Microsoft Azure AI Fundamentals (AI-900) Crash Course
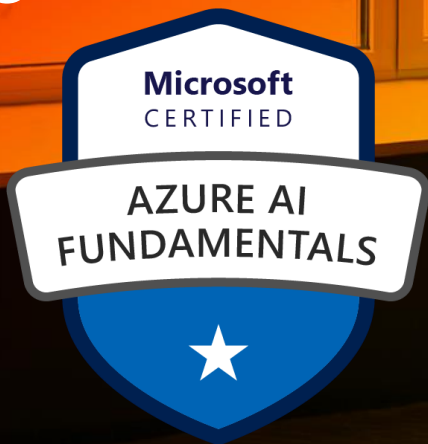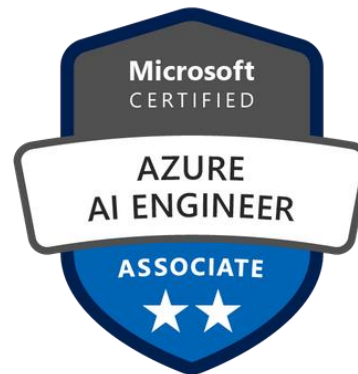
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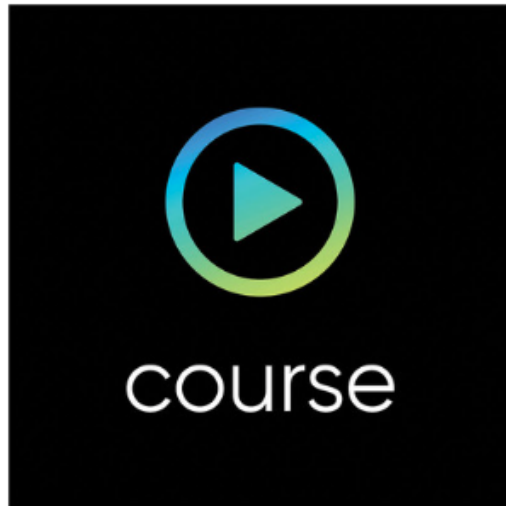AZURE AI FUNDAMENTALS

Reza Salehi

Cloud Consultant and Trainer

 @zaalion

Microsoft Azure Fundamentals (AZ-900) Certification Course

★★★★★ <u>1 review</u>

By **Reza Salehi**

TIME TO COMPLETE:
4h 37m

LEVEL:
Beginner

TOPICS:
Microsoft Azure

PUBLISHED BY:
O'Reilly Media, Inc.

PUBLICATION DATE:
October 2022

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Azure Cookbook

Recipes to Create and Maintain Cloud Solutions in Azure

Reza Salehi

Course Overview

AI-900 Crash Course

- Describe Artificial Intelligence workloads and considerations (15-20%)

- Describe fundamental principles of machine learning on Azure (20-25%)

- Describe features of computer vision workloads on Azure (15–20%)

- Describe features of Natural Language Processing (NLP) workloads on Azure (15-20%)

- Describe features of generative AI workloads on Azure (15–20%)

Course Repository

https://github.com/zaalion/oreilly-ai-900

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📄 .gitignore   Updated slide deck

HTTPS   SSH   GitHub CLI

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https://github.com/zaalion/oreilly-ai-900.git   📋

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EXAMS

Exam AI-900: Microsoft Azure AI Fundamentals

This exam is an opportunity to demonstrate knowledge of machine learning (ML) and artificial intelligence (AI) concepts and related Microsoft Azure services. Candidates for this exam should have familiarity with Exam AI-900's self-paced or instructor-led learning material.

This exam is intended for candidates with both technical and non-technical backgrounds. Data science and software engineering experience are not required; however, awareness of cloud basics and client-server applications would be beneficial.

Azure AI Fundamentals can be used to prepare for other Azure role-based certifications like Azure Data Scientist Associate or Azure AI Engineer Associate, but it is not a prerequisite for any of them.

You may be eligible for ACE college credit if you pass this certification exam. See ACE college credit for certification exams for

💡 **Tip**

- Review the **AI-900 study guide** ⧉ to help you prepare for the exam
- Demo the exam experience by visiting our **exam sandbox** ⧉

⚠ **Note**

Cognitive Services has been renamed to Azure AI Services. Individual services have also been renamed. These changes will appear on the exam in late 2023. **Learn more about Azure AI services.**

Part of the requirements for: Microsoft Certified: Azure AI Fundamentals
Related exams: none
Go to Learn Profile ⧉

Two ways to prepare

[**Self-paced** | Instructor-led]

