Report On

IMAGE INPAINTING AND IMAGE SUPER REESOLUTION USING GENERATIVE ADVERSARIAL NETWORK

Submitted in partial fulfillment of the requirements of the Course project in Semester VIII of fourth year Artificial Intelligence and Data Science

by

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CERTIFICATE

This is to certify that the project entitled "**IMAGE INPAINTING AND IMAGE SUPER RESOLUTION USING GENERATIVE ADVERSARIAL NETWORK**" is a bonafide work of "**Viraj Mhaske (Roll No. 13), Chetan Nevase (Roll No. 17), Yatish Patil (Roll No. 18)"** submitted to the University of Mumbai in partial fulfillment of the requirement for the Course project in Semester VIII of fourth year Artificial Intelligence and Data Science engineering.

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ABSTRACT

GANs are an exciting and rapidly changing field, delivering on the promise of generative models in their ability to generate realistic examples across a range of problem domains, most notably in image to-image translation tasks such as translating photos of summer to winter or day to night, and in generating photorealistic photos of objects, scenes, and people that even humans cannot tell are fake. The technique has been successfully used for high-fidelity natural image synthesis, data augmentation tasks, improving image compressions, and more. From emoting super-realistic expressions to exploring deep space, and from bridging the human- machine empathetic disconnect to introducing new art forms, GANs have it all covered.

Chapter 1: Introduction

1.1 Introduction

Generative Adversarial Networks (GANs) are a powerful class of neural networks that are used for unsupervised learning. It was developed and introduced by Ian J. Goodfellow in 2014. The basic idea was that of two models in constant competition, meaning one's loss is another's gain. This approach leads them to produce realistic, non-differentiable protégées of the input. For example, if we were to input a video, the output would also be in the form of a video. GAN models are trained to identify patterns or similarities from the inputs, and they can create items that are very closely related to the input. GAN has proven itself in various difficult tasks such as improving resolution, generating facial expressions, and much more.

1.2 Problem Statement & Objectives

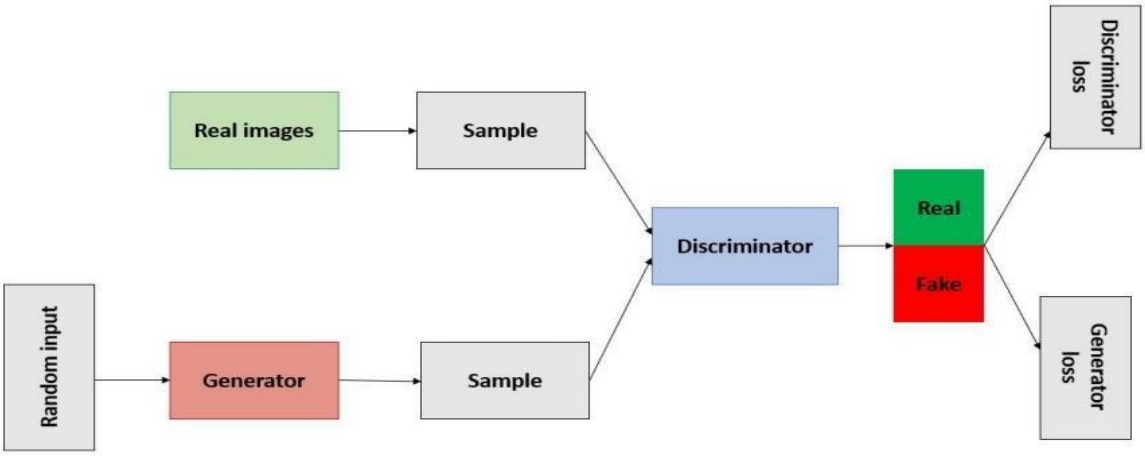
The task at hand involves automating the process of coloring fixed-size black and white images of any object using Generative Adversarial Networks (GANs). This project aims to develop a solution that can effectively determine and apply appropriate color combinations to enhance the aesthetic appeal of images. Such a solution holds significant potential for various applications, particularly in fields where determining optimal color schemes is crucial for attracting users and enhancing user experience. One prominent example is in UI development, where designers often need to ascertain color combinations that resonate well with users and contribute to an aesthetically pleasing interface.

