

# VIGNAN INSTITUTE OF TECHNOLOGY AND SCIENCE

Department of Computer Science and  
Engineering

Major Project Review

## InkyPic – Colorization of grayscale image

Batch No : B-16

Guided by  
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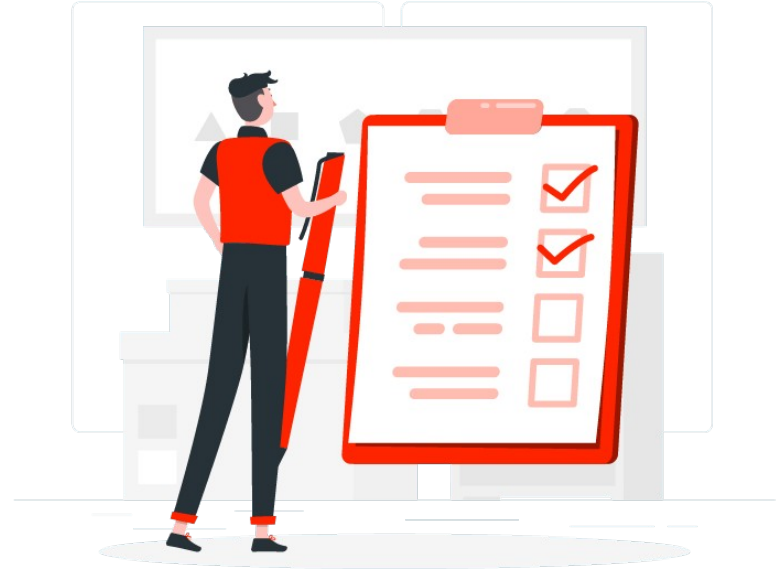
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# Abstract

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Many grayscale or black and white photos from the days before colour photography are now being tinted for historical and aesthetic purposes. One of the first phases in image analysis and recording is the colorization of the images. Here we are going to use machine learning techniques to color an image that is grayscale. Colorization of photos can be used in various fields, including in CCTV cameras, astronomical photography, electron microscopy, and historical photographs.

With the use of training images, the suggested system will be designed and put into operation to color photos. A grayscale image or video can be colored by the use of a computer program called colorization. This task needed a lot of human input and hardcoding several years ago but now the whole process can be done end-to-end with the power of Machine learning and Artificial Intelligence.

# Introduction

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The use of color in images can greatly enhance their visual appeal and make them more engaging for viewers. However, many images, particularly older ones, are only available in grayscale, which can limit their impact and make them less interesting to look at. Colorization is a process that aims to overcome this limitation by adding color to grayscale images, with the goal of reproducing the original colors as closely as possible.

There are several methods for colorizing grayscale images, ranging from manual techniques that involve an artist or editor selecting colors for each pixel, to automated techniques that use algorithms to determine the most appropriate colors based on the content of the image.

# Existing System

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There are few existing systems, which are mostly websites, which use this technology such as deepAI. Most of the systems have some limitations or disadvantages which are mentioned below:

## Limitations/Disadvantages:

- Most of the systems charges the user and the charges are a bit expensive when compared to the services provided
- In almost all of these technologies, after producing the output by colorizing the greyscale image, the produced picture will lack clarity and resolution.

# Proposed System

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In this project, we use GAN machine learning model and algorithms to solve the issued while colorizing the greyscale image.

## Advantages:

- This system is available to all users without any charge. It can be used without incurring any fees or costs. This means that users are able to access and use the system without having to pay anything.
- A colorized image obtained is clear and of high resolution is one that appears crisp and detailed, with minimal visual distractions or distortions.

