AIML Lecture 2 MCQ

1. Generative vs Predictive/Discriminative AI

1. **Medium:** Which characteristic best defines Generative AI?
   a) Specific Outcome
   b) **Brand New Content**
   c) Pre-defined Results
   d) Classification of Data

2. **Medium:** Predictive AI is primarily concerned with:
   a) Creating novel art pieces
   b) Generating new text formats
   c) **Producing a specific outcome**
   d) Developing new algorithms

3. **Hard:** A model designed to categorize emails as 'spam' or 'not spam' would primarily fall under which AI category?
   a) Generative AI
   b) **Predictive AI/Discriminative AI**
   c) Reasoning Model
   d) Diffusion Model

4. **Medium:** What type of AI is used when an application creates a unique musical composition?
   a) Predictive AI
   b) Discriminative AI
   c) **Generative AI**
   d) Classification AI

5. **Hard:** The fundamental difference between Generative AI and Predictive AI lies in:
   a) The scale of data they process
   b) Their ability to learn from feedback
   c) **Whether they produce novel outputs or specific, pre-determined outcomes**
   d) The type of neural network architecture they employ

2. AI/ML Application Suitability

1. **Medium:** According to the lecture, which of the following problems is *better suited* for AI/ML applications?
   a) Calculating the salary of an employee
   b) Launching rockets
   c) **Generating Music, Art**
   d) Calculating grades in a school examination

2. **Medium:** Predicting next week's vegetable prices is listed as a problem better suited for AI/ML applications. This is an example of what kind of AI task?
   a) Generative
   b) Reasoning
   c) **Predictive**
   d) Discriminative

3. **Hard:** Based on the implied context of the "problems better suited for AI/ML applications" section, which of the following tasks would typically *not* be considered "better suited" for AI/ML compared to direct calculation?
   a) Converting handwritten text to printed text
   b) Checking grammar
   c) **Calculating grades in a school examination**
   d) Generating music

4. **Medium:** Converting handwritten text to printed text is identified as an appropriate problem for AI/ML due to its nature of:
   a) Simple arithmetic
   b) **Pattern recognition and transformation**
   c) Deterministic computation
   d) Manual data entry

5. **Hard:** If a task involves complex pattern recognition, prediction, or creation of new content, it is generally considered _____ for AI/ML applications.
   a) poorly suited
   b) **better suited**
   c) irrelevant
   d) impossible

3. Neural Networks & LLM Architecture

1. **Medium:** Modern Large Language Models (LLMs) primarily utilize which architecture?
   a) Recurrent Neural Network (RNN)
   b) Convolutional Neural Network (CNN)
   c) **Transformer Architecture**
   d) Multilayer Perceptron (MLP)

2. **Medium:** The Transformer Architecture, crucial for modern LLMs, was introduced by Google in what year?
   a) 2015
   b) **2017**
   c) 2019
   d) 2021

3. **Hard:** The research paper that introduced the Transformer Architecture is titled:
   a) "Neural Networks for Language Understanding"
   b) "The Dawn of Large Language Models"
   c) **"Attention is all you need"**
   d) "Transformers: A New Era of AI"

4. **Medium:** ChatGPT is categorized as what type of model in the context of LLM architectures?
   a) Auto-encoding Model
   b) **Auto-regressive Model**
   c) Discriminative Model
   d) Multimodal Model

5. **Hard:** Which of the following models is specifically mentioned as an Auto-encoding Model in the context of LLM architectures?
   a) ChatGPT
   b) GPT-4
   c) **Gemini**
   d) LLaMA

4. Reasoning Models

1. **Medium:** Reasoning models are described as large language models trained with:

a) Supervised learning
b) Unsupervised learning
c) **Reinforcement learning**
d) Semi-supervised learning

2. **Medium:** What is a key characteristic of reasoning models when responding to a user?
a) They provide instant answers without internal processing.
b) **They produce a long internal chain of thought before responding.**
c) They prioritize speed over accuracy.
d) They only respond to simple, factual queries.

