Image Generation

An Introduction into Convolutional Neural Networks for Generating Images

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Introduction to Image Generation with CNNs

Definition:

- **CNN**s (Convolutional Neural Networks) are specialized neural networks designed to process grid-like data such as images.
- Image generation with CNNs uses architectures like DCGAN, StyleGAN, or Pix2Pix to synthesize new images or transform existing ones.

Why It Matters:

- Automates creative tasks (e.g., generating artwork, designs, product images).
- Can reduce manual design costs and accelerate product development.

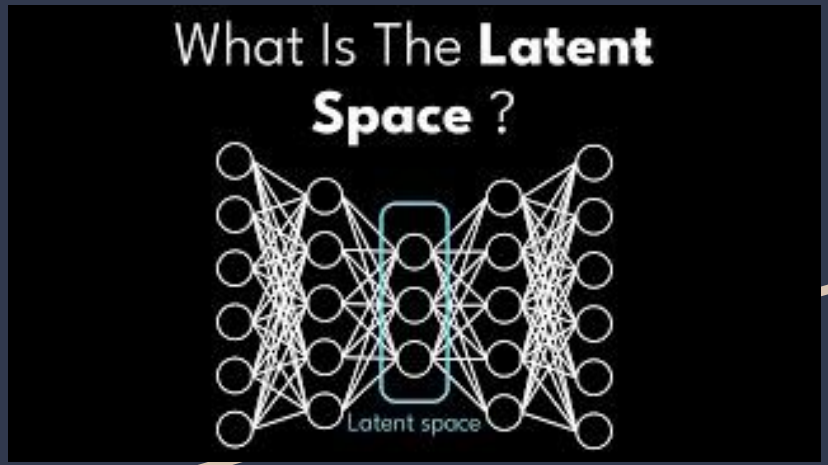
GANs

A **Generative Adversarial Network** (GAN) consists of two CNN - based networks:

- A **generator** that creates images from random
- A **discriminator** that evaluates whether an image is real or generated.

- These networks compete, improving over time
- **GOAL**: generator produces images that are indistinguishable from real ones
- CNNs are used in both networks to extract:
  - spatial features
  - refine image quality

Latent Space Representation



Latent space is a compressed, abstract representation of data where each point corresponds to a unique set of features

In image generation, a GAN's generator takes a random vector from this space and transforms it (using CNN layers) into a realistic image

By manipulating latent space inputs, we can control the generated image attributes, such as style, shape, or texture

Transposed Convolution (Deconvolution)

Transposed Convolution also known as **deconvolution** or **upsampling convolution**, used to increase the spatial resolution of an image.

It is the reverse operation of standard convolution,

- Allows CNNs to generate high-resolution images from lower-dimensional representations

Github Repo

Gan iGAN: Interactive Image Generation via Generative Adversarial Networks

Key People & Companies Behind the Technology

Yann LeCun

- Pioneer of modern CNNs; foundational work on backpropagation in CNNs.

Geoffrey Hinton

- Often called the “Godfather of Deep Learning”; co-author of seminal CNN papers, developed algorithms critical to modern deep learning.

Alex Krizhevsky & Ilya Sutskever

- Creators of AlexNet (2012), a CNN breakthrough that drastically improved ImageNet classification and ignited the deep learning revolution.

Notable Companies & Platforms

OpenAI (DALL·E):

- Developer of powerful text-to-image models (e.g., DALL·E).
- Significant research in generative AI and large-scale language/image models.

MidJourney:

- Another leading text-to-image service producing high-quality artistic images from prompts.
- Known for its easy-to-use, Discord-based interface.

Stability AI (Stable Diffusion):

- Creator and maintainer of Stable Diffusion, an open-source text-to-image generation model.
- Aims to democratize AI research by providing accessible, cutting-edge generative tools.

Midjourney Video

Business Use Case – Midjourney https://www.midjourney.com/explore?tab=top

What is Midjourney?

A popular AI image-generation service accessible through Discord.

Users input text prompts, and Midjourney generates high-quality, often artistic images.

Marketing & Advertising: Quickly generate compelling visuals for campaigns and branding materials.

Design & Concept Art: Save time developing product mock-ups, packaging concepts, and creative storyboards.

Creative Inspiration: Spark new ideas for designers, artists, and brand managers.

Business Use Case – Icon.me

https://icon.me/

https://www.instagram.com/icon.me/reel/C_gh8OYpIkF/

What is Icon.me?

A leading AI-driven platform that specializes in automatically generating ad creatives and promotional visuals.

Known for its user-friendly interface and fast turnaround time, Icon.me harnesses advanced convolutional neural networks (CNNs) and generative AI to produce striking, on-brand advertisements.

How It Works

User Input: Marketers upload branding materials (logos, color schemes) and provide basic ad copy or themes.

AI Generation: Icon.me's CNN-based engines generate multiple ad variations in real time.

Refinement & Personalization: Users can adjust layouts, color palettes, or messaging to match brand identity and campaign goals.

In Class Activity: Guess Prompt + Prompt Tennis

https://guessprompt.com/

Ty ari :)