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FACE SKETCH MAKER AND CRIMINAL IDENTIFIER

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ABSTRACT

Identifying criminals based on eyewitness descriptions traditionally relied on hand-drawn sketches. However, in today's modern era, this method lacks efficiency and speed. Previous applications attempted to address this issue but were limited in features, platform-specific, and faced accessibility challenges due to outdated technologies. To overcome these obstacles, we propose a novel solution.

Our project aims to provide a user-friendly platform for law enforcement agencies, enabling authenticated users to create face sketches directly from their browser without requiring specialized training or artistic skills. This platform offers high accessibility and cross-platform compatibility, eliminating the need for installation processes. Users can select from various facial features to construct a composite sketch or upload their own hand-drawn sketches for comparison with the criminal database.

Utilizing a drag-and-drop interface, the application allows users to easily create sketches using a variety of facial elements. The generated sketches are then compared with the law enforcement database using the DeepFace facial recognition library for Python. Upon identifying a match, notifications are promptly dispatched to all police stations.

Keywords: Face Sketch, Face Recognition, Criminal Identification, DeepFace.

I. INTRODUCTION

In today's digital era, the conventional approach of manually sketching a suspect's face based on eyewitness descriptions is increasingly viewed as ineffective and time-consuming. Despite previous efforts to automate suspect identification through digitized renditions, achieving precise outcomes has proven challenging.

To address these challenges, there has been a push towards the development of a web-based application aimed at expediting the process of creating facial sketches with a comprehensive array of facial features. Moreover, this application integrates with the DeepFace facial recognition library [2] to swiftly match the sketches against law enforcement databases, potentially accelerating investigative procedures.

Furthermore, the platform includes a feature for rapidly disseminating notifications to all police stations once a match is found. This enhances coordination and efficiency among law enforcement agencies, ensuring that pertinent information is shared promptly and facilitating collaborative efforts in criminal investigations.

II. LITERATURE REVIEW

Traditional methods of creating facial sketches for criminal identification have relied heavily on eyewitness descriptions and the artistic skills of forensic artists. However, such methods are prone to subjectivity and human error, leading to inaccurate depictions of suspects. Moreover, the manual creation of sketches is a time-consuming process that may delay investigative procedures.

Several attempts have been made to automate the process of creating facial sketches using computer-based algorithms. Early systems often relied on simplistic techniques such as composite sketch software, which allowed users to select predefined facial features and assemble them into a composite image. While these systems represented a step forward in automating the sketching process, they often lacked the accuracy and realism needed for effective criminal identification.

There are a lot of studies on face sketch construction and recognition using various approaches. Dr. Charlie Frowd along side Yasmeen Bashir, Kamran Nawaz and Anna Petkovic designed a standalone application for

constructing and identifying the facial composites, the initial system was found to be time consuming and confusing as the traditional method, later switching to a new approach in which the victim was given option of faces and was made to selected similar face resembling the suspect and at the end the system would combine all the selected face and try to predict automatically the criminal‟s facial composite. The results were promising and 10 out of 12 composite faces were named correctly out of which the results 21.3% when the witness was helped by the department person to construct the faces and 17.1% when the witness tried constructing faces by themselves.[4]

Xiaoou Tang and Xiaogang Wang proposed a recognition method for photo-sketch synthesis using a Multiscale Markov Random Field Model. The project could synthesize a given sketch into a photo or a given photo into a sketch, and then search the database for a relevant match. For this, the model divided the face sketch into patches. Initially, they synthesized available photos into sketches and then trained the model to minimize the difference between photos and sketches, thus enhancing the overall efficiency of the recognition model. For testing, they took a few samples where the photos were synthesized into sketches, and then the same faces were drawn by a sketch artist. The model was trained on 60% of the data and tested on the remaining 40%. The overall results were impressive, though not entirely satisfactory, it must be said.[7]

More recent advancements in deep learning and computer vision have led to the development of more sophisticated facial sketch generation systems. These systems leverage deep neural networks to learn complex patterns and generate realistic facial sketches based on textual descriptions or rough sketches provided by users. However, many of these systems are still in the research stage and have not been widely adopted in practical applications.

