

Sketch To Photo Synthesis

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ABSTRACT

Face photo-sketch synthesis aims at generating a face sketch (or photo) from an input face photo (or sketch). It is of wide applications ranging from law enforcement to digital entertainment. For instance, the synthesized facial photos can be utilized to identify the suspects when only the sketches of mug-shots are available. Face sketch synthesis phenomenon, a kind of image-image translation, generates synthesized face/sketch with wide range of applications pertaining law enforcement and entertainment to mention few. Despite the compelling results produced by many existing methods of late, there are still challenges due to deformation and blurred effects on facial components resulting in unrealistic face/sketch. Face sketch synthesis has made significant progress with the development of deep neural networks in these years. The delicate depiction of sketch portraits facilitates a wide range of applications like digital entertainment and law enforcement. Moreover, Generative Adversarial Network (GAN) based deep learning approaches have paved way for dealing with issues of training quality. However, accurate and realistic face sketch generation is still a challenging task due to the illumination variations and complex backgrounds in the real scenes. This research is aimed at proposing a novel framework based on deep Generative Adversarial Networks to enhance face sketch synthesis by overcoming problems such as deformations and blurring effects in the generated artifacts.

The project “Sketch to Photo synthesis” aims at generating a Photo from an input face Sketch. It is having wide applications in Law enforcement where in the facial Sketch can be utilized to identify the suspects when only the sketches of mug-shots (artistic drawings of a Person’s face) are available. Face sketch synthesis phenomenon is a kind of image-image translation. Our project has wide range of applications in law enforcement and digital entertainment. Face sketch synthesis has made significant progress with the development of Deep Neural Networks in these years. We are using Generative Adversarial Network (GAN) Algorithm for Sketch to Photo Synthesis project

Existing System

There are several online tools that can convert Sketches to Photos. Some examples are Fotor, VividAI, Adobe Firefly etc. The existing tools have limitations such as low accuracy of capturing fine details from hand-drawn sketches, quality of final result etc.

Proposed System

The proposed system is a GAN based solution for generation of photos from given sketch. The data augmentation module improves diversity of each training and test sample available in the dataset by generating different versions of a real dataset artificially to increase its size. The system integrates advanced architectural innovations to address challenges such as sketch ambiguity, lack of detail, and variability in sketch styles. The workflow involves multiple stages: preprocessing sketches, feature extraction, photo generation, and refinement.

1. INTRODUCTION

2. REQUIREMENT ANALYSIS

Functional Requirements

The Sketch to Photo Synthesis is deep learning application developed to generate a sketch from a photo. It consists of login credentials

The Sketch to Photo Synthesis Consist the following modules:

1. User Module
2. Admin Module

User Module:

User is responsible for registering and to login to redirect to the source code page.

- Register
- Login
- Upload the path of the sketch

Admin Module:

- Login
- Admins can approve or reject user applications
- Generate a photo from a sketch

Non - Functional Requirements

- **Maintainability:** The system should be designed and implemented in a way that makes it easy to understand, modify and update.
- **Performance:** This includes requirements related to the speed, scalability and responsiveness of the system. Reduces image

deformations and blurring effects in the generated artifacts

- **Security:** The data inside the system must be protected against unauthorized users.
- **Scalability:** Performance scales efficiently with data growth.
- **Accuracy** The model accuracy is at least 80% on balanced image.
- **Efficiency:** Generates High-resolution outputs (256x256 pixels).

