Generative AI Master Course

Welcome to DataSciLearn's Generative AI Master Course. This course will guide you through the latest advancements in generative AI and empower you to build powerful applications.

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Prerequisites

Python

Learn the fundamental programming language used in data science, AI, and machine learning.

Machine Learning (ML)

Understand core concepts of ML, including supervised and unsupervised learning.

Deep Learning (DL)

Explore deep neural networks, their architectures, and applications in various domains.

Natural Language Processing (NLP)

Dive into techniques for processing, understanding, and generating human language.

```
5    myName = input()
6    print('It is good to meet you, ' + myName)
7    print('The length of your name is:')
8    print(len(myName))
```

Python Fundamentals

Variables and Data Types

Learn about different data types like integers, floats, strings, and booleans, and how to assign values to variables.

Control Flow

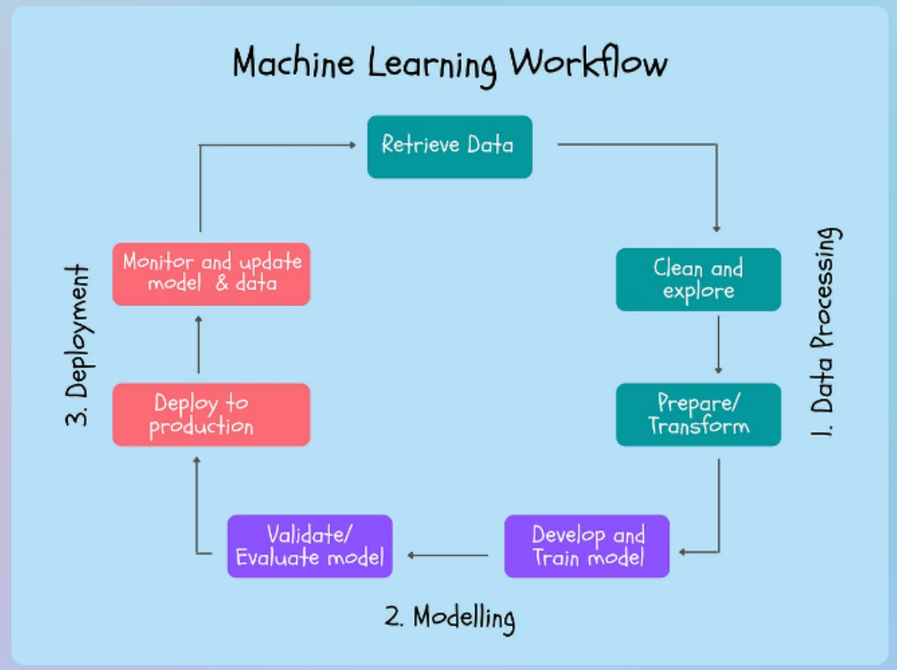
Understand conditional statements (if-else) and loops (for, while) to control the execution of your code.

Functions and Modules

Learn to create reusable blocks of code with functions and leverage existing modules for common tasks.

Data Structures

Explore fundamental data structures like lists, tuples, dictionaries, and sets for efficient data organization.



Machine Learning Essentials

1

Supervised Learning

Understand algorithms like linear regression, logistic regression, and decision trees for making predictions based on labeled data.