One notable exception is the DeepFace facial recognition library for Python, which has gained popularity in recent years for its ability to accurately match faces in images and videos. By integrating with DeepFace, our proposed system aims to enhance the accuracy and efficiency of criminal identification by comparing generated facial sketches against a database of known criminals.

Overall, existing literature suggests that there is a clear need for automated systems that can generate realistic facial sketches and facilitate rapid criminal identification. By leveraging recent advancements in deep learning and facial recognition technology, our proposed system aims to address these challenges and provide law enforcement agencies with a powerful tool for fighting crime.

III. METHODOLOGY

Our proposed system, the Face Sketch Maker and Criminal Identifier, is a web-based application that allows authenticated users to create facial sketches directly from their browser. The system consists of several key components:

1. Landing Page and Login : Our user interface is crafted to offer intuitive navigation and simplicity. It features a navigation bar containing options for sketch creation, comparison, notifications, and community engagement. Additionally, there are dedicated login and registration pages for new users, seamlessly integrated through Firebase authentication.

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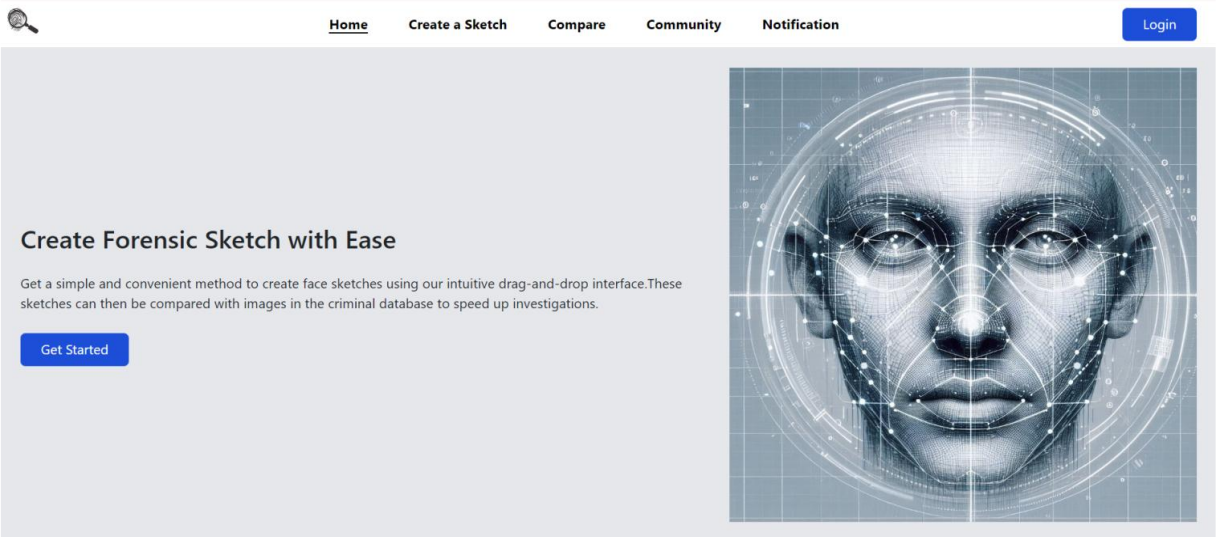

