



# Large Language Models

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## Why in News?

In the era of advanced [artificial intelligence \(AI\)](#), the emergence of [Large Language Models \(LLMs\)](#) has revolutionized the way computers interact with humans and process language. From enhancing virtual conversations to powering creative tasks, LLMs have paved the way for a new frontier in the realm of AI technology.

## What are Large Language Models (LLMs)?

- **Definition:**
  - LLMs are large general-purpose language models capable of solving common language problems such as text classification, question answering, and text generation.
  - These models are **trained on massive datasets to understand patterns**, structures, and relationships within human language.
- **Types of Large Language Models (LLMs)**
  - **Based on Architecture:**
    - **Autoregressive Models:** Predict the **next word in a sequence** based on previous words. **Example: GPT-3.**
    - **Transformer-based Models:** Utilise a specific **artificial neural network architecture** for language processing. Examples: **LaMDA, Gemini (formerly Bard).**
    - **Encoder-decoder Models:** Encode input text into a representation and then decode it into another language or format.
  - **Based on Training Data:**
    - **Pretrained and Fine-tuned Models:** Adapt to specific tasks through fine-tuning on particular datasets.
    - **Multilingual Models:** Capable of understanding and generating text in multiple languages.
    - **Domain-specific Models:** Trained on data related to specific domains like legal, finance, or healthcare.
  - **Based on Size and Availability:**
    - **Size:** Large models require more computational resources but offer better performance.
    - **Availability:** Open-source models are freely available, while closed-source models are proprietary.
      - **Examples of open-source LLMs:** LLaMA2, BLOOM, Google BERT, Falcon 180B, OPT-175 B.
      - **Examples of closed-source LLMs:** [GPT 3.5 by OpenAI](#), [Gemini by Google](#).
- **Operational Mechanisms of LLMs:**
  - At their core, LLMs utilize [deep learning techniques](#), to **predict the probability of words or sequences** given preceding text.
    - LLMs analyze patterns and relationships in data to predict the next word or sequence based on input prompts, akin to **how humans comprehend language**.
    - LLMs typically rely on [transformer models](#), such as the [Generative Pre-trained](#)

[Transformer \(GPT\)](#), with attention mechanisms for contextual understanding.

▪ **Applications of LLMs:**

- LLMs generate **human-like content**, from stories to songs, and act as virtual assistants, excelling in sentiment analysis, translation, and text summarization, crucial for marketing strategies.

▪ **Advantages of LLMs:**

- LLMs can adapt to various tasks and domains, leveraging their extensive training data to generalise patterns.
- They can perform well even with limited domain-specific data, thanks to their ability to learn from general language training datasets.
- As more data and parameters are added, LLMs **continuously enhance their performance**, making them valuable assets in evolving AI landscapes.

## What are Large Action Models (LAMs)?

- LAMs are **specialized AI models** built to perform specific **tasks or sequences of actions**, often beyond just understanding and generating text.
  - **LAMs** can understand human intention and predict actions. LAMs are designed to help with repetitive tasks.
- They are designed to execute **actions based on inputs, which may include text, images, or other forms of data.**
- LAMs can be used in various applications such as **virtual assistants, robotic systems, automated customer service**, and more.
  - **Example of LAM:** [Rabbit r1](#).
- These models are trained on **datasets that include both linguistic information and action-oriented data** to learn how to perform tasks based on given contexts.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### Prelims

**Q. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)**

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

**Select the correct answer using the code given below:**

- (a) 1, 2, 3 and 5 only
- (b) 1, 3 and 4 only
- (c) 2, 4 and 5 only
- (d) 1, 2, 3, 4 and 5

**Ans: (b)**

**Q 2. "The emergence of the Fourth Industrial Revolution (Digital Revolution) has initiated e-Governance as an integral part of government". Discuss. (2020)**