2

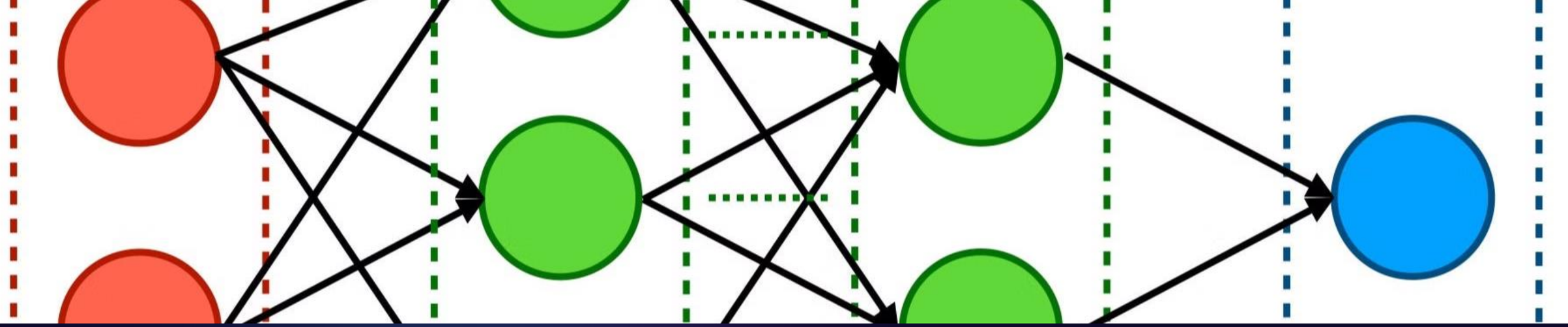
Unsupervised Learning

Explore clustering algorithms like K-means and dimensionality reduction techniques like PCA for finding patterns in unlabeled data.

3

Model Evaluation

Learn to assess the performance of your machine learning models using metrics like accuracy, precision, and recall.



Deep Learning Concepts

1 Artificial Neural Networks

Explore the basic structure of an artificial neural network, including neurons, layers, and activation functions.

2 Convolutional Neural Networks (CNNs)

Understand the architecture of CNNs for image recognition and object detection tasks.

3 Recurrent Neural Networks (RNNs)

Learn about RNNs and their applications in sequence modeling, such as natural language processing.

4 Backpropagation

Learn about the backpropagation algorithm, which is essential for training deep learning models.

Natural Language Processing (NLP)

Text Preprocessing

Learn techniques like tokenization, stemming, and lemmatization to prepare text data for NLP tasks.

Language Models

Explore different types of language models, including recurrent neural networks (RNNs) and transformers.

NLP Applications

Discover various applications of NLP, such as machine translation, sentiment analysis, and chatbot development.

Transformers: The Building Blocks

1

Encoder-Decoder Architecture

Learn about the encoder-decoder structure common in transformers, where the encoder extracts information from the input and the decoder generates the output.

