aRt Verse
ART • SCIENCE • NATURE

Compiled by Dr T Oberholster
AI-900 version: October 2021

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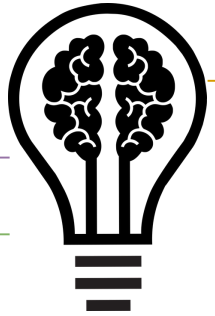

Azure AI Services

AI and ML

Bot Services

MS ML Services

Artificial Intelligence

- Uses complex computer algorithms to process and gain insights from large amounts of data

Machine Learning

- Data science technique that uses existing data to forecast future events and/or outcomes and/or trends

Resposible AI

- Ensures the provisioning of solutions and minimise unintended negative consequences
  - Fairness
  - Reliability & safety
  - Privacy & Security
  - Inclusiveness
  - Transparency
  - Accountability

ML as a Service

- Platform for making predictions
- Tools & Services:
  - Define data sources
  - Create pipelines
  - Connect & train models
  - Deploy with API
- Automated model generation & tuning
- Start on local machine & scale out to cloud

ML models

- Develop, train, test & deploy
- Open source tech:
  - Python
  - Jupiter
  - Visual Studio Code
  - Docker
- Automated model generation & tuning
- Start on local machine & scale out to cloud

ML models uses

- Make apps & devices smarter
- Azure Cognitive Services

- Uses Cognitive Services to interact with humans as virtual agents (bots) that understand/reply to questions
- Best for simple, repetitive tasks on websites (book reservations or retrieve information)
- Dialogs through website, email, social media, messaging, phone calls and other channels
- Customer product/services, reservation systems, health care consultants, home automation

- **MS AZ Computer Vision**
  - **QnA Maker Service**
    - Build a knowledge base of question-and-answer pairs, usually with built-in NLP for multiple phrased examples but same semantic meaning.
  - **Azure Bot Service**
    - Develop, publish, and manage bots.
    - Bot Framework to create bot, manage with Bot Service and integrate QnA/LUIS for interactions.

MS AZ AutoML

- No-code ML as a service
- AutoML to build and operate ML solutions in the cloud
- Prepare data, train models, publish predictive services, and monitor their usage.
- Increase data scientist efficiency by automating time consuming processes
- Scale solutions for large volumes of data with pay-as-you-use costs
- Automate time insensitive tasks
- Can add custom code when required (Azure Machine Learning Python SDK)

MS AZ Machine Learning Designer

- Notebooks
  - Write and run code in managed Jupyter Notebook servers.
- Azure ML designer
  - Train and deploy machine learning models without writing any code.
  - Drag and drop datasets and components to create ML pipelines.
- Azure AutoML GUI
  - Create automated ML experiments with an easy-to-use interface.
- Data labellling:
  - Efficiently coordinate image labeling or text labeling projects.

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Cognitive Services Summary

- Pre-trained AI models
- **Vision:** Analyse context of Images & videos
- **Speech:** Convert spoken language into text and vice versa
- **Language:** Understand meaning of text
- **Knowledge:** Create resources for apps
- **Search:** Web scale, add free search engine for apps

Azure Computer Vision

- **MS AZ Computer Vision**
  - Analyse images/videos
  - Extract/Create tags, objects, text & descriptions
  - No ML expertise required
- **MS AZ Custom Vision**
  - Train custom image classification and/or object detection models with own images
- **MS AZ Face**
  - Build facial detection and recognition solutions
- **MS AZ Form Recognizer**
  - Extract information from scanned forms and invoices

Image Classification

- Model recognizes individual objects in an image
- Class of each object in image
- Probability score of classification (confidence of prediction)
- Coordinate bounding box for each object
- Similar to tagging
- Determine multiple instances of same object

- **MS AZ Computer Vision**
  - Subset of Analyze Image of Computer Vision
  - **Detect API**
    - Applies tags in images
  - **Tag API**
    - Include contextual terms (i.e., indoors)

Object Detection

- Models predict category/class of object
- Set of inputs (features) to predict labels with probability scores
- Trained on pixel values (feautres) and labels of categorized images

- **MS AZ Computer Vision**
  - Subset of Analyze Image of Computer Vision
  - No need to manage individual servers for ML modelling and classification
  - Auto-scale
  - Azure managed identities
  - Regional resiliency

Facial Detection

- Analyse human faces in images/video
- **Face detection:** ID regions of image with human face
- **Facial analysis:** Return additional information
- **Facial recognition:** Identify known individuals

- **MS AZ Computer Vision**
  - Subset of Analyze Image of Computer Vision
  - **Computer Vision:** Basic analyses (age)
  - **Video Indexer:** Faces in videos
  - **Face:** Widest range of capailities
    - **Identify API:** One-to-many face match
    - **Verify API:** One-to-one face match
    - **Group API:** Similartiy face match

Language Understanding

- Understands written and spoken language
- Analyse & interpret text with AI
- Interpret spoken language & synthesise speech response
- Translate spoken or written language
- Interpret commands and take actions
- Evaluate different aspects of document/phrase to gain insights into the context of the text.

- **MS AZ Computer Vision**
  - Subset of Analyze Image of Computer Vision
  - Pretrained NLP ML models and services
    - **Text Analytics:** Analyse text documents and extract phrases, detect entities (places, dates, people), and evaluate sentiment (positive/negative)
    - **Translator Text:** Translate +60 languages
    - **Speech:** Recognize, synthesise, and translate speech
    - **Language Understanding Intelligent Service (LUIS):** Train language model to understand spoken or text-based commands

Natural Language Processing

- Intersection of Computer Vision and Natural Language Processing
- Models recognize individual shapes as letters, numbers and punctuation
- Machine Learning Comprehension
  - AI system reads and understands semantic context

- **MS AZ Computer Vision**
  - Subset of Analyze Image of Computer Vision
  - **OCR API:** Text limited
  - **Read API:** Text dominant
  - **Form Recognizer API:** Analyse documents/receipts