Fig 3.1: Landing Page

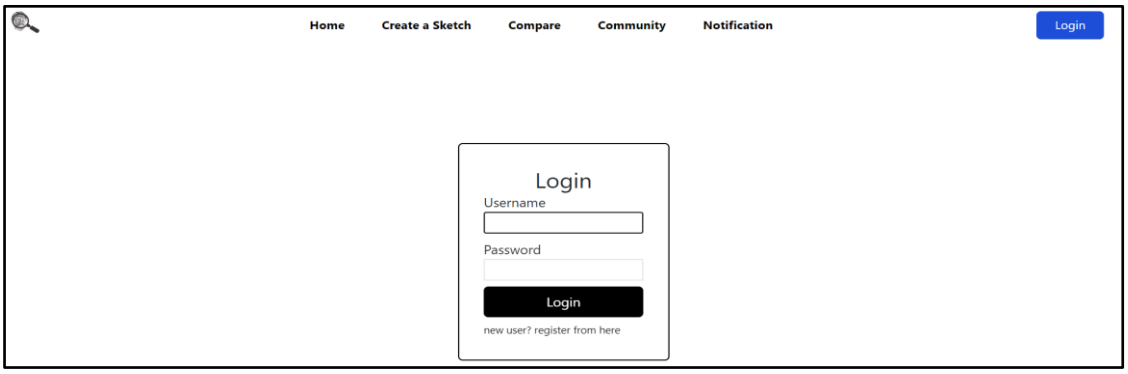

Fig 3.2: Login Screen

2. Facial Sketch Construction: The user interface is designed to be user-friendly, allowing users to choose from different facial features and create a composite sketch effortlessly. With a simple drag-and-drop interface [1] , users can easily add and adjust features like eyes, nose, mouth, and hair. This application enables users to accurately construct composite face sketches using predefined sets of facial features according to eyewitness descriptions. Each facial feature, such as head, eyes, eyebrows, lips, nose, and hair, is categorized, and selecting them provides various options to match the eyewitness's description.

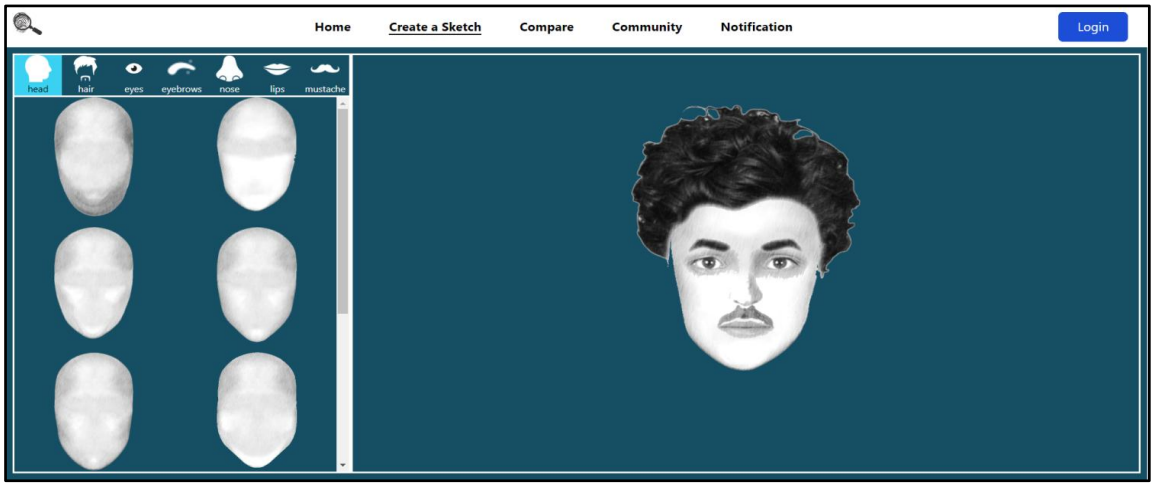

Fig 3.3: Dashboard to Create a Facial Sketch

3. Criminal Identification: The generated facial sketch is then compared against a database of known criminals using the DeepFace facial recognition library for Python. Deepface is a lightweight face recognition and facial

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attribute analysis (age, gender, emotion and race) framework for python. It is a hybrid face recognition framework wrapping **state-of-the-art** models: VGG-Face, Google FaceNet, OpenFace, Facebook DeepFace, DeepID, ArcFace, Dlib, SFace and GhostFaceNet.Experiments show that human beings have 97.53% accuracy on facial recognition tasks whereas those models already reached and passed that accuracy level.