2

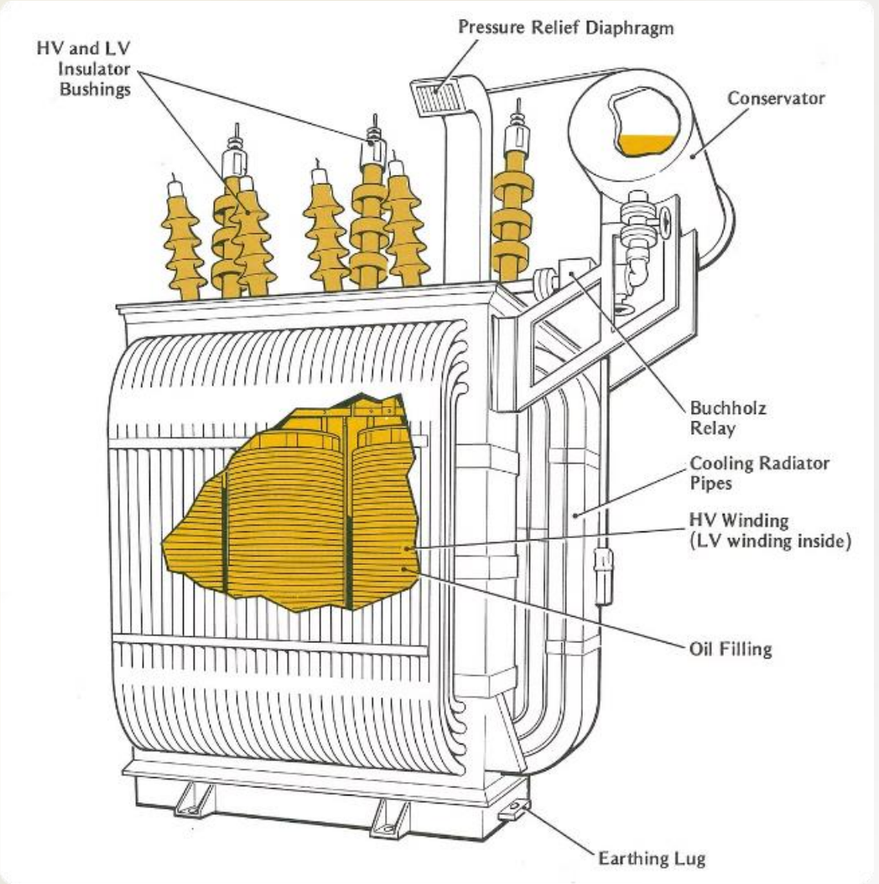
Attention Mechanism

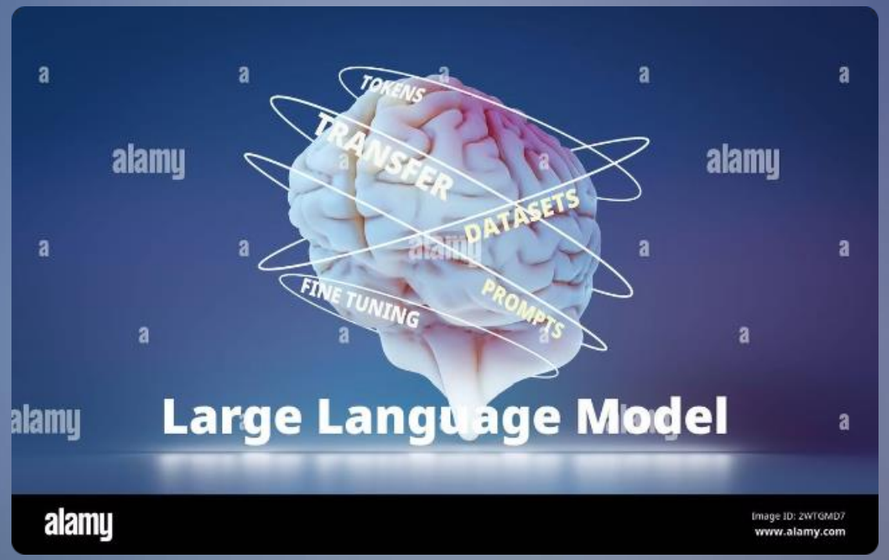
Explore the attention mechanism, which allows transformers to focus on relevant parts of the input sequence when processing it.

3

Self-Attention

Understand how self-attention enables transformers to learn relationships between words within a sentence.





Generative AI Foundation and LLMs

1 **Foundation**

Gain a solid understanding of the fundamental principles and concepts behind generative AI.

2 **LLMs**

Discover the capabilities of large language models and their impact on various industries.