Chapter 2: Proposed System

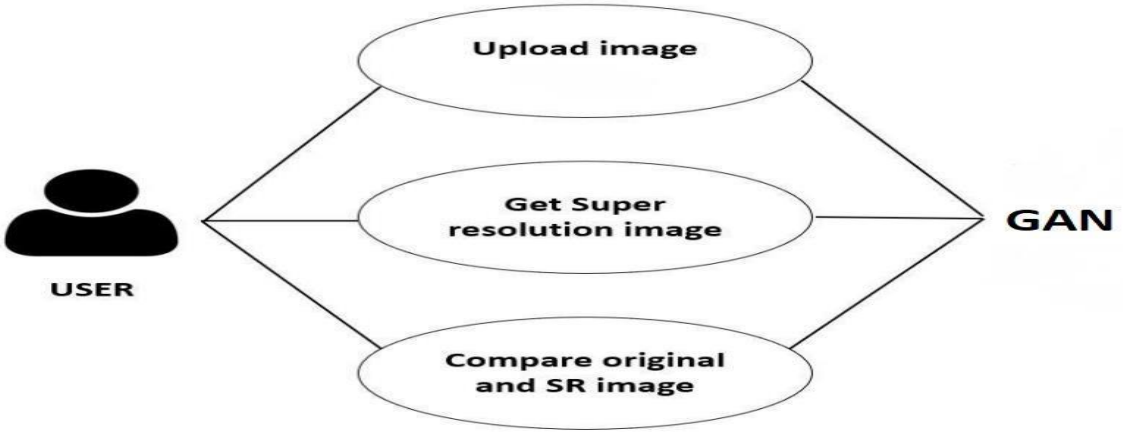
2.1 Introduction

Colour adds a sense of visual appeal when one looks at mundane things. Colours also have the capability to drive emotions of a human being. For example, consider the job of interior designers. They are majorly concerned with deciding upon those color combinations that gives soothing effect to residents and deciding in what patterns these colours are to be used to enhance aesthetics of the place. Thus, at first glance the problem statement of colouring black and white images may look trivial but if suppose black and white image of a house has been given, that GANs can be used to color those photos in such a way that color composition obtained may perfectly match with the structure of the house.

2.2. Architecture/ Framework/Block diagram



2.3. Algorithm and Process Design

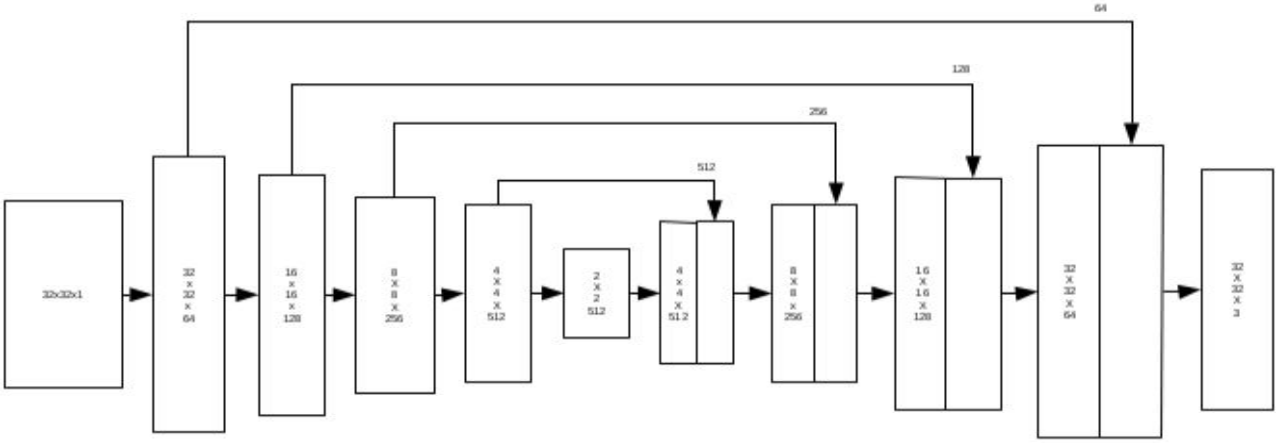


(ii) Image super resolution use case diagram

2.4. Details of Hardware & Software

- Operating System: Windows 7 or above, Linux.
- Python Compiler: (Jupiter/PyCharm/IDLE)
- Python Interpreter (IDLE). • Backend: Python3
- Frontend: HTML5, CSS3, JavaScript
- Other Requirements: HTML5 enabled browse.

