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Genface: Forensic Face Sketch Construction and Recognition

Assistant Professor Siddhi Shinde, Rajeshwari Ambekar, Narendra Kakde
Department of Computer Science, SKN Sinhgad Institute of Technology & Science, Lonavala,

Absvtract- Traditional forensic sketching is hindered by subjectivity and a lack of digital interoperability. This paper introduces GenFace, a JavaFX-based application that enables rapid composite sketch assembly via a modular drag-and-drop interface. The system's primary innovation is the integration of an AWS Rekognition backend to facilitate Heterogeneous Face Recognition. By matching user-generated sketches against criminal databases in real-time, the system provides ranked similarity scores to investigators. This approach bridges the gap between eyewitness testimony and digital suspect identification, significantly enhancing investigative efficiency.

Keywords- Forensic Science, Composite Sketch, JavaFX, AWS Rekognition, Deep Learning, Face Recognition.

I. INTRODUCTION

Even with all the technology we have today, most criminal investigations still depend on what an eyewitness remembers. The problem is that turning a person's memory into a useful face sketch is actually pretty difficult. Right now, police usually have to find a professional sketch artist, which takes a lot of time. Plus, because these sketches are just hand-drawn pictures, there's no easy way to automatically check them against a police database. Everything has to be done manually, which is slow and leaves a lot of room for mistakes.

To fix this, I developed GenFace, a desktop application built using JavaFX that connects directly to AWS cloud services. Instead of drawing from scratch, the system uses a digital library of facial features so a sketch can be put together quickly. The main goal of GenFace is to bridge the gap between an eyewitness's description and a digital mugshot database. By making this process digital and automated, it helps law enforcement identify suspects much faster and with better accuracy.

II. PROBLEM STATEMENT

With crime rates rising, police departments really need faster ways to track down suspects. One of the biggest delays right now is the way we handle face sketches. Most of the time, you need a specialized forensic artist to sit down and draw a composite by hand. The issue isn't just that there aren't enough artists available; it's that a hand-drawn sketch is basically "offline" data. You can't just plug a pencil drawing into a computer and expect it to search a national database.

Because those first few hours after a crime are so important, waiting for an artist to become available can cause a huge delay. We need a way for regular officers who might not be artists—to put together a realistic face sketch on a computer. That's why I built GenFace. It moves away from the old manual way of doing things and uses a modular system where you can assemble a face digitally. By making the

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sketch digital from the start, it's much easier to use AI to compare it against existing criminal records immediately.

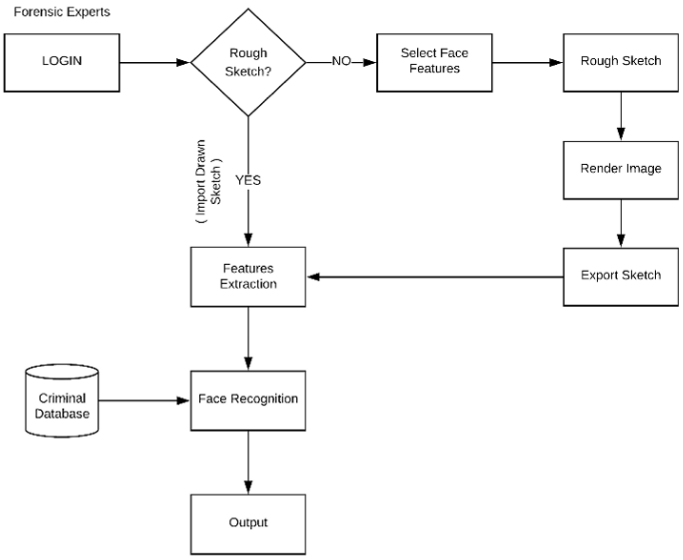

Figure 1: System Flow of the application

The workflow for GenFace is designed to be straightforward, starting with a secure login for the forensic user. Once logged in, the system gives two options for getting a suspect's image into the pipeline. An officer can either upload an existing hand-drawn sketch they already have, or they can use the app's digital tools to build a face from scratch by picking specific features like eyes, noses, and jawlines.
If they build the sketch digitally, the system renders it into a final image. From there, both types of images (uploaded or digitally built) go through the feature extraction stage. This is where the core logic happens: the system identifies the key landmarks of the face and sends them to the recognition engine. The engine then scans through the criminal database to find the best matches. Instead of a manual search, the app automatically gives the user a ranked list of potential suspects. This makes the whole identification process much faster and more organized than traditional methods.