# System Requirements

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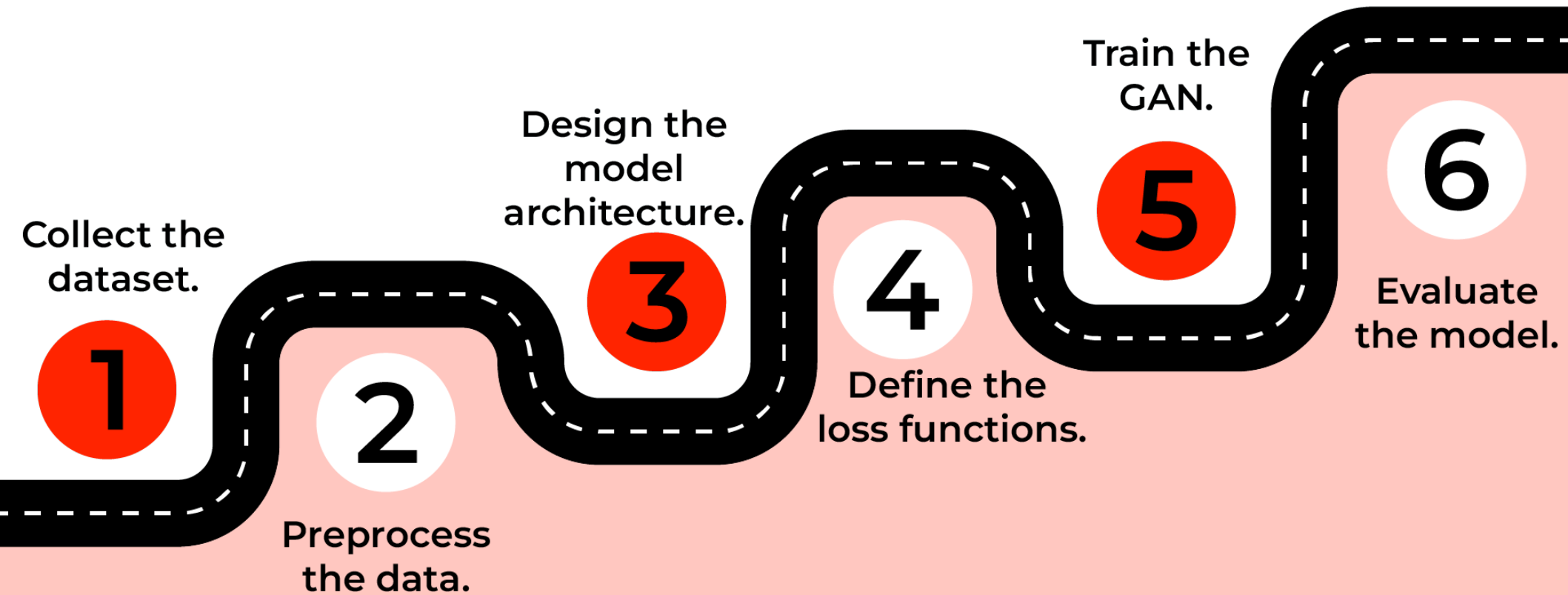
## Hardware Requirements