3. **Hard:** Reasoning models excel in which of the following areas?
a) Simple data retrieval
b) Basic arithmetic calculations
c) **Complex problem solving, coding, and multi-step planning**
d) Generating short, creative texts

4. **Medium:** Which of the following is listed as an example of a reasoning model?
a) GPT-4o
b) Claude 2
c) **Gemini 1.5 Deep Research**
d) LLaMA

5. **Hard:** Agentic workflows are specifically highlighted as an area where reasoning models excel due to their capability in:
a) High-volume data processing
b) Efficient data storage
c) **Multi-step planning**
d) Real-time information updates

5. GenAI for Education

1. **Medium:** Using chatbots with a Socrative Approach is suggested as a way to utilize GenAI for:
a) Automated grading
b) **Learning**
c) Content moderation
d) Administrative tasks

2. **Medium:** Which of the following is a direct use case of Generative AI as a learning tool, as per the lecture?
   a) Directly providing all answers to homework.
   b) **Generating FAQs and summaries of subject content.**
   c) Replacing traditional textbooks entirely.
   d) Automatically writing research papers for students.

3. **Hard:** When preparing for exams, GenAI can assist students by:
   a) Directly providing certified answers to past papers.
   b) **Generating questions and allowing students to answer them.**
   c) Predicting exam scores based on study habits.
   d) Replicating the exam environment with real-time proctoring.

4. **Medium:** The lecture suggests using GenAI as a personalized AI assistant for:
   a) Task automation
   b) **Brainstorming ideas**
   c) Financial planning
   d) Social media management

5. **Hard:** A key benefit of using Generative AI in education through a Socrative Approach is to:
   a) Deliver definitive solutions to complex problems.
   b) **Encourage critical thinking and active learning.**
   c) Reduce the need for human instructors.
   d) Standardize learning outcomes across all students.

6. Ethical/Learning Considerations with GenAI

1. **Medium:** According to the lecture, why shouldn't you use ChatGPT just to get answers?
   a) It is often incorrect.
   b) **It makes your brain less active, hindering learning.**
   c) It is too slow for quick answers.
   d) It might be unavailable.

2. **Medium:** What happens to brain activity when you don't think for yourself and rely on AI for answers?
   a) It increases.
   b) It remains constant.

c) **It drops.**

d) It becomes more focused.

3. **Hard:** The lecture states that "University is about learning how to think, not just finding answers." This statement emphasizes:
a) The limitations of AI in academic settings.
b) **The importance of developing critical thinking skills over rote memorization.**
c) The necessity of using AI for all research tasks.
d) The superiority of human intelligence over AI.

4. **Medium:** Thinking actively is crucial for building:
a) Faster typing speed.
b) **Memory and real understanding.**
c) Social connections.
d) Computational efficiency.

5. **Hard:** The overall advice regarding using AI for learning is to:
a) Let AI do all the work for you.
b) **Use AI to guide you—not to do the work for you.**
c) Avoid AI altogether in academic settings.
d) Rely solely on AI for generating all course content.

7. Developing GenAI Applications (API Calls)

1. **Medium:** The provided example of a "Normal API call" demonstrates how to fetch data from a:
a) Database server
b) Local file system
c) **Weather service**
d) Machine learning model

2. **Medium:** When calling an LLM like `gpt-4` to develop an application, what parameter in the `messages` list is used to define the AI's persona or role?
a) `model`
b) `role: "system"`
c) `api_key`
d) `content`

3. **Hard:** In the OpenAI `ChatCompletion.create` call example, the `messages` parameter is a list of dictionaries. What is the primary purpose of the dictionary with `role: "user"` ?
   a) To specify the model to be used.
   b) To set the system's overall behavior.
   c) **To provide the human user's input or query to the model.**
   d) To indicate the API key for authentication.

4. **Medium:** What does the `openai.api_key` variable store in the provided LLM application development example?
   a) The name of the AI model.
   b) **The authentication credential for accessing the OpenAI API.**
   c) The default response for the AI assistant.
   d) The user's query.

5. **Hard:** Which Python library is imported at the beginning of the example demonstrating how to call an LLM to develop an application?
   a) `requests`
   b) `json`
   c) **`openai`**
   d) `transformers`

8. Open vs. Closed Models

1. **Medium:** Which characteristic is typical of Open Models?
   a) Proprietary and controlled access
   b) Trained on large private datasets
   c) **Publicly available weights and code**
   d) Developed by xAI exclusively

2. **Medium:** GPT-4 is listed as an example of what type of model?
   a) Open Model
   b) **Closed Model**
   c) Foundation Model
   d) Small Language Model

3. **Hard:** The benefit of "community-driven improvement" is associated with which type of AI model?
   a) Closed Models

b) Proprietary Models

c) **Open Models**

d) Reasoning Models

4. **Medium:** Which of the following is an example of an Open Model?
   a) Claude 3
   b) Gemini
   c) **LLaMA**
   d) Grok

5. **Hard:** What distinguishes Closed Models regarding their training data?
   a) They are primarily trained on publicly available datasets.
   b) **They are trained on large private datasets.**
   c) They do not require extensive training data.
   d) Their training data is open source.