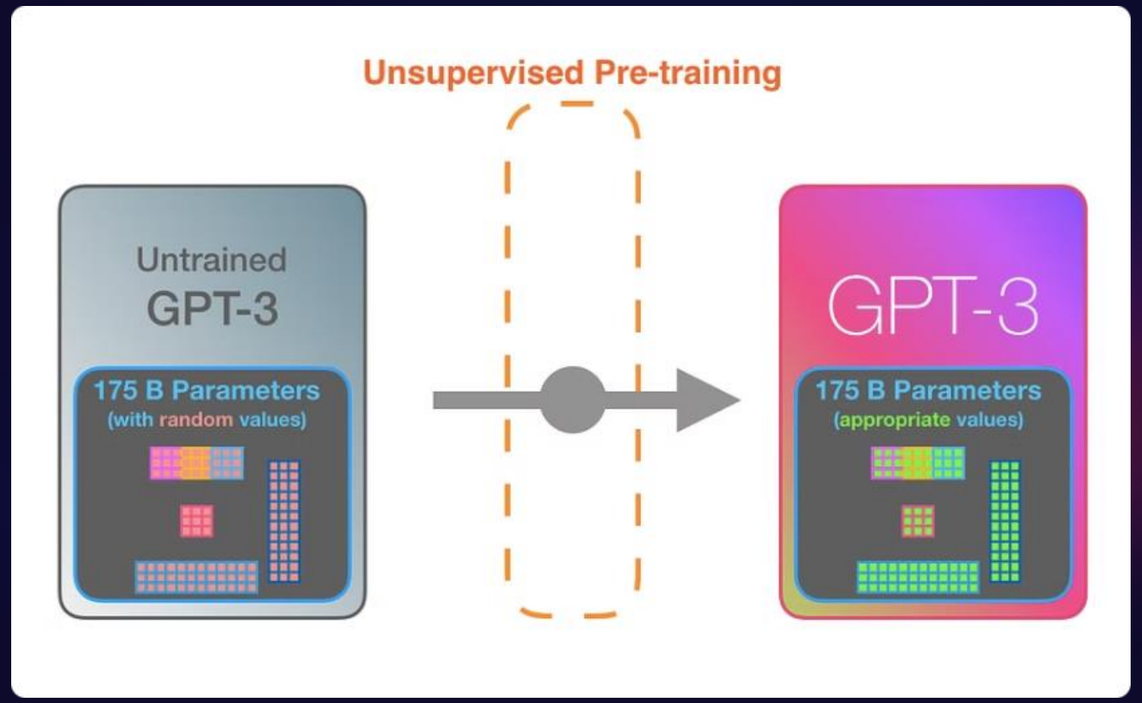
3 **Open Source**

Explore open-source LLM models such as Llama, a powerful and accessible option.

4 **Paid Models**

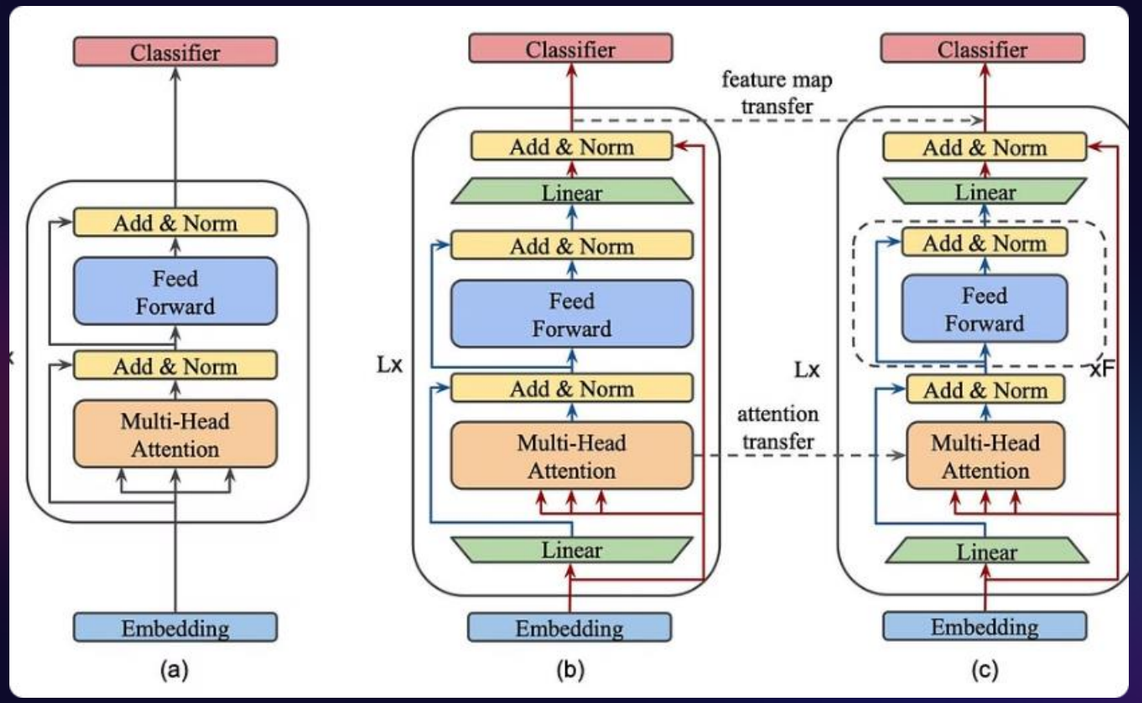
Understand the capabilities and limitations of paid models like OpenAI's ChatGPT and Google's PaLM.

Large Language Models (LLMs)



