AI-900: AI Fundamentals

# Core Exam Topics

1. Describe Artificial Intelligence workloads and considerations (15–20%)
2. Describe fundamental principles of machine learning on Azure (15–20%)
3. Describe features of computer vision workloads on Azure (15–20%)
4. Describe features of Natural Language Processing (NLP) workloads on Azure (15–20%)
5. Describe features of generative AI workloads on Azure (20–25%)

Module 1: Introduction to AI

# Generative AI (Gen-AI)

* A Branch AI which enables apps to generate new content; **often** natural language dialogs, but also images, video, code, and other formats.
  + Uses a language model which is trained with data from Internet or Public Sources
    - Types of models:
      * Large language models (LLMs) and small language models (SLMs)
        + Based on the volume of data and the number of variables in the model.
* Use Cases:
  + Implementing chatbots and AI agents that assist human users.
  + Creating new documents or other content (often as a starting point for further iterative development)
  + Automated translation of text between languages.
  + Summarizing or explaining complex documents.

# Computer Vision

* Use of large # of images to train a model
  + Image Classification = identifying unlabelled images by training on images with metadata labels
  + Object detection = Training model for AI to identify location of objects IN an image
  + Semantic Segmentation = AI can identify individual pixels in an image to class them
* Use Cases:
  + Auto-captioning or tag-generation for photographs.
  + Visual search.
  + Monitoring stock levels or identifying items for checkout in retail scenarios.
  + Security video monitoring.
  + Authentication through facial recognition.
  + Robotics and self-driving vehicles.

# Speech

* Speech recognition = AI’s ability to "hear"/interpret speech (speech-to-text)
* Speech synthesis = AI’s ability to vocalize words as spoken language (text-to-speech)
* Other use cases like: ignoring background noise, detecting interruptions, and generating increasingly expressive and human-like voices.
* Use Cases:
  + Personal AI assistants in phones, computers
  + Automated transcription of calls or meetings.
  + Automating audio descriptions of video or text.
  + Automated speech translation between languages.

# Natural Language Processing (NLP)

* Common NLP tasks:
  + *Entity extraction* – id mentions of entities (**ex**. people, places, organizations in a document)
  + *Text classification* – assign document to a category.
  + *Sentiment (opinion) analysis* – check if body of text is positive, negative, or neutral and inferring opinions.
  + *Language detection* – id the language of the text.
* Use Cases:
  + Analyze docs or meeting transcripts to find key subjects and mentions of entities
  + Analyze Social Media posts, reviews, to check opinions
  + Implementing chatbots to answer FAQs or generate conversational dialogs

# Extract data optical character recognition (OCR).

* A Computer Vision technology called *Optical Character Recognition* (OCR) model can id the location of text in an image and even interpret individual values in the document to extract specific fields.
* Use Case:
  + Automated processing of forms and other documents in a business process
  + Large-scale digitization of data from paper forms
  + Indexing documents for search.
  + Identifying key points and follow-up actions from meeting transcripts or recordings.

# Responsible AI

* **Fairness**
  + Ensure that AI models are trained using data sets that may contain unconscious biases.
* **Reliability and safety**
  + AI is based on probabilistic models, it is not infallible with some risk.
* **Privacy and security**
  + Ensure that the training data is kept secure, and don’t reveal private personal data.
* **Inclusiveness**:
  + Ensure AI is available to everyone.
* **Transparency**:
  + Ensure users are aware of how the AI system works and any potential limitations it may have.
* **Accountability**
  + People and orgs that develop AI solutions are accountable for their actions.