- Processor : intel i3
- Hard Disk : 64GB
- RAM : 4 GB

## Software Requirements

- Language : Python
- IDE : Visual Studio Code
- OS : Windows

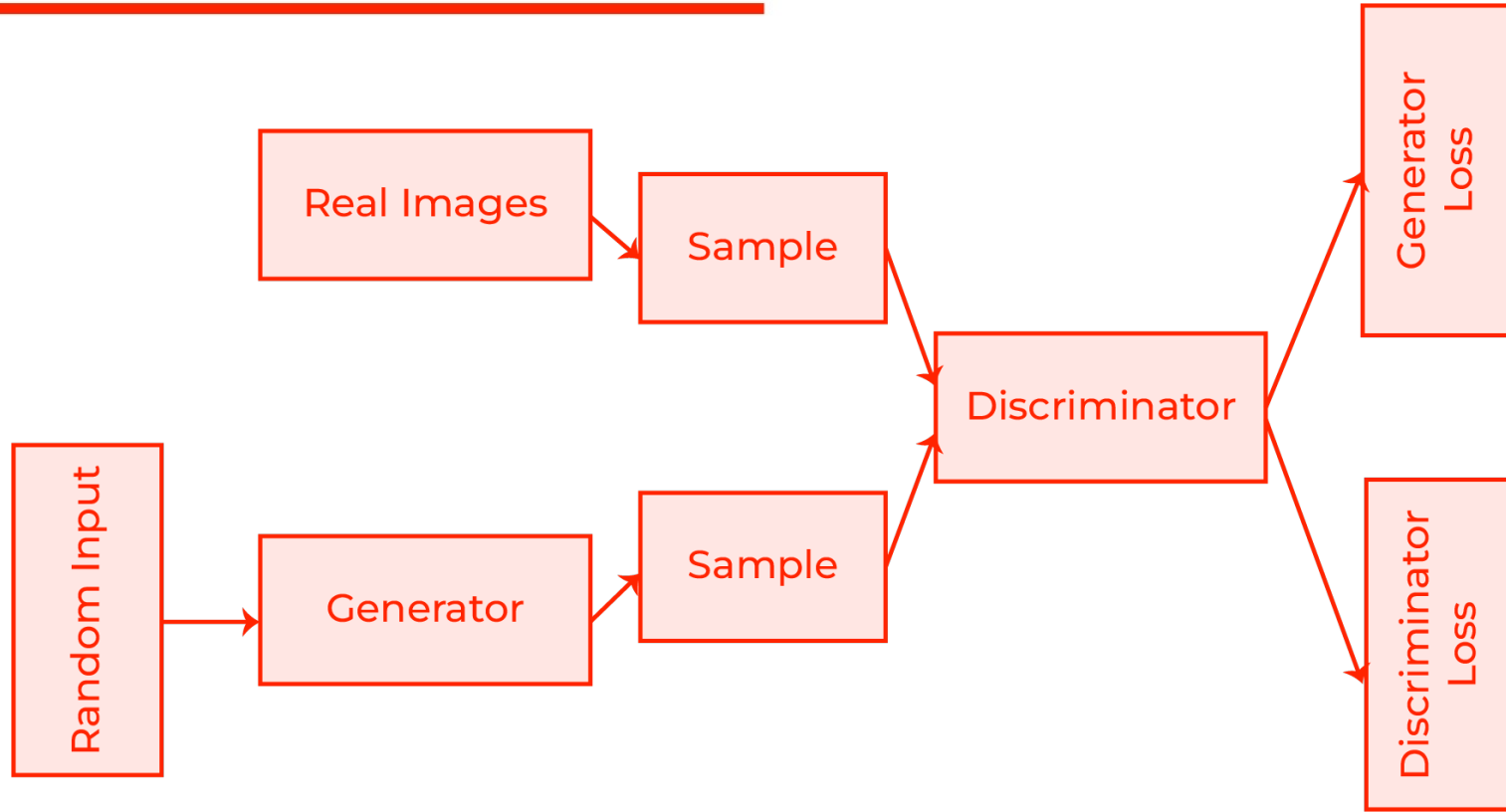
# Methodology





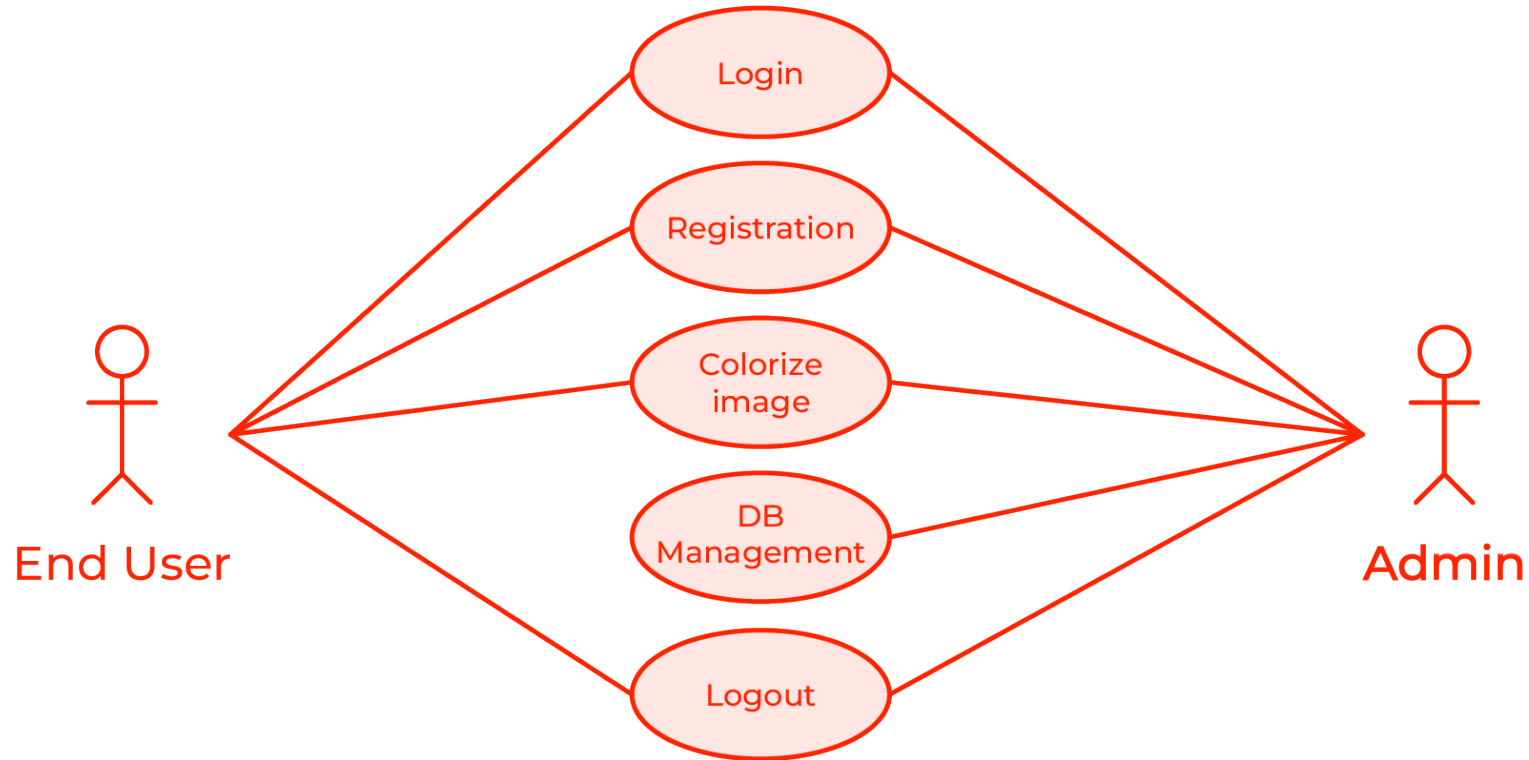
