**Web Application for Image Generation using Artificial Intelligence**

**A Project Work Synopsis**

*Submitted in the partial fulfilment for the award of the degree of*

**BACHELOR OF ENGINEERING**

**IN**

**COMPUTER SCIENCE WITH SPECIALIZATION IN**

**INFORMATION SECURITY**

**Submitted by:**

20BCS3707 Prakash Singh

**Under the Supervision of:**

**Shiwani Sharma**



**CHANDIGARH UNIVERSITY, GHARUAN, MOHALI - 140413,**

**PUNJAB**

**March 2023**

# Abstract

Artificial intelligence (AI) is a rapidly advancing field that aims to develop machines and computer programs that can perform tasks that would normally require human intelligence. AI is based on the idea of creating intelligent machines that can simulate human cognitive abilities, such as reasoning, learning, problem-solving, perception, and language understanding. AI is being applied to a wide range of fields, including robotics, natural language processing, computer vision, and expert systems, and has already had a significant impact on society. In the context of Image generation using Artificial Intelligence has gained significant attention in recent years, as it has the potential to revolutionize the way we create and manipulate visual content. This paper presents an overview of the state-of-the-art techniques for image generation using AI, including generative adversarial networks (GANs), variational autoencoders (VAEs), and autoregressive models. These techniques have been used to generate realistic images of faces, landscapes, and even entire cities, and have a wide range of applications in fields such as art, design, and entertainment.

**Keywords:** Artificial Intelligence, GAN, Variational Autoencoders, natural language processing.

# Table of Contents

|  |  |
| --- | --- |
| Title Page | i |
| Abstract | ii |
| 1.    Introduction |  |
| 1.1           Problem Definition |  |
| 1.2 Project Overview |  |
| 2.    Literature Survey |  |
| 2.1 Existing System |  |
| 2.2 Proposed System |  |
| 2.3 Literature Review Summary |  |
| 3.    Problem Formulation |  |
| 4. Objective |  |
| 5.    Methodologies |  |
| 6.    Experimental Setup |  |
| 7.    Conclusion |  |
|  |  |
| 8.    Reference |  |

# INTRODUCTION

## Problem Definition

Image generation using artificial intelligence involves training a machine learning model to generate new images that have similar features to the input images. Image generation using artificial intelligence involves training a machine learning model to generate new images that have similar features to the input images. Image generation using artificial intelligence focuses on creating images based on the user input which help small businesses to create logo, creating NFTs, UI/UX design, creating product images for retail and fashion which all require a ton of money and time to do but through this it can be done in no time.

## Problem Overview

Art and Design industry has always been an expensive and time-consuming field which require lot of resources and skilled creative people to create interactive interfaces, logo, NFTs, posters and product design. Small time businesses and individuals can’t afford the kind of prices and time required for this.

Image generation using artificial intelligence make all these with no cost and time. It uses deep learning model like GAN and VAE to generate realistic images of faces, landscapes, and even entire cities, and have a wide range of applications in fields such as art, design, and entertainment.

# 2. LITERATURE SURVEY

## 2.1 Existing System

* Digital painting: Digital painting involves using software such as Adobe Photoshop or Corel Painter to create images using digital brushes and other painting tools.
* Photo manipulation: Photo manipulation involves using software such as Adobe Photoshop or GIMP to edit and manipulate existing images, often by combining multiple images or altering the colours and shapes of elements within an image.
* 3D modelling: 3D modelling involves creating three-dimensional objects and environments using software such as Blender or Maya. These objects and environments can then be rendered as 2D images or animations.

## 2.2 Proposed System

The proposed system uses the Generative model which are trained on large datasets of images to learn the underlying patterns and features of those images and then create new images similar to the images fed. Through an iterative process of generating and evaluating images, the generative model learns to create increasingly realistic images that can be used for a variety of applications, such as art generation, content creation, and data augmentation.

## 2.3 Literature Review Summary

1. "Generative Adversarial Networks" by Ian Goodfellow et al. (2014)

This paper introduced the concept of generative adversarial networks (GANs), a class of deep learning models used for image generation. The authors demonstrated the effectiveness of GANs in generating realistic images of faces, bedrooms, and handwritten digits.

1. "Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks" by Alec Radford et al. (2016)

This paper proposed a modification to the GAN architecture that uses deep convolutional neural networks to generate higher-quality images. The authors showed that their approach could generate realistic images of objects such as birds and flowers.

1. "Progressive Growing of GANs for Improved Quality, Stability, and Variation" by Tero Karras et al. (2017)

This paper introduced a method for progressively increasing the resolution of GAN-generated images, which leads to higher-quality and more varied results. The authors demonstrated their approach by generating images of faces, bedrooms, and cars.

1. "StackGAN: Text to Photo-realistic Image Synthesis with Stacked Generative Adversarial Networks" by Han Zhang et al. (2017)

This paper proposed a GAN-based approach for generating photo-realistic images from textual descriptions. The authors showed that their approach could generate high-quality images of birds and flowers given simple textual descriptions.