III. RESULTS

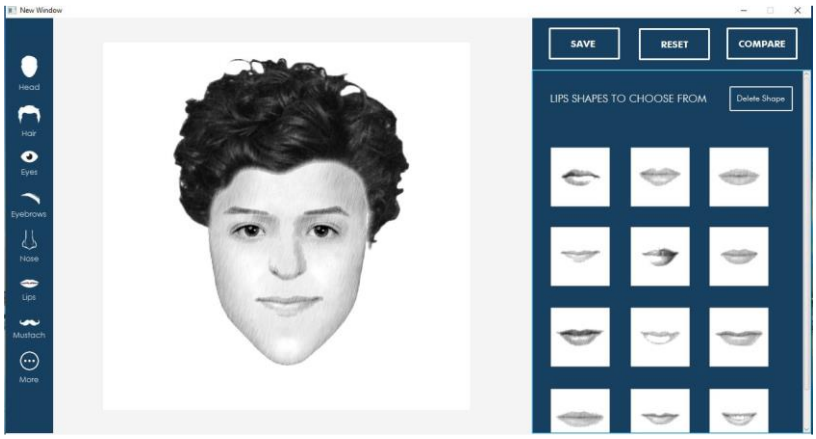

Figure 2: A Complete Face Sketch in Dashboard

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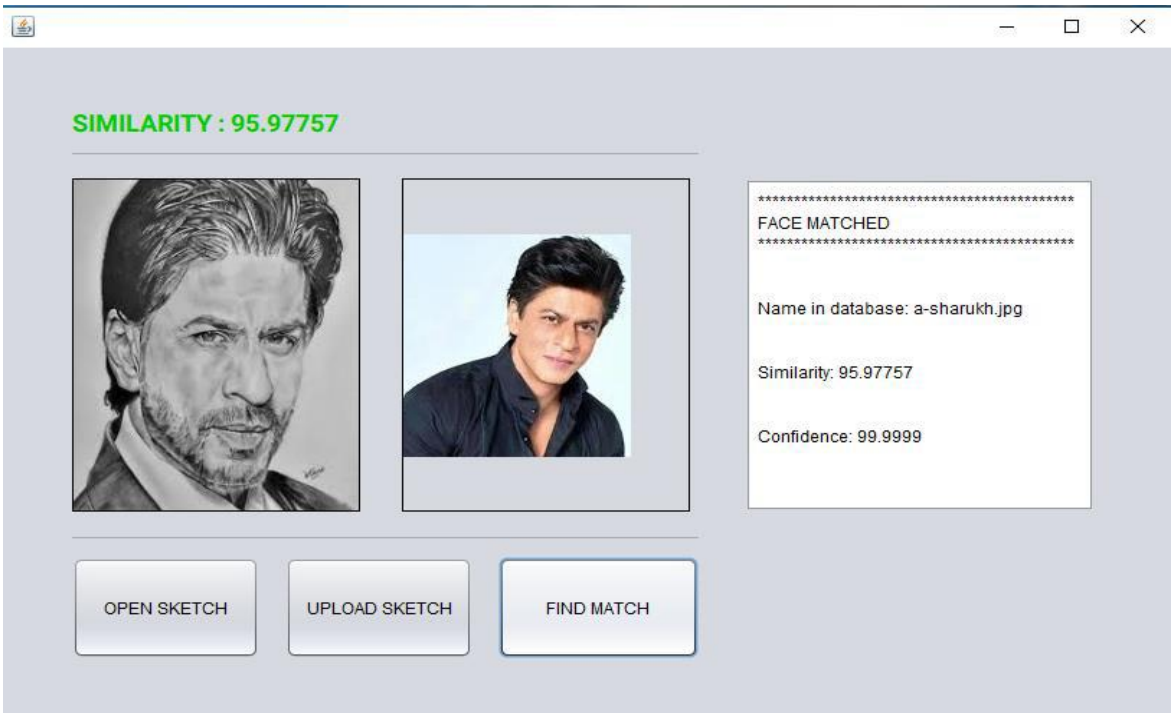

Figure 3: Face Sketch matched to Database Record

IV. CONCLUSION

- GenFace updates the old way of doing forensic sketches by moving everything into a faster, digital interface built with JavaFX.
- The system makes it easier to turn what an eyewitness remembers into a digital format using the modular feature library.
- By connecting the app to AWS Rekognition, we can compare these sketches to actual criminal databases in real-time using AI.
- Automating the way features are extracted and searched helps cut down on the time it takes to find a suspect and reduces the chance of human mistakes.
- Overall, this project gives police a modern, scalable tool that makes identifying suspects much quicker and more accurate than manual sketching.

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