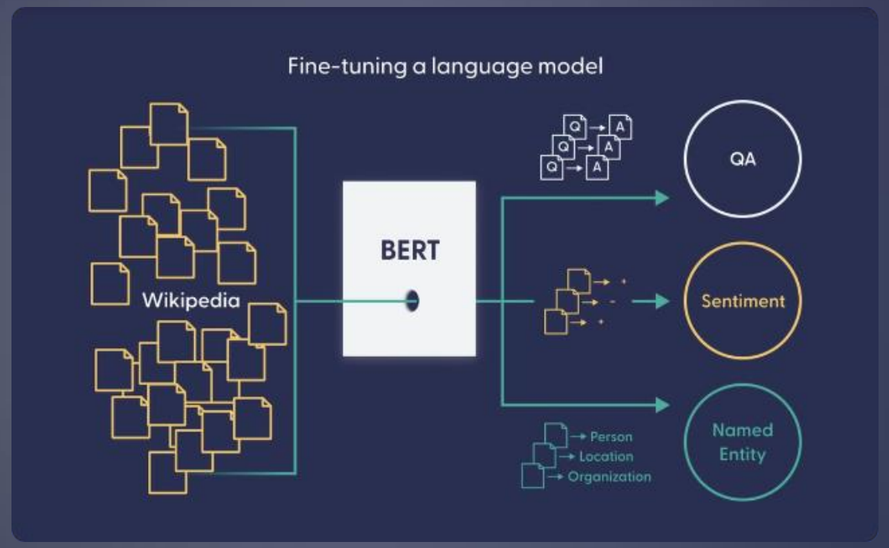
GPT-3

Explore the capabilities and limitations of GPT-3, a powerful language model known for its ability to generate human-like text.



BERT

Learn about BERT, another prominent LLM, and its applications in tasks like question answering and sentiment analysis.



Langchain

Introduction

Learn about Langchain, a framework designed to build powerful applications with LLMs.

Key Concepts

Understand essential Langchain concepts, including chains, prompts, and memory.

Practical Use Cases

Explore real-world applications of Langchain, such as chatbots, question-answering systems, and more.

Hugging Face

Model Hub

Discover Hugging Face's extensive model hub, offering a vast collection of pre-trained LLMs and other models.

Datasets

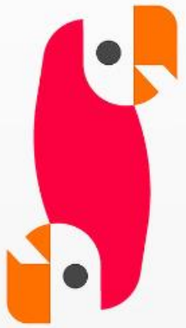
Access a wide range of high-quality datasets for training and evaluating generative AI models.

Community

Engage with the vibrant Hugging Face community to learn, collaborate, and share knowledge.

