Azure AI 102 Notes

Exam Contents

I. Plan and manage an Azure AI Solution
II. Implement Computer Vision Solutions
III. Implement NLP Solutions
IV. Implement GenAI Solutions - Azure Open AI and Other Models
V. Implement Knowledge Mining and Info Extraction

Appropriate Azure Solutions

1. Computer Visions
2. NLP - Text Analytics and Language Understanding
3. Decision Support - Azure ML Studio & Azure Databricks
4. Speech
5. Document Intelligence - Text Analytics & Azure AI Document Intelligence
6. Generative AI - Azure Open AI
7. Knowledge Mining - Azure Databricks and Text Analytics

Responsible AI Principles

1. Fairness - evaluate and mitigate bias from data and algorithm
2. Transparency - explain how the AI model works and decisions are made
3. Accountability - define clear ownership and responsibility
4. Privacy - anonymize and encrypt data
5. Reliability and Security - ensure the AI model is robust

Create an Azure AI Resource

- Choose the appropriate service from the Azure AI offerings
- Set up the resource by configuring the required parameters and connecting to the storage accounts
- Follow any other best practices

Plan, Create, and Deploy Azure AI Service

- Determine a default endpoint using tools like Azure Portal, CLI, or SDKs
- Integrate Azure AI into a CI/CD pipeline by using tools like Azure DevOps, Logic Apps, or custom scripts to build and deploy ML Models
- Plan and implement a container deployment using Docker Containers, ACI, AKS

Manage, monitor, and secure AI Service

1. Configure diagnostic logging
   Enable diagnostic logic by choosing a category and specify the storage destination, such as Azure Storage Account, Log Analytics workspace

2. Monitor an Azure AI resource
   Keep track of performance, health, and usage by using Azure Portal, Azure Monitor, resource specific dashboard

3. Manage Cost for Azure AI service

Manage, monitor, and secure AI Service

4. Manage Account Keys and protect keys by using Azure Key Vault

5. Manage authentication for an Azure AI Service resource by using Azure AD for fine-grained access control or API keys or tokens

6. Manage private connection by securing communication between resources within VN or using private endpoints

Create decision support solutions for data monitoring and content delivery

1. Implement a data monitoring solution with Azure AI Metrics Advisor
   - Metrics Advisor analyzes incoming data in real time detecting anomalies
2. Implement a text moderation solution with Azure AI Content Safety
   - Azure AI Content Safety scans input text based on the filters set up
3. Implement an image moderation solution with Azure AI Content Safety

Image Analysis Features in an Image Process Req.

1. Select appropriate features: Azure Computer Vision API vs Custom Vision
2. Specify features in request
   - Use API or SDK, provide image url or binary data, or customize settings
3. JSON Response
   - JSON response contains overall request status, individual feature results, error message (if applicable)
4. Understand feature response
   - Object Detection uses bounding box, labels, confidence scores,
   - OCR - text extraction, bounding boxes, confidence
   - Image Tagging - relevant tags, confidence scores
   - Face detection - bounding boxes, attributes

Extract Text from Images with Azure AI

1. Upload image to Azure using methods, like REST API, SDKs, Azure Portal
2. Utilize Azure AI Vision Text Recognition API within Azure AI Vision
3. The API returns text as structured data including: recognized text, info about the location and bounding boxes of each text within the image, confidence score
4. Integrate the extracted text, such as populating text fields in forms, indexing the text for search purposes, analyze and understand the context of the extracted text

Converting Handwritten Text with Azure AI

1. Fine tune for handwritten text
2. Train the custom model using Custom Vision service
3. Utilize ink recognition feature

Analyze Videos in Azure AI

1. Azure AI Video Indexer - extracts various insights from videos, such as scenes and shots, entities (people, places, and organizations), keywords & concepts, transcripts and captions, and custom insights

   Use Case - video search and navigation, content moderation
2. Azure AI Vision Spatial Analysis - analyze video recordings to detect human presence and movement, such as people counting, heatmaps, crowd analysis, line crossing detection

Analyze Text By Using Azure AI Language

- Extract Key Phrases, such as frequency analysis, statistical methods, keyword extraction
- Extract entities
- Determine the sentiment of text by using Lexicon analysis, machine learning models, rule based systems
- Detect the language used in text by using character n gram analysis, word n gram analysis, or machine learning models
- Detect PII by using regular expression, rule based systems, or ML models

Process speech by using Azure AI Speech

- Implement text to speech written text into spoken audio
- Implement speech to text - audio into written text
- Improve text to speech with SSML
- Implement custom speech solutions \
- Implement intent recognition by identifying user’s intention behind their spoken words
- Implement keyword recognition by finding keywords or phrases with spoken language

Translate Language

- Translate Text and Doc. with Azure AI Translator
  Azure AI Translator uses ML to translate text and documents through REST APIs or SDKs
- Implement Custom Translation
- Speech to Speech Translation with Azure AI Speech
  Can integrate the app using SDKs or speech APIs
- Speech to Text Translation with Azure AI Speech
- Translate to Multiple Language Simultaneously

Intents, Utterances, Entities

- Intents
  Represents the user’s goal or intention behind their utterances
- Utterances
  Various ways a user might express those intents in NL
- Entities
  Represent key info from utterances, such as names, dates, locations

Creating intents and adding utterances

1. Identify key intents
   What actions or info do users want?
2. Group similar utterances
   Collect examples of similar intents
3. Consider variations
   Think about different phrase, synonyms, misspelling, and slang
4. Add utterances to intents
   Build a comprehensive set of examples for each intent

Creating Entities

1. Define entity types - the type of info that is relevant
2. Specify entity roles
3. Provide Examples

Optimize A Language Understanding Model

1. Add more training data to improve accuracy and coverage
2. Adjust model parameters by fine tuning hyperparameters to optimize performance
3. Apply feature engineering
4. Experiment with different algorithms
5.

Use Azure Open AI Service

1. Provision an Azure Open AI Service resource

1. Access the Azure Portal
2. Search for Azure Open AI Service and create a new resource
3. Select a subscription, resource group, and region for deployment
4. Provide necessary info including name for the resource
5. Review and agree to the terms of usage
6. Create the resource

2. Select and deploy Azure Open AI Model

1. Access the Azure OpenAI Service resource
2. Choose from available models
3. Consider factors like model capabilities, cost, and latency
4. Deploy the chosen model

3. Submit the prompts

1. Use the Azure Open AI Service REst APIs
2. Use Azure Open AI Service SDKs
3. Provide a prompt to guide the model’s text generation

4. Submit prompts to generate code

1. Use the Rest APIs or SDKs
2. Provide a prompt that specifies the desired output

Optimize Gen AI

- Configure param to control behavior
  - Temperature - higher the temp more creative
  - Response length - desired length of generated text
  - Top P - filters out less likely, potentially repetitive text sequences
  - Stop Sequences - define phrase to stop generating text
- Apply prompt engineering
  - Define the task within the prompt
  - Provide examples
  - Use keywords or phrases for desired output
  - Break down complex prompt into manageable steps
- Fine tune Open AI Model