9. Hugging Face (Functionality & Benefits)

1. **Medium:** Hugging Face is primarily focused on which areas?
   a) Hardware manufacturing
   b) **AI/NLP**
   c) Quantum computing
   d) Network infrastructure

2. **Medium:** What does the Hugging Face "Model Hub" offer?
   a) Training services for custom models.
   b) **Thousands of pre-trained models for direct use.**
   c) Physical storage for AI hardware.
   d) Consulting services for AI ethics.

3. **Hard:** Which of the following is *not* listed as a direct benefit or feature of using Hugging Face for AI development?
   a) No need to train models from scratch.
   b) **Guaranteed real-time inference without any cost.**
   c) Time-saving with pre-built models.
   d) Large, active community.

4. **Medium:** The 🤗 Transformers Library from Hugging Face provides access to:
   a) Data visualization tools.
   b) **Top AI models.**

c) Operating system kernels.

d) Cloud computing instances.

5. **Hard:** To host machine learning applications using Gradio or Streamlit on Hugging Face, one would typically use:
a) The Model Hub
b) The Datasets feature
c) **Spaces**
d) The Inference API

10. Core Definitions (Model, Foundation Model, LLM, Multimodal)

1. **Medium:** In machine learning, a model is described as:
a) A type of database.
b) **A brain made of math.**
c) A software compiler.
d) A hardware component.

2. **Medium:** What defines a Foundation Model?
a) It specializes in a single, narrow task.
b) It is a small model trained on limited data.
c) **It is a large pre-trained model designed for broad general-purpose tasks.**
d) It is an untrained model used for initial experiments.

3. **Hard:** Which of the following is *not* explicitly mentioned as an example of a Foundation Model, but rather as a product of distillation?
a) GPT
b) PaLM
c) LLaMA
d) **DistilBERT**

4. **Medium:** Large Language Models (LLMs) are a type of Foundation Model primarily focused on:
a) Image recognition tasks.
b) Audio processing.
c) **Text-based tasks.**
d) Video generation.

5. **Hard:** A model capable of handling multiple data types like text, image, audio, and video is known as a:

a) Foundation Model
b) Large Language Model
c) **Multimodal Model**
d) Discriminative Model

11. Parameters (Definition, Significance, Examples)

1. **Medium:** What are "parameters" in the context of a machine learning model?
   a) The input data provided to the model.
   b) The fixed rules programmed into the model.
   c) **The parts of the model that it learns during training.**
   d) The output generated by the model.

2. **Medium:** How many parameters does GPT-3 have?
   a) 10 million
   b) **175 billion**
   c) 1 billion
   d) 100 trillion

3. **Hard:** Why do parameters matter in a model?
   a) They determine the speed of inference.
   b) **More parameters generally mean more knowledge and capacity to learn patterns.**
   c) They define the model's architecture.
   d) They control the cost of training.

4. **Medium:** The lecture refers to parameters as the '_____ of the model'.
   a) brain
   b) **memory**
   c) processor
   d) interface

5. **Hard:** If a small model has 10 million parameters, and another model has 175 billion parameters, what is the most likely implication regarding their capabilities?
   a) The smaller model is always faster.
   b) **The larger model (175 billion parameters) likely has a greater capacity to learn and store complex patterns.**

c) The number of parameters has no bearing on learning capacity.

d) The smaller model requires more computational resources for training.

12. Context Window (Definition, Importance, Comparisons)

1. **Medium:** The context window of a language model is analogous to its:
   a) Long-term memory
   b) **Short-term memory**
   c) Processing unit
   d) Output buffer

2. **Medium:** How is the context window of a language model measured?
   a) In bytes of data.
   b) In words, approximately.
   c) **In tokens, roughly 1 token = ¾ of a word.**
   d) In seconds of processing time.

3. **Hard:** Why is the context window essential for complex reasoning and coding tasks?
   a) It speeds up the model's response time.
   b) **It allows the model to consider a larger amount of previous input, critical for understanding complex relationships.**
   c) It reduces the computational cost.
   d) It simplifies the model's architecture.