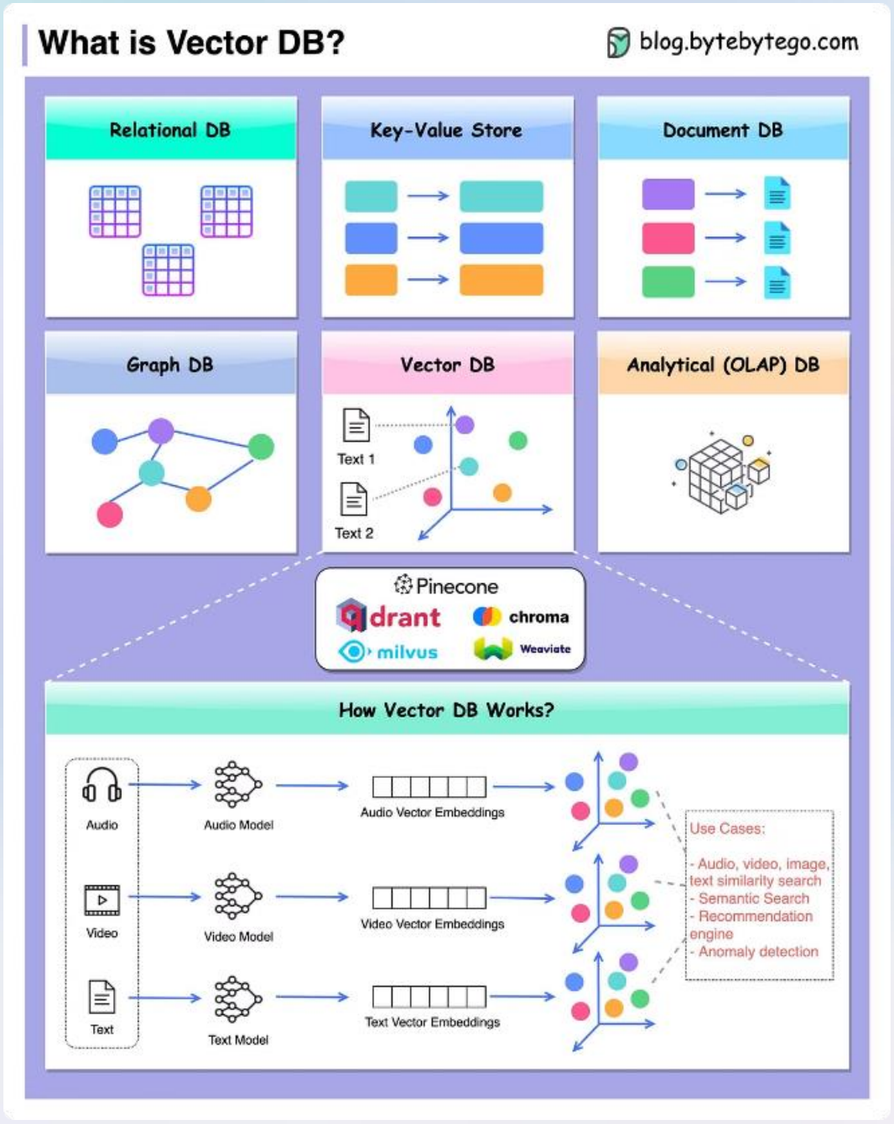
Tools

Utilize Hugging Face's tools for fine-tuning, inference, and deploying your generative AI models.



Langchain and Hugging Face

LangChain	Hugging Face
A framework for building applications with LLMs.	A community-driven platform for developing and sharing machine learning models.
Provides tools for connecting LLMs with external data sources.	Offers a vast library of pre-trained models, including LLMs, and makes it easy to use them in your applications.



Vector and Graph Databases

Vector Databases

Understand how vector databases store and retrieve data based on its semantic similarity, making them ideal for LLM applications.

Graph Databases

Learn about graph databases that represent data as nodes and edges, enabling efficient analysis of relationships between entities.

Knowledge Graphs

Explore the use of knowledge graphs, which store structured information about entities and their relationships, for enhancing LLM performance.

Vector and Graph Databases

Vector Databases	Graph Databases
Store data as vectors, enabling efficient similarity searches.	Represent data as nodes and edges, capturing relationships between entities.
Ideal for applications like recommendation systems and semantic search.	Suitable for tasks involving knowledge graphs, social network analysis, and fraud detection.

Fine-Tuning

1

Step 1: Data Preparation

Prepare and curate your training data, ensuring it's relevant and aligned with your desired output.

2

Step 2: Model Selection

Choose an appropriate base LLM or model architecture for your fine-tuning task.

3

Step 3: Training

Train the model on your specific data to adapt its behavior and improve its performance.

4

Step 4: Evaluation

Evaluate the fine-tuned model's performance using metrics relevant to your task.

Retrieval Augmented Generation (RAG)

1

Step 1: Retrieval

Retrieve relevant information from a knowledge base or external data source.

2

Step 2: Augmentation

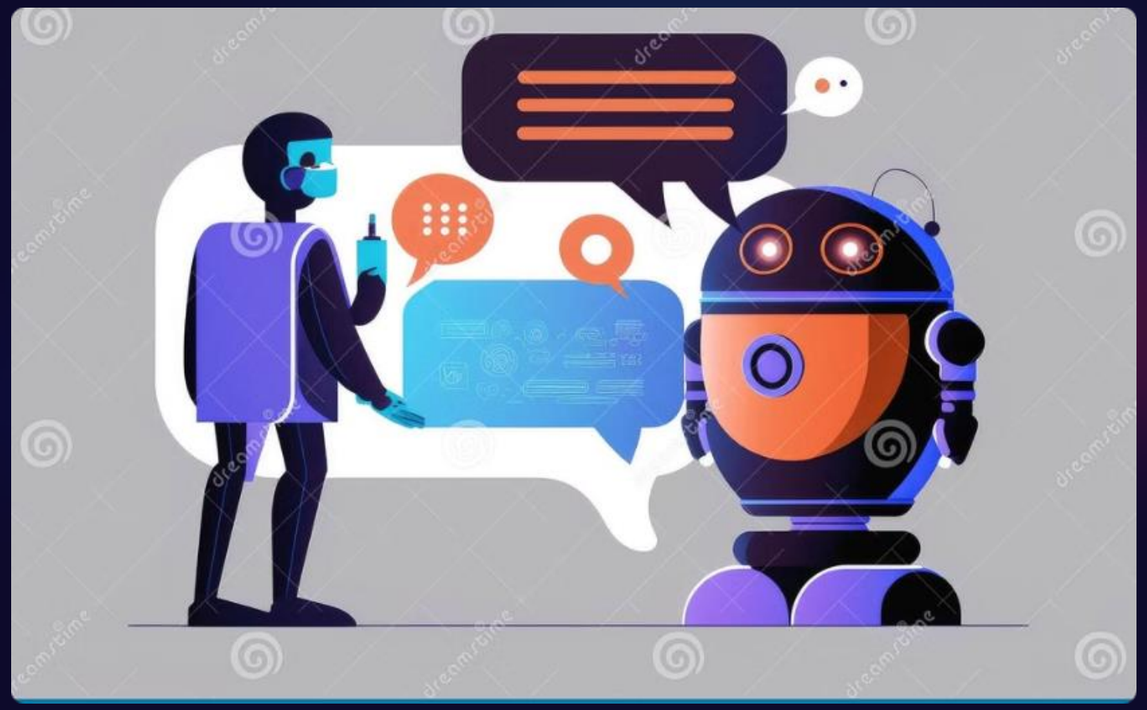
Augment the retrieved information with the input prompt or query.

