



# **Assignment 5:**

# **Creative Artwork Generation**

# **using Stable Diffusion**

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# Introduction

- Generative AI enables machines to create new content
- Image generation is a key application of Generative AI
- Diffusion models are widely used for high-quality image synthesis
- Stable Diffusion is a popular text-to-image diffusion model

## Diffusion Models

- Diffusion models generate images by reversing a noise process
- Random noise is gradually removed to form meaningful images
- Two phases:
  - Forward diffusion (adds noise)
  - Reverse diffusion (removes noise)
- Produces realistic and detailed images

## Stable Diffusion

- Stable Diffusion is a latent text-to-image diffusion model
- Converts textual prompts into visual content
- Works in latent space for efficiency
- Open-source and computationally optimized

## Diffusion Model Used

**Model Name:** Stable Diffusion v1.5

**Architecture:** Latent Diffusion Model

**Core Network:** U-Net

**Text Encoder:** CLIP

**Image Decoder:** VAE

### Reason for Selection:

- High-quality image generation
- Open-source and well-documented
- Efficient for GPU-based inference

# Problem Statement



## Problem 1

Manual digital artwork creation is time-consuming



## Problem 2

Requires skilled designers



## Problem 3

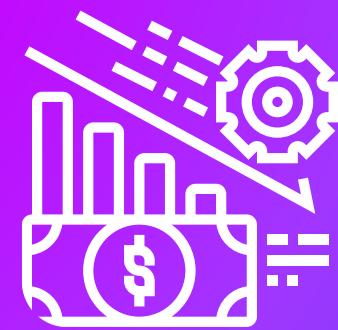
Need for an automated artwork generation system