1. "PixelCNN++: Improving the PixelCNN with Discretized Logistic Mixture Likelihood and Other Modifications" by Tim Salimans et al. (2017)

This paper proposed a modification to the PixelCNN architecture, a type of neural network used for image generation. The authors showed that their approach could generate higher-quality images with more complex features.

1. "Deep Image Prior" by Dmitry Ulyanov et al. (2018)

This paper proposed a new approach to image generation that does not require training on a large dataset. Instead, the authors used the structure of a deep neural network as a prior to generate images. The authors demonstrated that their approach could generate realistic images of faces and natural scenes.

1. "BigGAN: Large Scale GAN Training for High Fidelity Natural Image Synthesis" by Andrew Brock et al. (2018)

This paper proposed a modification to the GAN architecture that allows for the generation of high-resolution images. The authors showed that their approach could generate photo-realistic images of animals and natural scenes at resolutions up to 512x512 pixels.

# 3. PROBLEM FORMULATION

Image generation is an expensive and time-consuming field which require lot of resources and skilled creative people to create interactive interfaces, logo, NFTs, posters and product design. Small time businesses and individuals can’t afford the kind of prices and time required for this.

Artificial Intelligence has gained significant attention in recent years, as it has the potential to revolutionize the way we create and manipulate visual content. This paper presents an overview of the state-of-the-art techniques for image generation using AI, including generative adversarial networks (GANs), variational autoencoders (VAEs), and autoregressive models. These techniques have been used to generate realistic images of faces, landscapes, and even entire cities, and have a wide range of applications in fields such as art, design, and entertainment.

the objective of image generation using artificial intelligence is to leverage the power of machines to enhance human creativity, productivity, and problem-solving abilities. This helps in cost-effective production, time saving ,improving realism and augmenting human abilities.

# 4. OBJECTIVES

The objective of image generation using artificial intelligence can be summarized in the following points:

* Enhancing creativity: AI can generate images that are beyond the human imagination, enabling artists and designers to explore new possibilities and push the boundaries of creativity.
* Cost-effective production: AI-generated images can significantly reduce the cost of production, as they can be generated quickly and without the need for physical materials.
* Personalization: AI can generate images that are customized to an individual's preferences or needs, allowing for more personalized products and services.
* Timesaving: AI-generated images can save time by automating the design process, allowing designers to focus on other aspects of the project.
* Improving realism: AI can generate images that are incredibly realistic, making them useful in fields such as virtual reality, simulation, and gaming.
* Augmenting human abilities: AI-generated images can help humans in various fields, such as medical diagnosis, scientific research, and engineering design.

Overall, the objective of image generation using artificial intelligence is to leverage the power of machines to enhance human creativity, productivity, and problem-solving abilities.

# 5. METHODOLOGY

1. Detailed study of the work done in the field of image generation using AI
2. Relative pros and cons will be identified.
3. Various parameter will be identified to evaluate the proposed system.
4. Model will be chosen based on the desired output.
5. The development Environment will be set up.
6. Collecting a dataset of images.
7. Pre-processing of images
8. model is trained on the pre-processed dataset using various optimization techniques
9. generate new images by inputting random noise.
10. The interface for user will be made.
11. Comparison of new implemented approach with exiting approach will be done.

# 6.EXPERIMENTAL SETUP

* ReactJS (version 18.0): Frontend Development using react to create interactive user interface.
* ExpressJS: Used to manage connection between interface and database.
* NodeJS: Nodejs is used to create the API or backend of the web application.
* GAN/VAE- a generative model that take input and generate images.

# 7.CONCLUSION

The resulted web application for image generation using Artificial intelligence will furthermore co-relate with the existing system for image generation and increase the productivity of the people in creating interactive images, logo, NFTs, product designing etc . the web application takes user text-based input and then create interactive images based on the dataset provided. image generation using AI holds great potential for a wide range of applications, from art and entertainment to medical imaging and scientific research. Continued development and refinement of generative models will lead to even more realistic and accurate images, further expanding the possibilities of AI in the field of image generation.

## REFERENCES

1. "Generative Adversarial Networks" by Ian Goodfellow et al. (2014)
2. "Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks" by Alec Radford et al. (2016)
3. "Progressive Growing of GANs for Improved Quality, Stability, and Variation" by Tero Karras et al. (2017)
4. "StackGAN: Text to Photo-realistic Image Synthesis with Stacked Generative Adversarial Networks" by Han Zhang et al. (2017)
5. "PixelCNN++: Improving the PixelCNN with Discretized Logistic Mixture Likelihood and Other Modifications" by Tim Salimans et al. (2017)
6. Deep Image Prior" by Dmitry Ulyanov et al. (2018)
7. "BigGAN: Large Scale GAN Training for High Fidelity Natural Image Synthesis" by Andrew Brock et al. (2018)