Roadmap of Genative AI : Assignn

Score: 67 / 68

Prerequisites -> Python, SQL, Linear algebra basics, Statistics basic

Database -> No SQL, Vector index, and Vector Database

Basic NLP -> Word and sentence embeddings, RNN, CNN, LSTM, GRU Transformer Architecture, Basic Evaluation metrics

Gean AI (LLM) -> LLM architecture (Autoencoding Autorregressive, Sentence to sentence), Prompt Engineering, Fine-tuning, PEFT, Aligning with RLHF, Evaluation, RAG, Application

Gen AI(LIM)-> LIM architecture (VAE, GAN, VQVAE, CLIP, Stable diffusion), Application

LLMOPS -> Gen AI lifecycle, Frameworks (Langchain, LLamaIndex), Traning, Using API calls for open source LLM/LIM.

Feedback

Great answer! Well done!

Many image generation models like GAN, VAE , and DIffusion can generate images

from the latent space. CLIP is a well-known architecture that can help to find the best text embedding among given image-text pairs. These two architecture can be combined. We need to modify and train an image generation model like GAN or VAE to take text embeddings (of CLIP) and generate images conditioned on the text embeddings. The text embeddings should be able to define the latent space vector selected for the image generation.

Feedback

Great answer! You have demonstrated a solid understanding of how Generative AI can be utilized in text-to-image synthesis by explaining the combination of CLIP for text embeddings and modifying/training image generation models like GAN or VAE to generate images conditioned on the text embeddings.

The neural network in Gen AI is trained or structured in a way that introduces randomness during the processing of the input. It is this randomness or the uncertainty in the GEN AI model that drives the creativity of the content generation. It can be an asset or liability. It can be an asset in situation where we need different outputs for the same inputs like diverse generation of data. It can be a liability in the sense that it can lead to unpredictable generations in situations where we need predictable outcomes. Many models have hyperparameters to control this randomness.

Feedback

Great answer! The explanation is clear and well-understood. It effectively describes how uncertainty drives creativity in Gen AI models and its implications. Well done!

1. Mode collapse is where the model starts generating only selective images to fool the discriminator.
2. In GAN we are training two models generator and discriminator. Generally, discriminator training is relatively easy compared to the generator. So stable training is a challenge i.e. to keep the generator and discriminator at the same level.
3. Vanishing or exploding gradients are often observed during training.

Feedback

The response covers common challenges in GAN training, such as mode collapse, training stability, and vanishing/exploding gradients. However, it lacks depth and examples to illustrate understanding.

The output of generative AI is judged on below parameters

1. Honesty - Modle should not generate output if it does not know the answer. It should not hallucinate.
2. Harmfulness - The output should not encourage illegal methods or

activities that can harm.
3. Helpful - The output should be relevant to a user query.
4. Toxicity - The output should not contain toxic language.

Feedback

Great answer! You have provided a comprehensive explanation of the ethical considerations related to the use of Generative AI in creating human-like content. Well done!

Traditionally machine learning models are discriminatory in the sense that they are trained to learn to either predict a class(classification) or predict an outcome directly (regression) or group(clustering) a given dataset. Generative AI is trained to generate new content like text, images, and speech based on the training dataset.

Feedback

Great answer! Generative AI is trained to generate new content, while traditional machine learning models are trained to predict or group data.

Mode collapse occurs when the generator produces only a few examples from a given training dataset and ignores the rest. This happens because during training model learns that a particular set of images is fooling the discriminator better than others

and starts focusing on that set of dataset examples, ignoring other set of sampls. For example, consider MNIST dataset of handwritten digits from 0 to 9. Mode collapse occurs if the generator starts producing only a few digits like 7 or 0 and ignores generating other digits. This can solved using a different loss function like the Wasserstein loss

Feedback

Great answer! The explanation is clear and provides a good example to illustrate mode collapse. Well done!

A major application is drug discovery as Gen AI can generate new content. Gen AI can simulate different possible chemical compounds and accelerate the process of drug discovery.

Other potential applications -> Anomaly detection based on patient data, Generative new data to better train traditional ML algorithms

Feedback

Good response with clear examples. Consider providing more detail on how Gen AI can be used for anomaly detection and data generation in healthcare.

Techniques used to evaluate GEN AI models

1. Traditional NLP metrics -> ROUGE, BLUE, Accuracy
2. Benchmarks -> GLUE, SuperGLue
3. LLM - We can use other benchmarked LLM to evaluate our trained LLM.
4. Human evaluation

Feedback

Great answer! Well done!