FORENSIC FACE SKETCH ARTIST SYSTEM

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***Abstract*−In this modern age, the general crime rate is increasing day-by-day and to cope up with this the enforcement departments too should find ways in which would speed up the overall process and help them in bringing one to justice. One such way can be using face recognition technology for identifying and verifying the criminal. The traditional approach here is to use the hand-drawn face sketches drawn by forensic sketch artist to spot the criminal, modernizing this is able to mean using the hand-drawn sketch and then matching them with the enforcement departments database to spot the criminal. Using this approach would result in the various limitations with latest technologies and even would be time consuming as there are very few forensic sketch artists available when compared to the increasing crime ratio. Our project is aimed on decreasing the time span and speeding up this process by providing a standalone platform to the law enforcement department which would allow users to create accurate face sketch of the suspect without the help of forensic sketch artist and no special training or artistic skills. The sketch can be created using drag and drop feature in the application with variety of face elements and can automatically match the drawn composite face sketch with the law enforcement departments database much faster and efficiently using deep learning and cloud infrastructure.**

1. INTRODUCTION

This is a Forensic application, allowing user to construct accurate composite face sketch using the predefined facial feature sets provided as tools that can be resized and repositioned as per requirement/described by the eye-witness.

Moreover, the constructed composite face sketch can then be matched with the law enforcement departments database using deep learning and the speed and efficiency of cloud infrastructure to identify and verify the criminal. The same process can even be done with the hand-drawn sketch making the application backward compatible with traditional approaches.

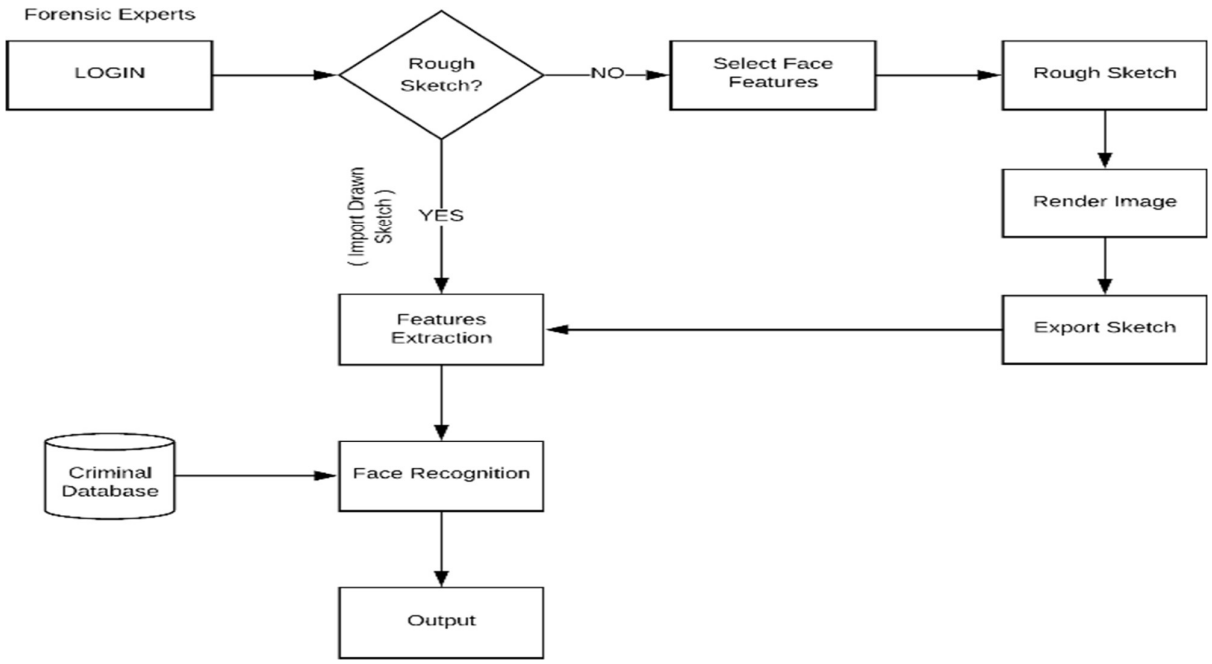
2. LITERATURE SURVEY

The common issue with all the proposed algorithm where that they compared the face sketches with human face which were usually front facing making it easier to be mapped both in drawn sketch and human face photograph, but when a photograph or sketch collected had their faces in