3-ARCHITECTURE

Project architecture represents number of components we are using as a part of our project and the flow of request processing i.e. what components in processing the request and in which order. An architecture description is a formal description and representation of a system organized in a way that supports reasoning about the structure of the system. Architecture is of two types. They are

- (1) Software Architecture
- (2) Technical Architecture

Software Architecture

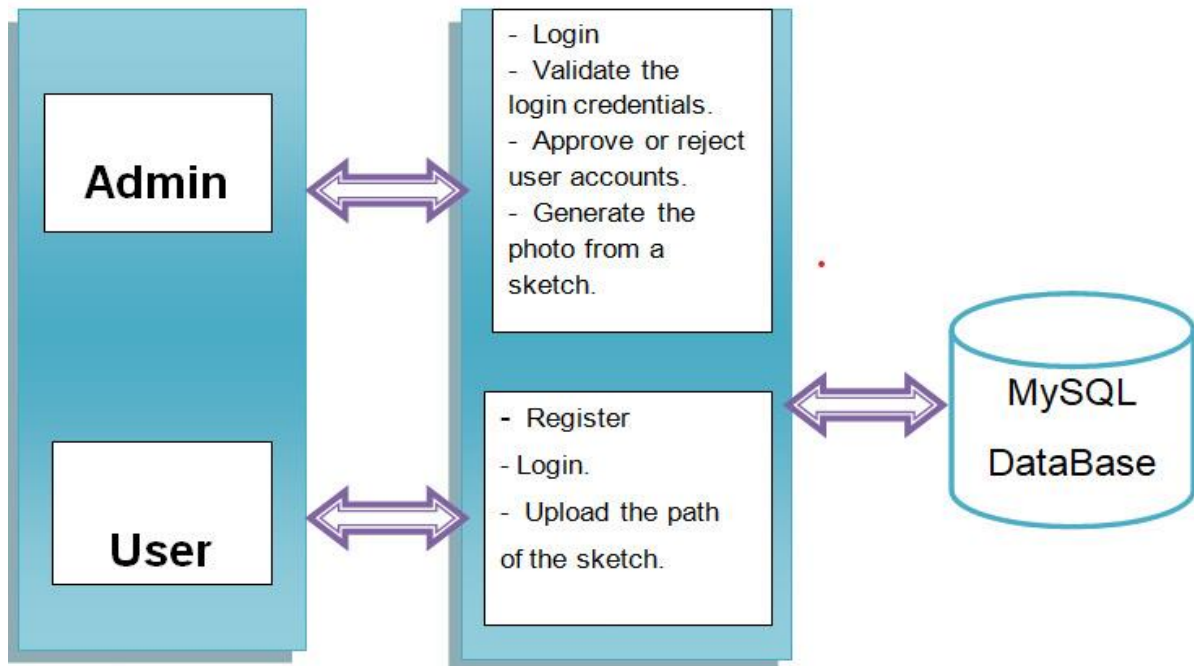


Fig 3.1 Software architecture

Technical Architecture

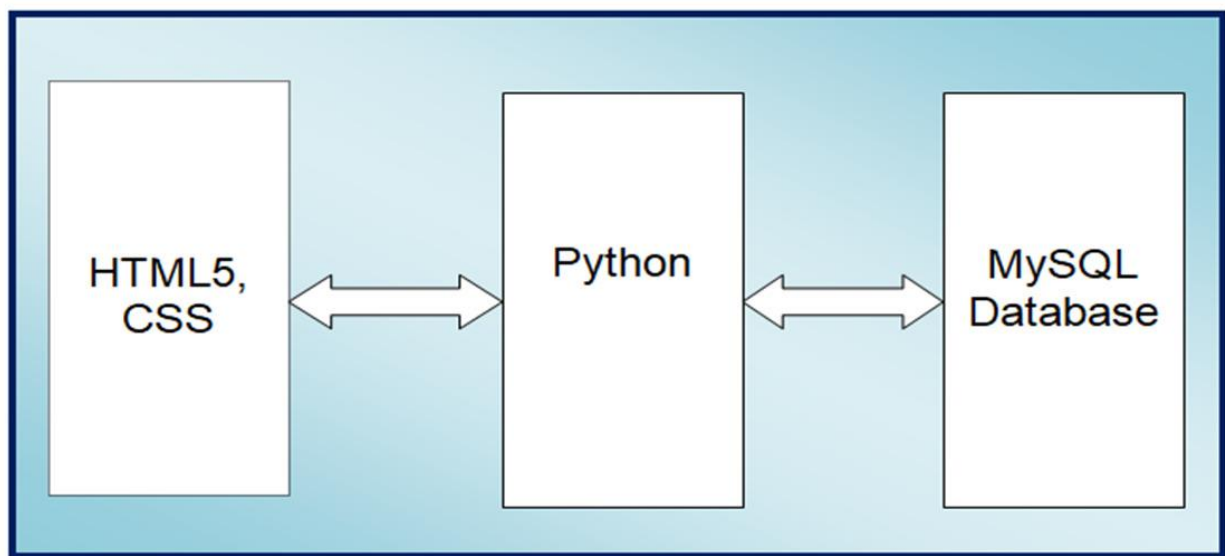


Fig 3.2 Technical architecture

4-IMPLEMENTATION

Technologies

This system is developed using Python programming language and Deep Learning.

Python

Python is a programming language that is

interpreted, object-oriented, and considered to be high-level too. Python is one of the easiest yet most useful programming languages which is widely used in the software industry. Due to its easiest syntax, it is recommended for beginners who are new to the software engineering field. Its demand is growing at

a very rapid pace due to its vast use cases in Modern Technological fields like Data Science, Machine learning, and Automation Tasks. For many years now, it has been ranked among the top Programming languages. Today Python is used in all kinds of development from game development, basic programming, and scripting to large and complex software development. It has a large community support and is rich in the library, having all kinds of frameworks for backend, frontend and you name it python has it all Due to its beginner-friendly syntax, it became a clear choice for beginners to start their programming journey. The major focus behind creating it is making it easier for developers to read and understand, also reducing the lines of code. It has spread its demand in various fields which includes machine learning, artificial intelligence, data analysis, web development.

Deep Learning

In the fast-evolving era of artificial intelligence, Deep Learning stands as a cornerstone technology, revolutionizing how machines understand, learn, and interact with complex data. At its essence, Deep Learning AI mimics the intricate neural networks of the human brain, enabling computers to autonomously discover patterns and make decisions from vast amounts of unstructured data. This transformative field has propelled breakthroughs across various domains, from computer vision and natural language processing to healthcare diagnostics and autonomous driving.