# Architecture

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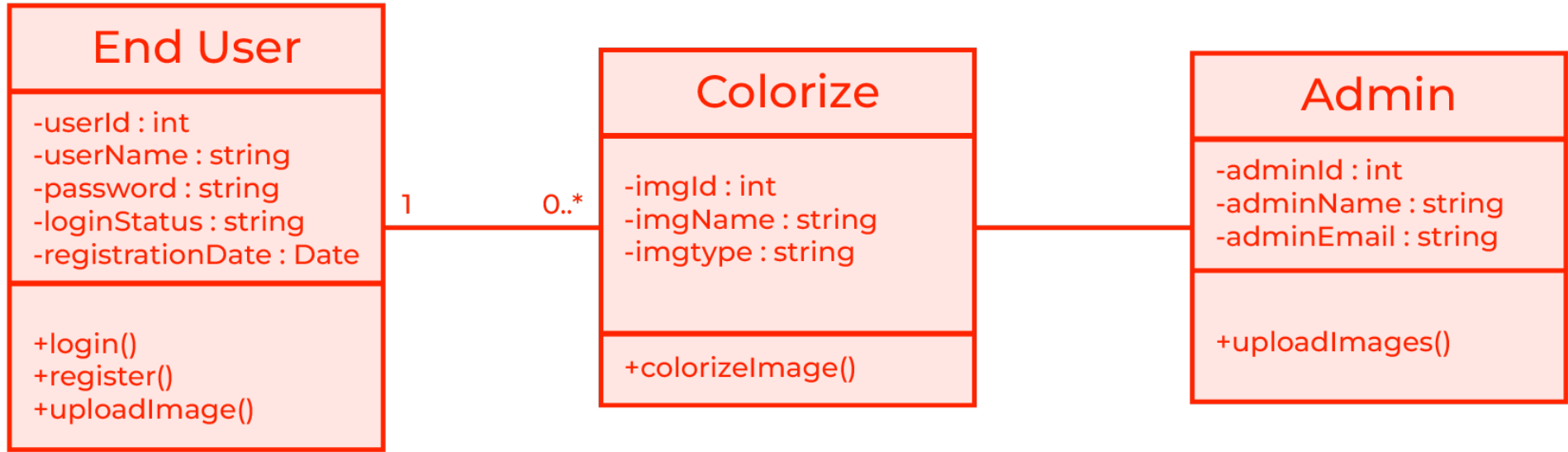
# UML Diagrams (UseCase Diagram)

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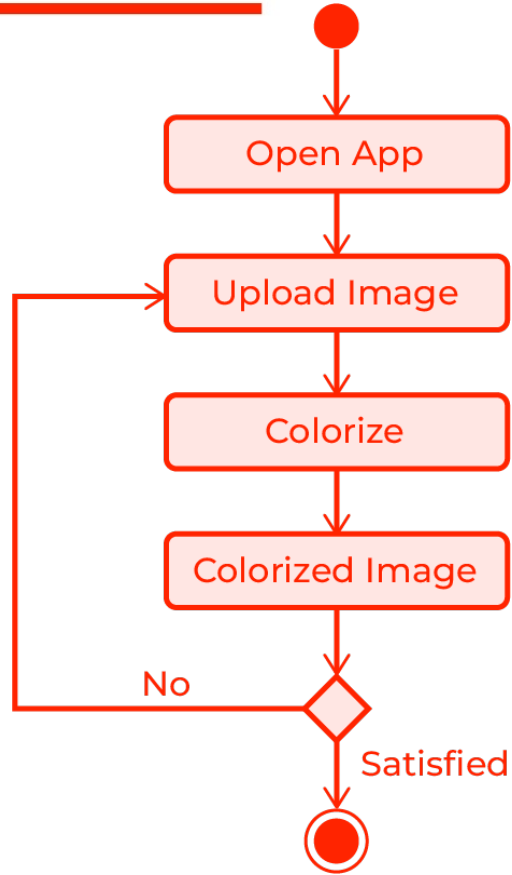