## Problem 4

Difficult to scale creative content production

## Proposed Solution



04

No need to train model from scratch

01

Use a pre-trained Stable Diffusion model

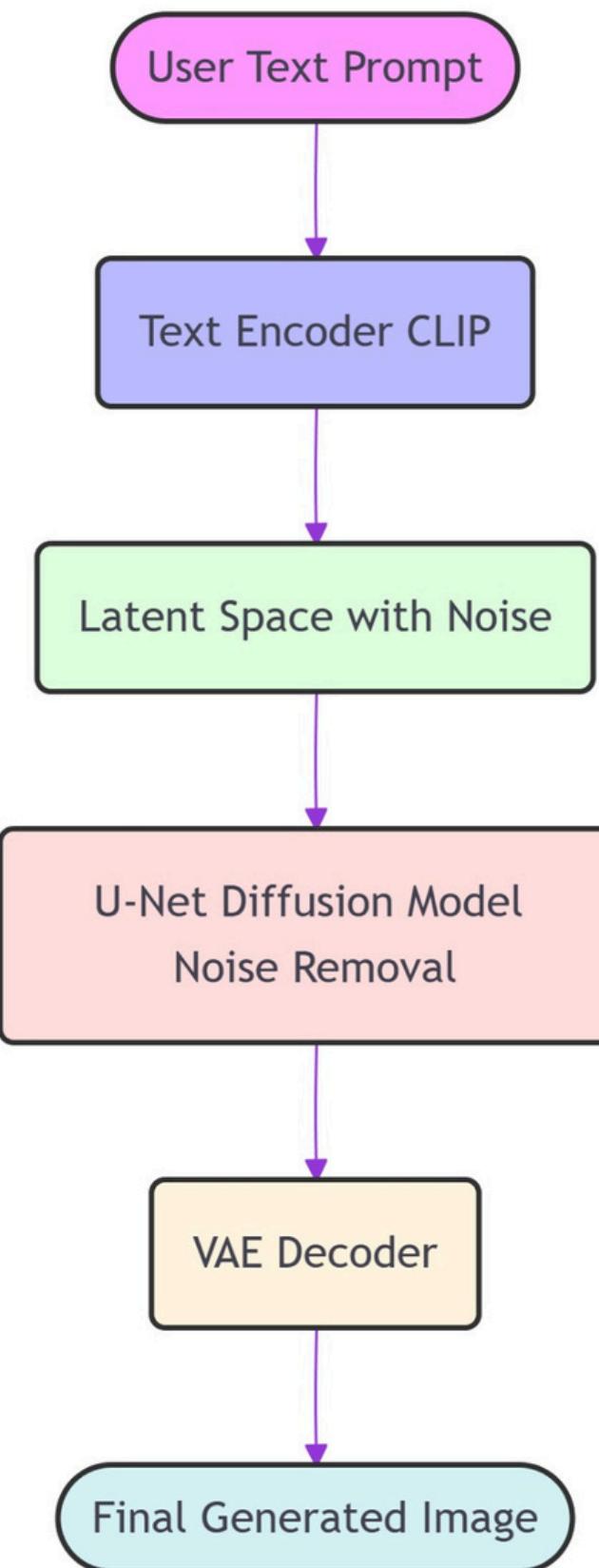
02

Generate artwork using text prompts

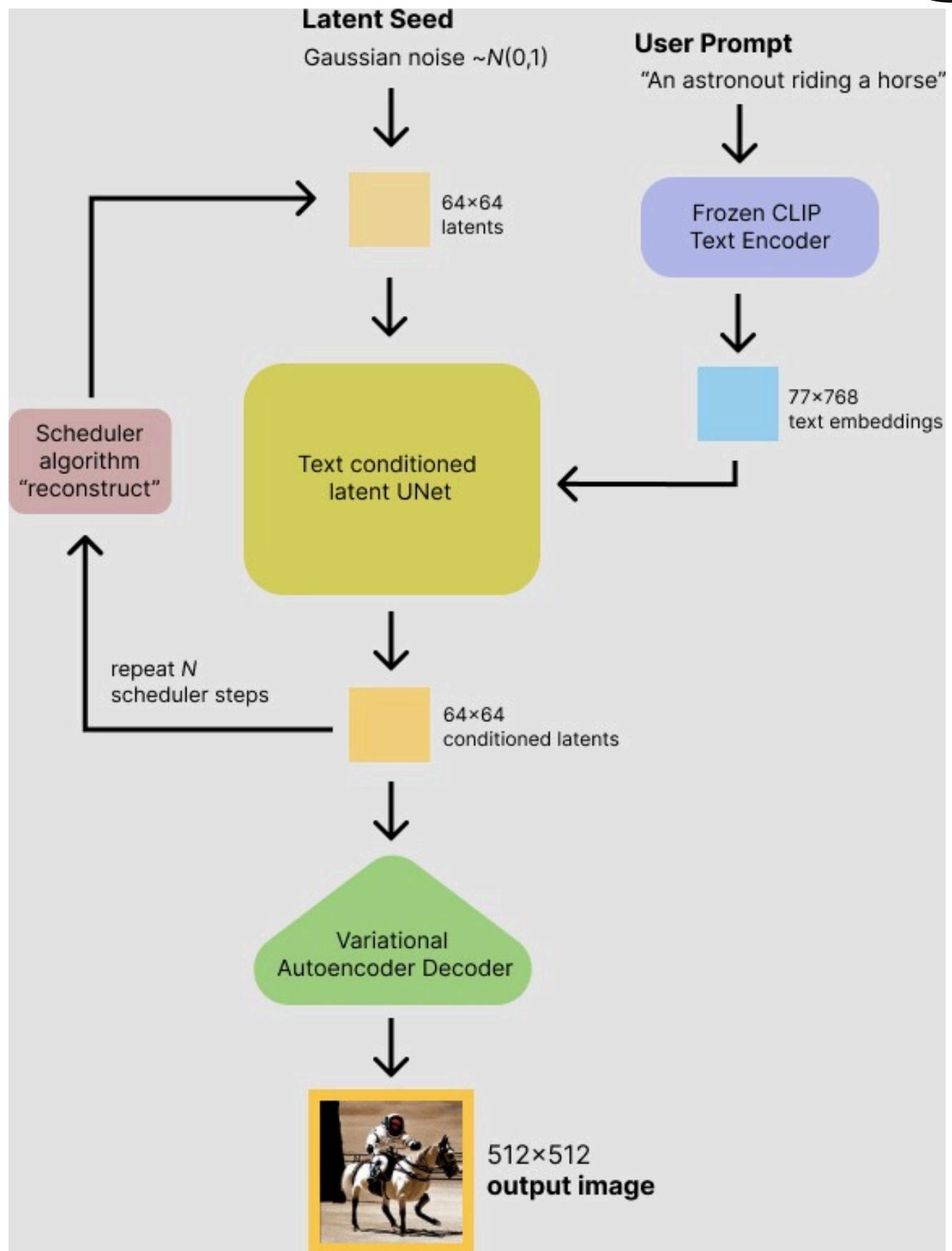
03

Modify outputs using prompt engineering

# System Workflow



# Architecture Diagram



# Implementation

- Implemented using Google Colab
- Used Hugging Face Diffusers library
- Pre-trained Stable Diffusion model
- GPU acceleration used for faster generation

Google Colab Link:

# Results



**prompt = "A traditional Indian village festival, colorful, digital art, highly detailed"**



**prompt = "Watercolor painting of a girl reading a book under a tree, soft lighting"**



**prompt = "A futuristic cyberpunk Mumbai city, neon lights, ultra realistic, 4K"**

# Conclusion

- Stable Diffusion successfully generates creative artwork
- Pre-trained diffusion models reduce computation cost
- Prompt engineering controls image quality
- Demonstrates real-world application of Generative AI



# Thank you