The definition of Deep learning is that it is the branch of machine learning that is based on artificial neural network architecture. An artificial neural network or ANN uses layers of interconnected nodes called neurons that work together to process and learn from the input data.

In a fully connected Deep neural network, there is an input layer and one or more hidden layers connected one after the other. Each neuron receives

input from the previous layer neurons or the input layer. The output of one neuron becomes the input to other neurons in the next layer of the network, and this process continues until the final layer produces the output of the network. The layers of the neural network transform the input data through a series of nonlinear transformations, allowing the network to learn complex representations of the input data.

5-TESTING

Software testing is a process, to evaluate the functionality of a software application with an intent to find whether the developed software met the specified requirements or not and to identify the defects to ensure that the product is defect free in order to produce the quality product.

Some of the reasons why software testing becomes very significant and integral part in the field of information technology are as follows.

1. Cost effectiveness
2. Customer Satisfaction
3. Security
4. Maintainability

Unit Testing

During This first round of testing, the program is submitted to assessments that focus on specific units or components of the software to determine whether each one is fully functional. In this phase, a unit can refer to a function, individual program or even a procedure, and White box testing method is usually used to get the job done. One of the biggest benefits of this testing phase is that it can be run every time a piece of code is changed, allowing issues to be resolved as quickly as possible. It quite common for software developers to perform unit tests

before delivering software to testers for formal testing.

Integration Testing

Integration testing allows individuals the opportunity to combine all of the units within a program and test them as a group. This testing level is designed to find interface defects between the modules/functions. This is particularly beneficial because it determines how efficiently the units are running together. Keep in mind that no matter how efficiently each unit is running, if they properly integrated, it will affect the functionality of the software program. In order to run these types of tests, individuals can make use of various testing methods, but the specific method that will be used to get the job done will depend

greatly on the way in which the units are defined.

