Roadmap of Genative AI : Assignn

Score: 67 / 68

What are the key components of a roadmap for Generative AI?

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!

How can Generative AI be utilized in text-to-image synthesis?

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.

Explain the concept of uncertainty in Generative AI models.

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!

What are some common challenges in training Generative Adversarial Networks (GANs)?

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.

Discuss the ethical considerations related to the use of Generative AI in creating human-like content.

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!

How does Generative AI differ from traditional machine learning models?

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.

Explain the concept of mode collapse in Generative Adversarial Networks (GANs).

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!

What are the potential applications of Generative AI in the field of healthcare?

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.

What are some techniques used to evaluate the performance of Generative AI models?

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!

Why is it important to consider diversity and fairness in the training data for Generative AI models?

Diversity and fairness in training data ensures the output of GEN AI is generalized for a wide range of input scenarios, not biased and helpful to user .

Feedback

Great answer! The response effectively explains the importance of diversity and fairness in training data for Generative AI models.

Discuss the concept of latent space in the context of Generative AI.

Latent space concepts come into play in Gen AI architecture like VAE and GAN. Latent space represents lower dimensional space on to much the original data sample is mapped. This lower dimensional space represents a feature mapping of data. This latent space mapping is learned by the gen ai architecture and during inference based on either random or conditional sampling from this latent space gen ai model can generate new data.

Feedback

Great answer! The explanation is clear and demonstrates a good understanding of latent space in the context of Generative AI.

How can Generative AI be used to enhance creativity in content generation?

Gen AI can generate new content like images, text, speech and video. This ability of Gen AI can help content creators creatively collaborate with Gen AI applications based on their personal preferences.

Feedback

Great answer! The response effectively explains how Generative AI can enhance creativity in content generation by generating new content like images, text, speech, and video. It also highlights the potential for creative collaboration based on personal preferences. Well done!

What are the key considerations for selecting appropriate loss functions in Generative AI models?

The loss function in Gen AI model should

1. Align with the evaluation metric used for judging the performance of the model
2. Have regularization terms to avoid overfitting or divergence from the expected distribution
3. In the case of a multi-objective task it should balance all components of loss
4. It should not result in unstable training or take forever for convergence.

Feedback

Great answer! The response demonstrates a clear understanding of the key considerations for selecting appropriate loss functions in Generative AI models. Well done!