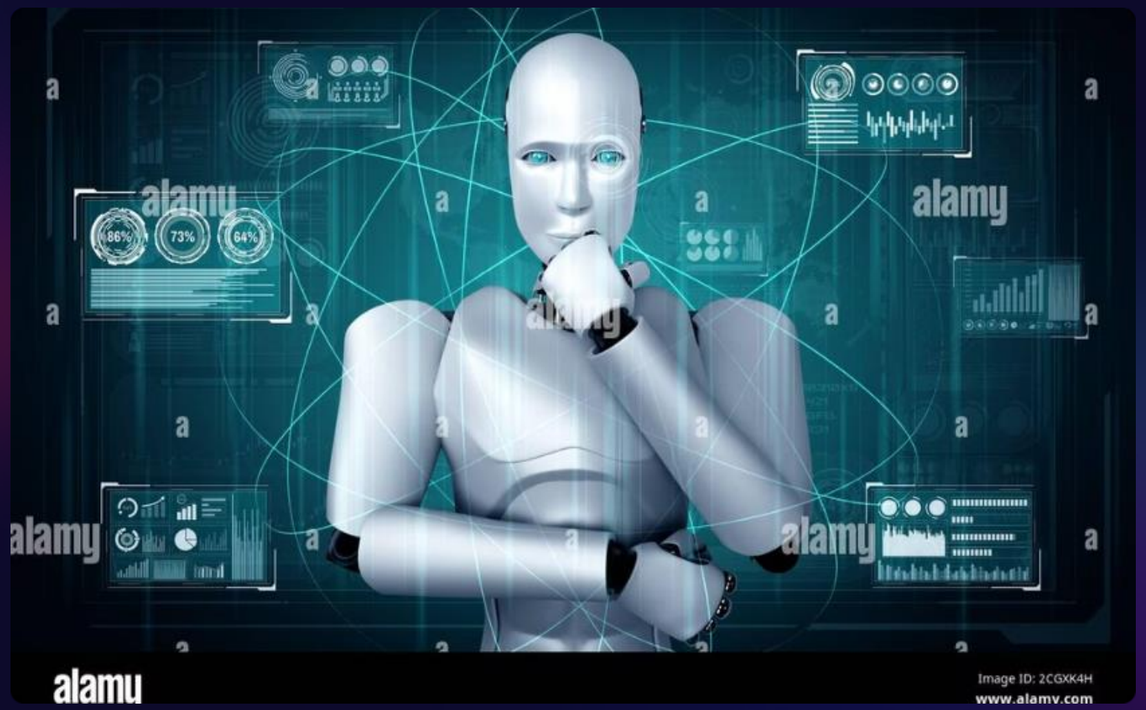
3

Step 3: Generation

Generate a comprehensive and informative response using the augmented information.

Reinforcement Learning from Human Feedback (RLHF)





Human Feedback

Collect human feedback on the model's responses to improve its alignment with human preferences.

Reinforcement Learning

Train the model using reinforcement learning techniques to maximize its performance based on human feedback.

Real-Time Projects

1 Chatbots

Build engaging and informative chatbots capable of carrying on natural conversations with users.

2 Content Generation

Create high-quality content, such as articles, blog posts, and social media updates, using generative AI models.

3 Translation

Develop accurate and fluent machine translation systems for diverse languages.

4 Code Generation

Utilize generative AI to assist in code development and accelerate the software development process.

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Thank you