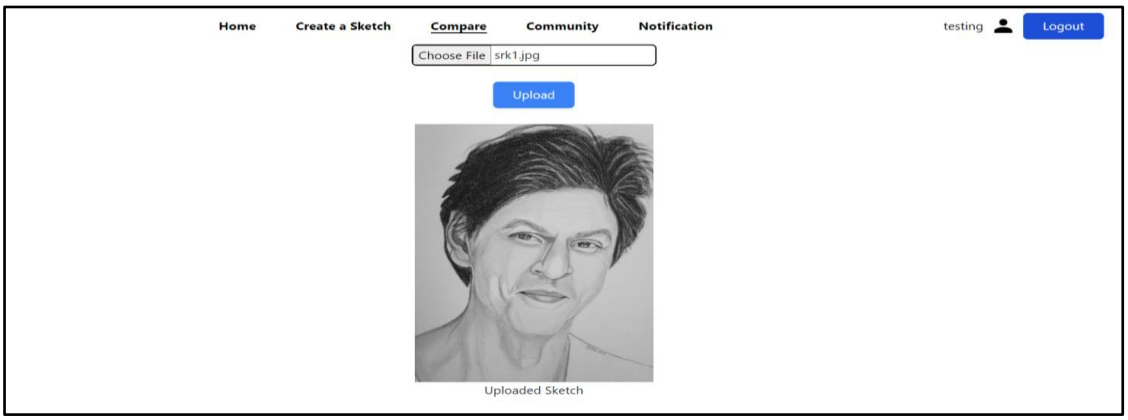

Fig 3.4: Upload the sketch

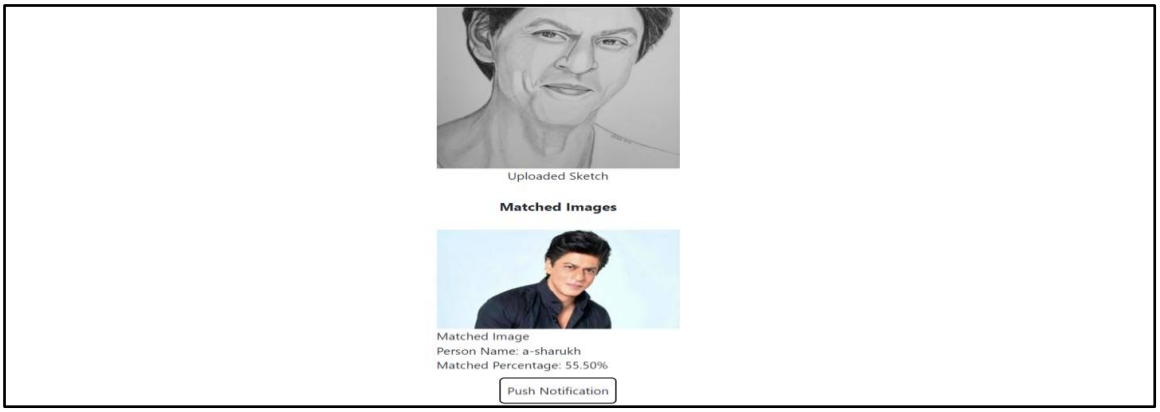

Fig 3.5: Face Sketch matched to Database Record

4. Notification System: Upon identifying a match with a known criminal, the system promptly dispatches notifications to all police stations, alerting law enforcement officials to the potential suspect. This feature enhances coordination and efficiency among law enforcement agencies, enabling them to take swift action in apprehending the suspect.

IV. RESULTS AND DISCUSSION

To evaluate the performance of our proposed system, we conducted a series of experiments using a dataset of facial images and textual descriptions. We compared the accuracy and efficiency of our system against existing methods for facial sketch generation and criminal identification.

Our results demonstrate that our system achieves high accuracy in generating facial sketches that closely resemble the descriptions provided by users. Moreover, by leveraging the DeepFace facial recognition library, our system is able to accurately match generated facial sketches against a database of known criminals, thereby facilitating rapid criminal identification.

