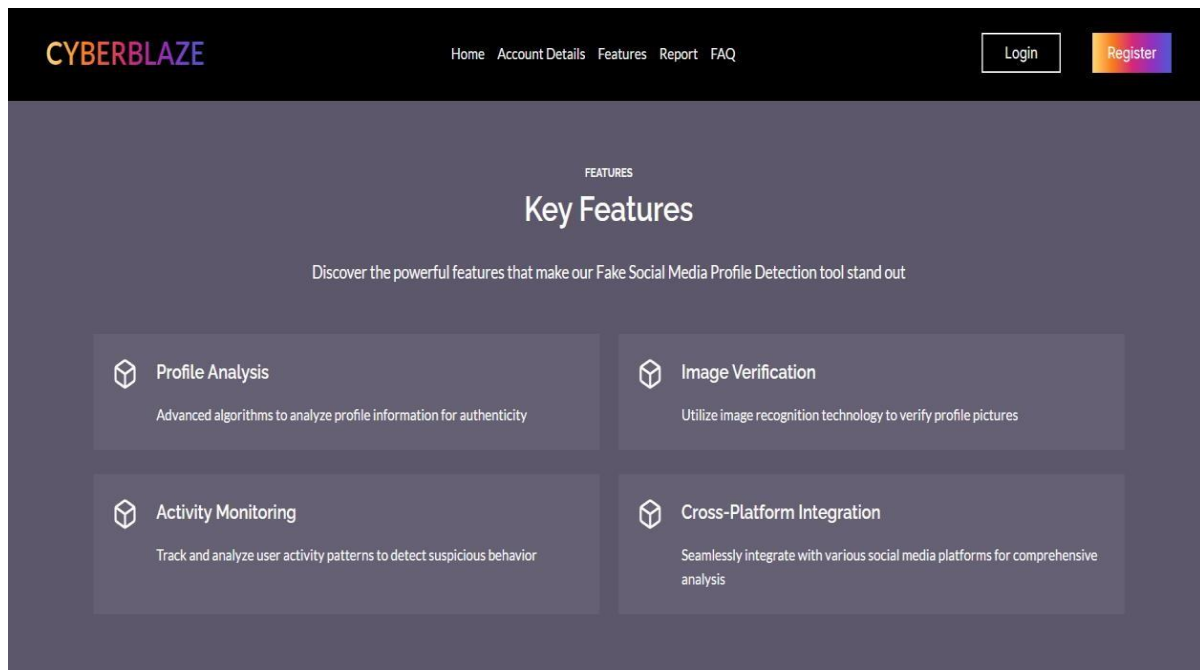


Fig 4.3.2 Key Features of the Interface

User Settings:

- ☐ Options for users to customize notification preferences, account settings, and privacy options.

User Feedback:

- ☐ The UI may include feedback mechanisms to inform users about the progress of data retrieval and analysis. This ensures users are aware of the status of their queries and the application's responsiveness.

User-Friendly Interactions:

- ☐ Responsive Design: The UI is designed to be responsive, ensuring that it adapts to various screen sizes and devices. Whether accessed on a desktop, laptop, tablet, or mobile phone, the UI remains visually appealing and functional.
- ☐ Navigation and Menus: The UI features an intuitive navigation system with well-organized menus and options. Users can easily access different sections and functionalities of the application,

4.4 CONCLUSIN

In conclusion, the Fake Social Media Profile Detection System user interface is intuitive and user-friendly. It seeks to balance easy navigation, search profile features, detailed profile analyses, and reports on suspect accounts. There will be a clear overview of the most important metrics offered on the dashboard, as well as a notification center about detected threats to alert users. In general, the UI encourages the user to interact and enables secure checking of authenticity at social media sites.

5. LIMITATIONS & FUTURE SCOPE

5.1 LIMITATIONS

The platform also suffers from many limitations regarding its effectiveness, specifically when it comes to issues like data privacy, which could create huge disputes among its users who might not know their details are being gathered and processed. Another challenge is that the system completely depends on the correctness and availability of data, meaning that any incomplete or inaccurate data will most likely result in misleading conclusions and false positives, wherein actual profiles will be flagged. Moreover, the dynamic nature of the online social media environment makes it impractical for this solution to keep pace with more sophisticated methods being used by identity thieves masquerading as legitimate profiles. Additionally, some forms of data processing may also limit its ability to capture complex behaviors that are associated with fraud. Lastly, factors such as reporting bias, and any constraints in reporting based on the specific policies of different social media networks, may further distort the results obtained. The program must also be intuitive and flexible enough for users of different levels of technical expertise, remove security vulnerabilities, and include continuous updating to keep pace with new threats that pose challenges to its operation.

5.2 FUTURE SCOPE

The future scope of this system includes several potential advancements and improvements. There are many developments and enhancements about which the possible future scopes of the system are made. Machine learning and AI algorithms can improve detection accuracy to analyze the most complex patterns and user behaviors. Involving natural language processing would make it possible to reach deeper into content analysis, making it more able to pinpoint lies or manipulative tricks. This kind of system can be expanded to monitor real-time actions and enhance response times by quickly identifying suspicious activities. Cooperation with social media should provide easier access to the information and should also enhance detection mechanisms. The system can be improved through user education on fraudulent profiles detection and secure online activity. Also, mobile app development will make the solution more available to a wider audience and add more comfort for the users.

5.3 Conclusion

In conclusion, the social media profile detection system is a valuable tool for identifying and managing potentially fraudulent accounts. However, the system needs continuous developments with rapid technological progress and respective user behavior. If users provide feedback to the system and it shows a proactive stance toward security, then the system could be improved toward being more effective and dependable. Ultimately, education and awareness by the users will help make the internet much safer. Users will certainly be more confident in embracing digital space with knowledge of their responsibility.

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