4. **Medium:** Which model, among those listed, boasts the largest context window of 10 million tokens?
   a) GPT-3.5
   b) GPT-4 (Turbo)
   c) Gemini 1.5
   d) **LLaMA 4**

5. **Hard:** A model's ability to accurately summarize a very long document is directly impacted by its:
   a) Inference speed.
   b) Number of parameters.
   c) **Context window size.**
   d) Training data diversity.

13. Training & Inference (Process, Differences)

1. **Medium:** What is the primary purpose of "training" a machine learning model?
   a) To deploy it to end-users.
   b) **To make it learn and adjust its parameters to reduce mistakes.**
   c) To convert its output to a human-readable format.
   d) To evaluate its performance on unseen data.

2. **Medium:** Training a model typically requires:
   a) Minimal computational resources.
   b) **Powerful hardware like GPUs or TPUs.**
   c) Only small datasets.
   d) Seconds of computation.

3. **Hard:** Which statement accurately describes the relationship between training and inference?
   a) Training is faster and cheaper than inference.
   b) Inference is the process of learning, while training is using the learned model.
   c) **Training is how a model learns, while inference is using a trained model to get predictions, and inference is much faster.**
   d) Both training and inference are done on user's phones simultaneously.

4. **Medium:** When a trained model is used to get predictions, this process is called:
   a) Fine-tuning
   b) Distillation
   c) Training
   d) **Inference**

5. **Hard:** The statement "Training is expensive" primarily refers to the cost in terms of:
   a) Licensing fees for the model.
   b) **Massive datasets, powerful hardware, and weeks/months of computation.**
   c) Maintenance of the model after deployment.
   d) User support and feedback collection.

14. Fine-tuning & Distillation (Definition, Purpose, Examples)

1. **Medium:** What is the main goal of "fine-tuning" a pre-trained model?
   a) To simplify its architecture.
   b) **To train it on a specific task for better performance or customized behavior.**
   c) To increase its overall size.
   d) To make it completely unlearn previous knowledge.

2. **Medium:** Which tool is explicitly mentioned for fine-tuning models?
   a) TensorFlow Lite
   b) OpenCV
   c) **Hugging Face**
   d) Scikit-learn

3. **Hard:** The process of "distillation" aims to compress a large model into a smaller one. What is the primary benefit of this?
   a) To make the smaller model more accurate than the original large model.
   b) **To enable faster, lighter, and cheaper deployment, especially on edge and mobile devices.**
   c) To allow the smaller model to handle more data types.
   d) To make the model's parameters publicly available.

4. **Medium:** DistilBERT is cited as an example of a model that has undergone:
   a) Fine-tuning
   b) Pre-training
   c) **Distillation**
   d) Reinforcement learning

5. **Hard:** A company wants to deploy a large language model on mobile phones with limited computational resources. Which technique would be most appropriate to achieve this while retaining much of the original model's performance?
   a) Increase the number of parameters.
   b) Use a larger context window.
   c) **Apply distillation.**
   d) Train it from scratch on the mobile device.

15. Small Language Models (SLMs) (Definition, Examples, Use Cases)

1. **Medium:** Small Language Models (SLMs) are optimized for:
   a) Maximum parameter count.
   b) **Speed and efficiency.**
   c) Handling multiple languages simultaneously.
   d) Complex reasoning tasks only.

2. **Medium:** Which of the following is listed as an example of an SLM?
   a) GPT-4
   b) Gemini 1.5
   c) **Mistral 7B**
   d) Claude 3

3. **Hard:** In what kind of environments are SLMs particularly useful?
   a) High-resource cloud computing environments.
   b) Data centers with unlimited power.
   c) **Low-resource environments requiring fast inference.**
   d) Environments requiring maximum context window.

4. **Medium:** Phi-2 is an example of what type of model?
   a) Large Language Model (LLM)
   b) Multimodal Model
   c) **Small Language Model (SLM)**
   d) Reasoning Model

5. **Hard:** Why would a developer typically choose an SLM over a much larger LLM for a specific application?
   a) SLMs offer superior accuracy on all tasks.
   b) SLMs are better for tasks requiring extensive context windows.
   c) **SLMs are preferred for deployment where speed, efficiency, and lower resource consumption are critical.**
   d) SLMs are the only models capable of generating new content.