different direction the algorithms were less likely to map it and match with a face from the database which is front facing. Thus, all the previous approaches proved either inefficient or time consuming and complicated. Our application as mentioned above would not only overcome the limitations of the mentioned proposed techniques but would also fill in the gap between the traditional handdrawn face sketch technique and new modernized composite face sketch technique by letting user to upload the hand-drawn face sketches and facial features

3. DESIGN SYSTEM

3.1SYSTEM FLOW



The above flowchart illustrates the users flow been followed by the platform to provide an recognize accurate face sketch based on the description, the dashboard is designed simple in order to encourage no professional training to go through before using this platform already saving the timeframe which would have been taken a lot time and resources of the Department.

Keeping it simple thus ensures that the user does not have to be a professional sketch artist from the forensic department rather any one from the law enforcement department using the descriptions narrated by the eye witness or in some cases the eye witness too can take control of the platform but that would not be recommended as it can tamper the security protocols.

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4. TECHNOLOGY AND SPECIFICATION.

4.1. JAVA

- Java offers higher cross- functionality and portability as programs written in one platform can run across desktops, mobiles, embedded systems.
- Java is free, simple, object-oriented, distributed, supports multithreading and offers multimedia and network support.
- Java is a mature language, therefore more stable and predictable. The Java Class Library enables cross-platform development.

4.2.JAVAFX

JavaFX is a set of graphics and media packages that enables developers to design, create, test, debug, and deploy rich client applications that operate consistently across diverse platforms. Written as a Java API, JavaFX application code can reference APIs from any Java library. For example, JavaFX applications can use Java API libraries to access native system capabilities and connect to server- based middleware applications. The look and feel of JavaFX applications can be customized. Cascading Style Sheets (CSS) separate appearance and style from implementation so that developers can concentrate on coding. Graphic designers can easily customize the appearance and style of the application through the CSS. If you have a web design background, or if you would like to separate the user interface (UI) and the back-end logic, then you can develop the presentation aspects of the UI in the FXML scripting

language and use Java code for the application logic. If you prefer to design UIs without writing code, then use JavaFX Scene Builder. As you design the UI, Scene Builder creates FXML markup that can be ported to an Integrated Development Environment (IDE) so that developers can add the business logic.With JavaFX, you can build many types of applications..

4.3. AWS (Amazon Web Services)

Amazon Web Services (AWS) is a subsidiary of Amazon that provides on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered pay-as-you-go basis. In aggregate, these cloud computing web services provide a set of primitive abstract technical infrastructure and distributed computing building blocks and tools. One of these services is Amazon Elastic Compute Cloud (EC2), which allows users to have at their disposal a virtual cluster of computers, available all the time, through the Internet. AWS's version of virtual computers emulates most of the attributes of a real computer, including hardware central processing units (CPUs) and graphics processing units (GPUs) for processing; local/RAM memory; hard-disk/SSD storage; a choice of operating systems; networking; and pre-loaded application software such as web servers, databases, and customer relationship management (CRM).