System Testing

System testing is the first level in which the complete application is tested as a whole. The goal at this level is to evaluate whether the system has complied with all of the outlined requirements and to see that it meets Quality Standards. System testing is undertaken by independent testers who haven't played a role in developing the program. This testing is performed in an environment that closely mirrors production. System Testing is very important because it verifies that the application meets the technical, functional, and business requirements that were set by the customer.

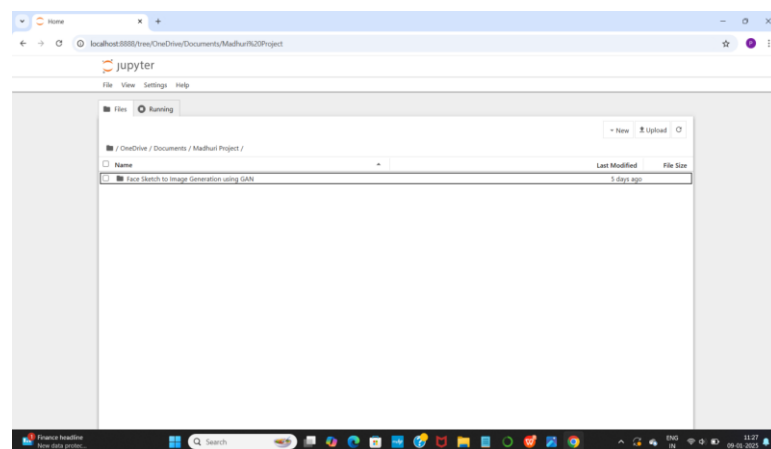
6-RESULTS



Screenshot 6.1 Sign up Page

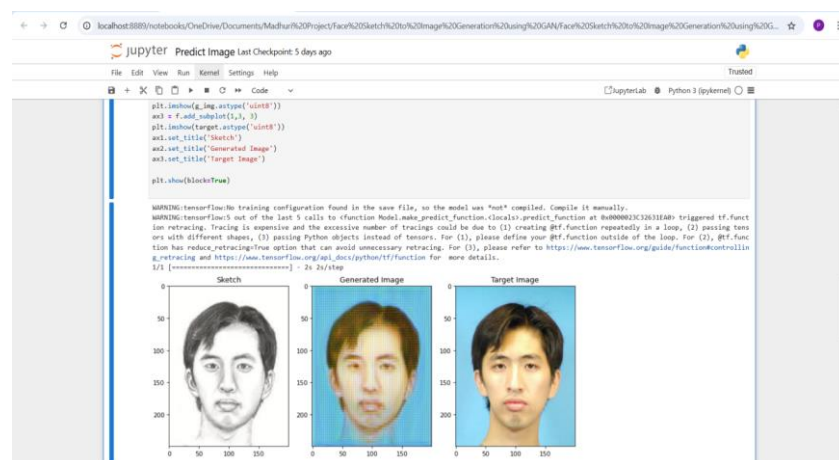


Screenshot 6.2 Sign In page



Screenshot 6.3 Pseudo code location

The input the model Image file path is given as a parameter
`def load_and_preprocess_sketch(file_path_of_the _sketch):`



Screenshot 6.4 Output of the Model

7-CONCLUSION & FUTURE SCOPE

Conclusion

Sketch synthesis has made significant progress with the development of Deep Neural Networks in these years. The delicate depiction of sketch facilitates a wide range of applications like law enforcement. Mini project is aimed at proposing a framework based on deep Generative Adversarial Networks to enhance face sketch synthesis by overcoming problems such as deformations and blurring effects in the generated artifacts.

Future Scope

To provide a powerful tool to Law enforcement organizations to convert Sketches into realistic Photos for the identification of suspects.

8.REFERENCES

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