2.5. Experiment and Results for Validation and Verification



Generator Network visualization

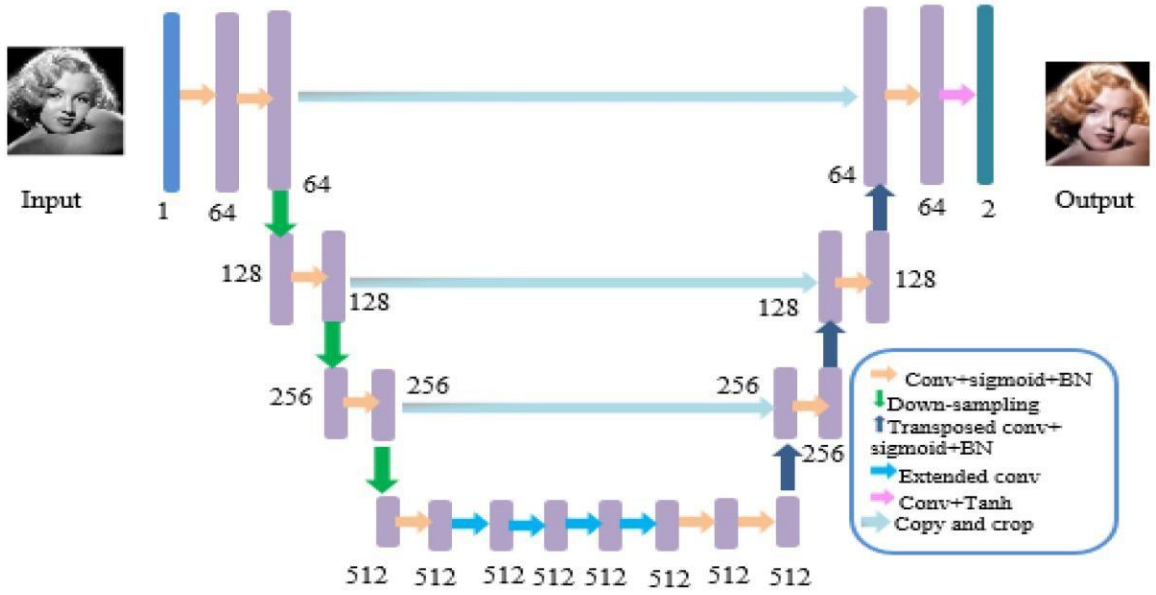


Fig 1. The Network diagram of CU-net

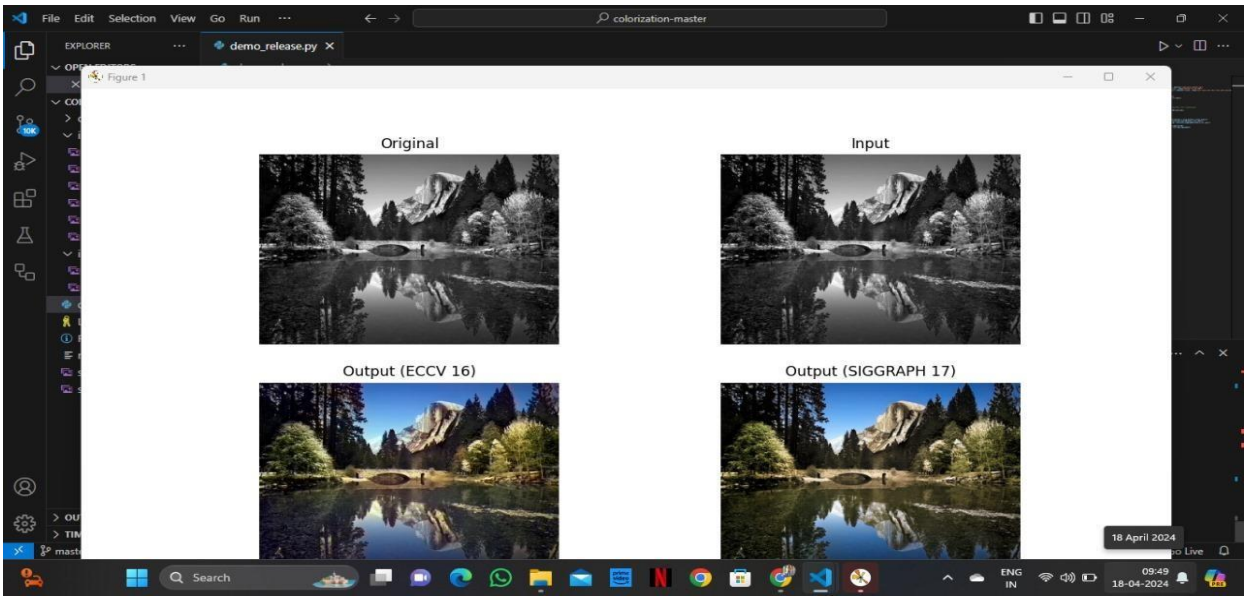


Fig 2. Results and Output

2.6 Conclusion

There are many factors that can be improved in GAN models. SRGAN can be achieved with another model called ESRGAN+. This has the basis of what we saw but only the generator loss functions are improvised to provide better results. Boundless GAN can be improved to make the output a lot better. Similarly, GAN is a growing field and there will always be scope for improvement and betterment. There are many fields in which GAN models are applied as seen above. This can be further taken care of.

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