Azure AI-900 Artificial Intelligence (AI) Cheat sheet v2024.08.23

Guiding principles

- **Accountability** — People should be accountable for AI systems
- **Inclusivity** — Empower everyone and Engage people
- **Transparency** — Understandable decisions
- **Privacy & Security** — Be secure and respect privacy
- **Fairness** — Treat all people fairly
- **Reliability** — Perform reliably and Safely
- **Unintended Consequences** — Bias, Wrong, Illegal, Hallucinations, Harmful

Common Workloads

- **Anomaly Detection** — Is this weird?
- **Prediction & Forecasting**
- **Knowledge Mining** — AI S/W Navigator
- **Natural Language Processing (NLP)** — What info is in? — AI S/W Sentinel
- **Computer Vision**
- **Content Moderation** — Violence, Self-Harm, Sexual, Hate

Feature	• Input variable • Life insurance example: Smoker, Gender
Label	• Thing we predict • Life insurance example: Life expectancy
Training	• Split date 50:50 • Training : Actual • Compare actual to predicted • Mean Square Error

Azure Portal → All Services → AI + Machine Learning → AI Machine Learning

1. New workspace
2. Launch studio
3. Create compute "instance" to work
4. Create compute "cluster" for ML training
5. Automate ML (no-code option) or ML Designer (low-code option)

Common Machine Learning Types

Common Types

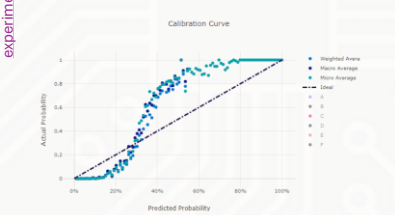
- **Deep learning** — Neural networks, Large dataset
- **Clustering** — Unsupervised, Find group of **similarities**, How is this organized?
- **Regression** — Supervised, **Numeric**, How much? How many?
- **Classification** — Supervised, **Binary**, Is it an Apple? Is it A, B, or C? Is it a ...?
- Experiment

https://aka.ms/mlcheatsheet

experiment results - Azure Machine Learning | Microsoft Learn

Confusion matrices visually demonstrate the systematic errors of a classification model, with "confusion" referring to the mislabeling of samples by the model.

The **receiver operating characteristic** (ROC) curve illustrates the connection between the true positive rate (TPR) and the false positive rate (FPR) as the decision threshold is varied. The area under the curve (AUC) represents the fraction of correctly classified instances.



A **calibration curve** shows a model's confidence in predictions versus the proportion of correct positive samples at each confidence level. An ideal model accurately classifies 100% of predictions with 100% confidence, 50% with 50% confidence, and 20% with 20% confidence. A perfectly calibrated model's curve matches the y = x line, where probabilities are predicted flawlessly.

Vision Workloads

- **Facial detection & recognition**
- **Optical Character Recognition** — Detect text
- **Image Classification** — What is image? A car!
- **Semantic Segmentation** — Detect object boundaries
- **Object Detection** — Detect multiple objects on image
- Tools

Azure Portal → All Services → AI + Machine Learning

- **Cognitive** Services — Umbrella service; Includes many other services
- **Computer** Vision Services — Pre-trained LM model; Can recognize 10,000 objects; Detect faces and text recognition
- **Custom** Vision Services — Model you can build and train; Classification or object detection
- **Face** Services — Recognize a human face on an image; Returns coordinates of 1+ faces; Recognizes pre-trained celebrities
  - **Face** Detection — Gender; Age; Face boundaries
  - **Face** Verification — Compare faces; Identify if same individual
  - **Similar** Faces — Identify similar faces
  - Face **Grouping** — Divides a set of unknown faces into groups based on similarities
  - **Identify** API — Identify (assign names) to faces
- **Form Recognizer** Service — Ideal for invoices and receipts; Pre-built or custom model; Pre-built = English in USA
- **AI Video Indexer** — Build on Az Media Services and Azure AI Services (**Face**, Translator, **Vision**, Speech); Allows extraction of insights from videos

Removed from AI-900

- **Agents** or **Bots** — Conversational AI; Computer and humans talk; Operate over web, email, social media, and voice
- **Conversational Services** — QnA Maker Service – codeless chatbot; Azure Bot Service – Enterprise grade

NLP Workloads

Understand written or spoken language

- **Key Phrase Extraction** — Key points in document
- **Entity recognition** — Categorize by type and subtype; Today = date; Driveway = location
- **Sentiment Analysis** — Prebuilt model 0-1 (neg-pos)
- **Translation** — 60+ Languages, Context aware
- **Language Modelling** — Common Language
- **Speech Recognition & Synthesis** — Speech -> Text, Text -> Speech
- Services

- **Text Analysis** Service — Key phrase extraction; Entity detection; Sentiment analysis; Language detection; Returns NaN for undetermined
- **Language Understanding** Service (LUIS) — Understand natural language; Utterances – *when do you close?*; Entities – *today (date time)*; Intents – *goal: total hours of operation*; No intent – *what is the meaning of life?*
- **Speech** Service — Text to speech; Speech to text; Auto translation; Custom voice models
- **Translator Text** Service — Translate between 70 languages; Custom models; Language detection

Generative AI Workloads

- **Image Creation** — Art, Impressionism, Face
- **Others** — Discovery, Gaming, Security, Simulations
- **Text Generation** — ChatGPT, Copilot
- **Video Generation** — Deep Fakes, Animation
- **Code Generation**
- **Music, Audio Generation** — Voice synthesis, Sound effects
- Responsible Generative AI

- **Dangers** — Deep fakes; Impersonation; Harmful; Discriminating
- **Process**
  1. Identify harm – *what is worst case scenario?*
  2. Measure harms – *try to generate harmful content*
  3. Mitigate harms - *fine-tune model and filters, meta prompts, grounding data*
  4. Operate responsibly - *monitor, feedback, track telemetry*