# UML Diagrams (Class Diagram)

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# UML Diagrams (Activity Diagram)



# Algorithms

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The basic idea behind GANs is to train two neural networks - a generator and a discriminator - that compete with each other. The generator takes random input noise and generates new data that resembles the training data. The discriminator, on the other hand, tries to distinguish between the generated data and the real data.

The training process for GANs involves the following steps:

- The generator receives a random noise vector as input and generates fake data.
- The discriminator receives both real and fake data and tries to classify them correctly.

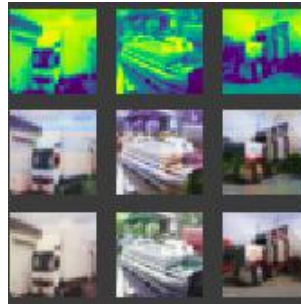
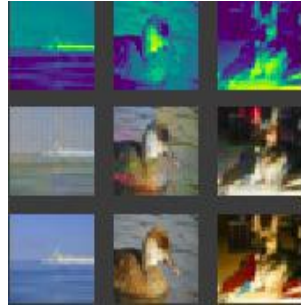
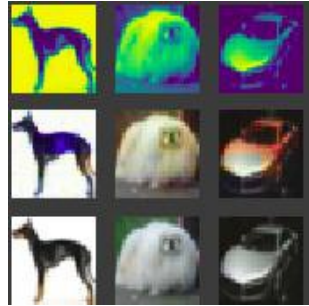
# Algorithms

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- The discriminator's output is used as a feedback signal for the generator to improve the quality of the generated data.
- The generator is trained to generate data that can fool the discriminator into classifying it as real data.
- The discriminator is retrained on the new data (a mix of real and generated data).
- The process is repeated until the generator produces data that is indistinguishable from real data by the discriminator.

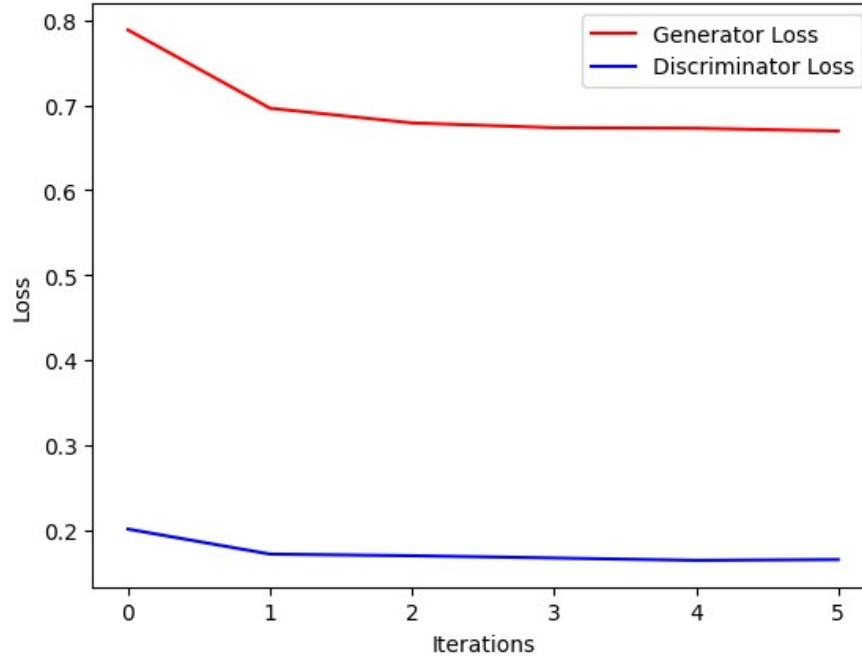
# Results

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# Results

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Generator Loss  
Discriminator Loss



# Conclusion

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- GAN is one of the few models which can be used to colorize black and white images. Using GAN we have created a model which can be used to convert black and white image as color image.
- GAN has discriminator and generator which generate more accurate model when compared to other algorithms.

# Future Scope

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- Still there are many areas such as CCTV cameras, astronomical photography, electron microscopy, and historical photographs where we obtain black and white photographs as output.
- In areas like these, we can embed this algorithm so that we can obtain output as a color image.