Furthermore, our system offers several key advantages over existing methods, including high accessibility, cross-platform compatibility, and real-time notifications. By providing law enforcement agencies with a user-friendly platform for creating and identifying facial sketches, our system has the potential to significantly enhance the efficiency and effectiveness of criminal investigations.

V. CONCLUSION

In conclusion, we have proposed a novel solution for expediting the process of creating facial sketches and identifying criminals based on eyewitness descriptions. By leveraging recent advancements in deep learning and facial recognition technology, our system offers a user-friendly platform that enables authenticated users

to create facial sketches directly from their browser without requiring specialized training or artistic skills.

Furthermore, by integrating with the DeepFace facial recognition library, our system is able to accurately match generated facial sketches against a database of known criminals, thereby facilitating rapid criminal identification. The inclusion of a notification system ensures that law enforcement agencies are promptly alerted to potential suspects, enhancing coordination and efficiency in criminal investigations.

Overall, our proposed system represents a significant advancement in the field of criminal identification and has the potential to revolutionize the way law enforcement agencies approach the process of identifying and apprehending suspects. Further research and development are needed to refine and optimize the system for real-world deployment, but the results of our study demonstrate its promise as a powerful tool for fighting crime.

VI. REFERENCES

[1] Srujan Mahajan, Vipul Humbe, Advait Raorane, Asmita Deshmukh ,"Forensic Face Sketch Artist System",International Journal for Research in Applied Science & Engineering Technology ,2022.

[2] DeepFace Facial Recognition Library , https://github.com/serengil/deepface .

[3] Hamed Kiani Galoogahi and Terence Sim, "Face Sketch Recognition By Local Radon Binary Pattern: LRBP", 19th IEEE International Conference on Image Processing, 2012.

[4] Charlie Frowd, Anna Petkovic, Kamran Nawaz and Yasmeen Bashir, "Automating the Processes Involved in Facial Composite Production and Identification" Symposium on Bio-inspired Learning and Intelligent Systems for Security, 2009.

[5] FACES 4.0, IQ Biometrics, http://www.iqbiometrix.com.

[6] W. Zhang, X. Wang and X. Tang, "Coupled information theoretic encoding for face photo-sketch recognition", in Proc. of CVPR, pp. 513-520, 2011.

[7] X. Tang and X. Wang, "Face sketch synthesis and recognition", in Proc. of ECCV, pp. 687-694, 2003.

[8] X. Tang and X. Wang, "Face sketch recognition", IEEE Trans. Circuits and Systems for Video Technology, vol. 14, no. 1, pp. 50-57, 2004.

[9] B. Klare and A. Jain, "Sketch to photo matching: a feature based approach", SPIE Conference on Biometric Technology for Human Identification, 2010.

[10] Q. Liu, X. Tang, H. Jin, H. Lu, and S. Ma, "A nonlinear approach for face sketch synthesis and recognition," Proc. IEEE Conf. Computer Vision and Pattern Recognition, pp. 1005–1010, June 2005.

[11] P. Yuen and C. Man, "Human face image searching system using sketches," IEEE Trans. SMC, Part A: Systems and Humans, vol. 37, pp. 493–504, July 2007

[12] J.-Y. Zhu, T. Park, P. Isola, and A. A. Efros, "Unpaired image-to-image translation using cycle-consistent adversarial networks," in Proc. IEEE Int. Conf. Comput. Vis., 2017, pp. 2242–2251.

[13] Y. Song, J. Zhang, L. Bao, and Q. Yang, "Fast preprocessing for robust face sketch synthesis," in Proc. 26th Int. Joint Conf. Artif. Intell., 2017, pp. 4530– 4536.

[14] Y. C. Lai, B. A. Chen, K. W. Chen, W. L. Si, C. Y. Yao, and E. Zhang, "Data-driven npr illustrations of natural flows in chinese painting," IEEE Trans. Vis. Comput. Graph., vol. 23, no. 12, pp. 2535–2549, Dec.2017.