4.4. DEEP LEARNING FOR FACE RECOGNITION

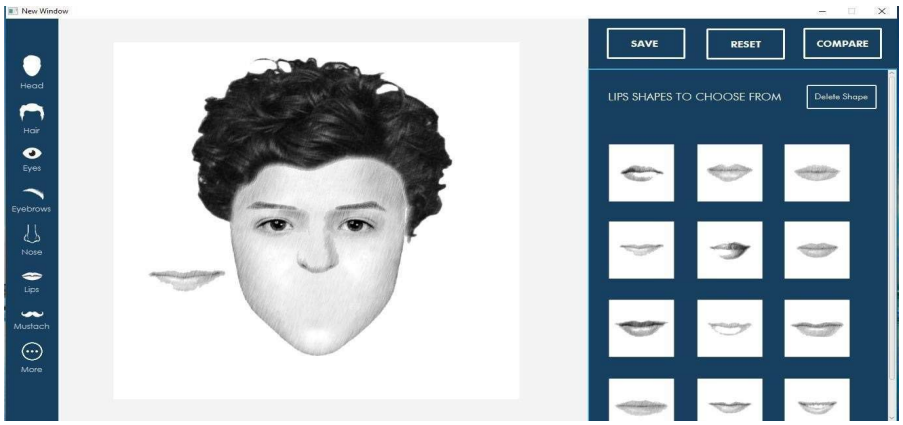
Deep learning methods are able to leverage very large datasets of faces and learn rich and compact representations of faces, allowing modern models to first perform as-well and later to outperform the face recognition capabilities of humans. Generally, we refer to this as the problem of automatic “face recognition” and it may apply to both still photographs or faces in streams of video. Humans can perform this task very easily. We can find the faces in an image and comment as to who the people are, if they are known.

We can do this very well, such as when the people have aged, are wearing sunglasses, have different colored hair, are looking in different directions, and so on. We can do this so well that we find faces where there are not any, such as in clouds. Nevertheless, this remains a hard problem to perform automatically with software, even after 60 or more years of research. Until perhaps very recently.

4.5. CNN (Convolution Neural Network)

All facial recognition and detection systems require the use face datasets for training and testing purposes. In particular, the accuracy of CNNs is highly dependent on large training datasets. For example, the development of very large datasets such as ImageNet, which contains over 14 million images, has allowed the development of accurate deep learning object detection systems. More specifically, face detection and recognition datasets developed alongside benchmarks such as the MegaFace Challenge, the Face Detection Dataset and Benchmark (FDDB) dataset and the Labeled Faces in the Wild (LFW) dataset provide a means to test and rank face detection, verification and recognition systems using real-life, highly challenging images in unconstrained settings. Notable and widely used datasets are listed in Table, along with information regarding their intended usage, size and the number of identities they contain.

4.6. FACE CONSTRUCTION WITH DRAG DROP



In this application, accurate composite face sketch can be constructed using the predefined facial feature sets provided as tools allowing to be resized and repositioned as per requirement/described by the eye-witness. Here, the human face is be categorized into various facial features such as head, eyes, eyebrow, lips, nose, ears, etc. and some important wearable components such as hats, specs, etc. too are been available in the application for use. Every facial feature when selected would open a wide range of options to choose from based on the requirement/description of the eye-witness. The machine learning algorithm would learn and in future try to suggest all the facial features which could suit the single selected feature and would try to help in completing the composite face sketch much sooner and much efficiently.

4. RESULT AND CONCLUSION

The Project "**Forensic Face Sketch Construction and Recognition**" is been designed, developed and finally tested keeping the real-world scenarios from the very first splash screen to the final screen to fetch data from the records keeping security, privacy and accuracy as the key factor in every scenario. The platform even showed good accuracy and speed while face sketch construction and recognition process, provided an average accuracy of more than 90% with a confidence level of 100% when tested with various test cases, test scenario and data sets, which means a very good rate according to related studies on this field. The platform even has features which are different and unique too when compared to related studies on this field, enhancing the overall security and accuracy by standing out among all the related studies and proposed systems in this field.

5. FUTURE SCOPE

The immense potential that Deep Learning holds can be understood by the various other technologies that are covered under the umbrella of AI. Some of the examples of such technologies include self-improving algorithms, **Machine Learning**, Pattern Recognition, **Deep Learning**, and many others. In the next few years, it is predicted that there will hardly be any industry left untouched by this powerful tool. This is the reason why AI has so much potential to grow in India.

7. REFERENCES

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