Name : Jayesh Bhagyesh Gajbhar

Unity ID : jgajbha

**Answer 1**

**1. Artificial Intelligence (AI)**

**Definition:**

AI is the broad field of computer science focused on creating systems capable of performing tasks that typically require human intelligence. This includes tasks such as understanding natural language, recognizing patterns, problem-solving, and decision-making.

**Key Characteristics:**

• Encompasses a wide range of techniques and approaches.

• Includes both symbolic AI (rule-based systems) and subfields like machine learning and robotics.

**Example:**

AI includes expert systems, natural language processing (NLP), and autonomous vehicles.

**2. Machine Learning (ML)**

**Definition:**

ML is a subset of AI that involves teaching computers to learn from data. Instead of being explicitly programmed, ML algorithms identify patterns and make predictions or decisions based on data.

**Key Characteristics:**

• Requires a large amount of data for training.

• Includes supervised, unsupervised, and reinforcement learning.

**Example:**

Spam filters in email services use ML algorithms to detect and block unwanted messages.

**3. Deep Learning (DL)**

**Definition:**

DL is a subset of ML that uses neural networks with many layers (hence “deep”). It is particularly effective for tasks like image recognition, speech processing, and natural language understanding.

**Key Characteristics:**

• Requires vast amounts of data and computational power.

• Architectures include convolutional neural networks (CNNs) and recurrent neural networks (RNNs).

**Example:**

Image recognition systems in autonomous cars use DL to identify pedestrians and other objects on the road.

**4. Large Language Models (LLM)**

**Definition:**

LLMs are a type of deep learning model specifically designed for understanding and generating human language. They are trained on massive datasets of text to predict and generate coherent, contextually relevant text.

**Key Characteristics:**

• Often built on transformer architecture.

• Capable of performing a wide range of NLP tasks, such as translation, summarization, and question-answering.

**Example:**

OpenAI’s GPT-3 is a well-known LLM that can generate human-like text based on prompts.

**5. Generative AI**

**Definition:**

Generative AI refers to algorithms that can create new content, such as text, images, music, or videos. It often leverages techniques from DL, especially in models like Generative Adversarial Networks (GANs) and LLMs.

**Key Characteristics:**

• Focused on generating new, synthetic data that mimics real data.

• Can be used for creative tasks like art generation, text completion, or synthetic voice creation.

**Example:**

AI models that create realistic images of non-existent people or complete a sentence based on a given prompt are examples of generative AI.

**Summary of Differences:**

• **AI** is the broadest concept, encompassing any technology that mimics human intelligence.

• **ML** is a subset of AI that focuses on learning from data.

• **DL** is a more specific subset of ML that uses complex neural networks.

• **LLM** is a type of DL model specifically designed for language-related tasks.

• **Generative AI** is a branch of AI that focuses on creating new content, often leveraging DL techniques.

**Answer 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Developer** | **Architecture** | **Capabilities** | **Training Data** | **Key Features** | **Model Parameters** |
| GPT-3.5/4o | OpenAI | Transformer | Text generation, summarization, translation, coding, dialogue | Internet-scale data, books, articles, code | Advanced reasoning, coding, and multiturn dialogue capabilities | 1.8 trillion |
| Gemini | Google DeepMind | Transformer-based | Multimodal capabilities (text, image, etc.), natural language understanding | Large-scale datasets including text and images | Designed for synergy across various AI disciplines | 1 trillion + |
| LLaMA | Meta | Transformer | Text generation, research-focused tasks | Curated text data from diverse sources | Open weights available, fine-tunable for specific tasks | 70 billion |
| Claude v1.5 | Anthropic | Transformer | Dialogue, safe AI interactions, language comprehension | Text data with a focus on ethical considerations | Emphasizes safety, alignment, and responsible AI use | 137 billion |
| **Gemma2** | Meta | Transformer-based | Language understanding, summarization, general NLP tasks | Large-scale text data | Combines features from LLaMA and other models, focus on efficiency and safety | 9 billion |
| Mistral | Mistral AI | Transformer | Text generation, reasoning, creative writing | Text data from diverse domains | Efficient, smaller model architecture, focuses on European languages | 7 billion |
| Qwen2 | Alibaba Cloud | Transformer-based | Multimodal (text, image, speech), dialogue systems, natural language generation | Internet-scale data, enterprise-specific datasets | Designed for business applications, strong in multilingual tasks | 72 billion |
| Phi3 | Google Deepmind | Transformer-based | Text completion, summarization, dialogue, coding | Broad dataset including code, text | Specialized in coherent text generation, built on advanced deep learning techniques | 8 billion |
| **PaLM** | Google Research | Transformer-based | Text generation, reasoning, language comprehension | Diverse internet-scale text data | Multitask learning, supports reasoning and code generation | 540 billion |
| **Falcon** | TII (Technology Innovation Institute) | Transformer | Text generation, translation, summarization, dialogue | Curated datasets from diverse internet sources | Open weights available, fine-tuned for multilingual and creative tasks | 40 billion |

**Answer 3**

**3 Major Points from Eric Schmidt’s Speech:**

1. **The Role of AI in Society:**

Eric Schmidt emphasizes the transformative impact of AI on various sectors, including healthcare, education, and economics. He argues that AI is not just a technological advancement but a societal change that will redefine how we live and work. AI’s ability to process and analyze vast amounts of data has the potential to revolutionize decision-making processes and solve complex global challenges.

2. **Ethical Considerations and AI Governance:**

Schmidt discusses the importance of ethical frameworks and governance structures in the development and deployment of AI technologies. He stresses that while AI offers enormous benefits, it also poses risks, particularly in areas like privacy, bias, and security. He calls for responsible AI development, where ethical considerations are integrated from the outset, and governance frameworks are established to ensure AI benefits society as a whole.

3. **The Need for Collaboration Between Public and Private Sectors:**

Schmidt highlights the importance of collaboration between governments, academia, and the private sector in advancing AI research and development. He believes that innovation in AI requires not just technological expertise but also policy-making, regulatory support, and societal acceptance. He advocates for a collaborative approach to harness the full potential of AI while addressing its challenges.

**Question:**

• **How can global governance frameworks be effectively implemented to manage the ethical challenges posed by AI, especially in countries with differing regulations and societal values?**

This question arises from Schmidt’s emphasis on the need for ethical AI governance and the challenges that come with implementing these frameworks globally, considering the diverse regulatory environments and cultural values around the world.

**Answer 4**

Colab Notebook link:

<https://colab.research.google.com/drive/1aApMSoZtZxvFdIjD46oSw80UmLSAcdAl?usp=sharing>