Items in this collection

Microsoft Azure AI Fundamentals: Get started with artificial intelligence

2 Modules

Beginner • AI Engineer • Bot Service

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Microsoft Azure AI Fundamentals: Explore visual tools for machine learning

4 Modules

Beginner • AI Engineer • Azure

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Describe Artificial Intelligence workloads and considerations (15–20%)

Describe Artificial Intelligence workloads and considerations (15-20%)

- Identify features of common AI workloads

- Identify guiding principles for responsible AI

Identify Features of Common AI Workloads

- Identify features of data monitoring and anomaly detection workloads [see 1 2 3 4 5]

- Identify features of content moderation and personalization workloads

- Identify computer vision workloads [see 1 2 3 4 5 6 7]

- Identify natural language processing workloads [see 0 1 2 3 4 5]

- Identify knowledge mining workloads [see 1 2 3 4 5]

- Identify document intelligence workloads [see 1]

- Identify features of generative AI workloads

Identify Guiding Principles for Responsible AI

- Describe considerations for fairness in an AI solution [see 1 2 3]

- Describe considerations for reliability and safety in an AI solution [see 1]

- Describe considerations for privacy and security in an AI solution [see 1]

- Describe considerations for inclusiveness in an AI solution [see 1]

- Describe considerations for transparency in an AI solution [see 1]

- Describe considerations for accountability in an AI solution [see 1]

Describe Fundamental Principles of Machine Learning on Azure (20-25%)

Describe Fundamental Principles of Machine Learning on Azure (20-25%)

- Identify common machine learning techniques

- Describe core machine learning concepts

- Describe Azure Machine Learning capabilities

Identify Common Machine Learning Techniques

- Identify regression machine learning scenarios [see 1 2 3 4 5 6 7]

- Identify classification machine learning scenarios [see 1 2]

- Identify clustering machine learning scenarios [see 1 2]

- Identify features of deep learning techniques [see 1 2]

Describe Core Machine Learning Concepts

- Identify features and labels in a dataset for machine learning [see 1]

- Describe how training and validation datasets are used in machine learning [see 1 2]

Describe Azure Machine Learning Capabilities

- Describe capabilities of Automated machine learning [see 1 2]

- Describe data and compute services for data science and machine learning

- Describe model management and deployment capabilities in Azure Machine Learning [see 1 2]

Creating Your Own ML Model

1. Collect training datasets; 1000+ cat and not-cat photos

2. Cleanup the collected training data

3. Choose the right ML model for your usecase

4. Train the model and verify the result

5. Deploy the read-to-use model to your application

6. Start using the model with the data in question

Using Cognitive Services Models

1. Provision an Azure Computer Vision service

2. Start using the service with the data in question

   a. Microsoft has trained the models for you

   b. These models can be customized if needed

Describe Features of Computer Vision Workloads on Azure (15–20%)

Describe Features of Computer Vision Workloads on Azure (15–20%)

- Identify common types of computer vision solutions

- Identify Azure tools and services for computer vision tasks

Identify Common Types of Computer Vision Solutions

- Identify features of image classification solutions [see 1 2]

- Identify features of object detection solutions [see 1 2]

- Identify features of optical character recognition solutions [see 1 2]

- Identify features of facial detection and facial analysis solutions [see 1 2 3]

Identify Azure Tools and Services for Computer Vision Tasks

- Identify capabilities of the Computer Vision service [see 1 2]

- Identify capabilities of the Custom Vision service [see 1 2 3]

- Identify capabilities of the Face service [see 1 2]

- Identify capabilities of the Form Recognizer service [see 1 2]

Describe Features of Natural Language Processing (NLP) Workloads on Azure (15-20%)

Describe Features of Natural Language Processing (NLP) Workloads on Azure (15-20%)

- Identify features of common NLP workload scenarios

- Identify Azure tools and services for NLP workloads

Identify Features of Common NLP Workload Scenarios

- Identify features and uses for key phrase extraction [see 1 2]

- Identify features and uses for entity recognition [see 1]

- Identify features and uses for sentiment analysis [see 1]

- Identify features and uses for language modeling [see 1 2]

- Identify features and uses for speech recognition and synthesis [see 1 2]

- Identify features and uses for translation [see 1 2]

Identify Azure Tools and Services for NLP Workloads

- Identify capabilities of the Language service [see 1]

- Identify capabilities of the Speech service [see 1]

- Identify capabilities of the Translator service [see 1]

Describe features of generative AI workloads on Azure (15–20%)

Describe features of generative AI workloads on Azure (15–20%)

- Identify features of generative AI solutions

- Identify capabilities of Azure OpenAI Service

Identify Features of Generative AI Solutions

- Identify features of generative AI models [see 1]

- Identify common scenarios for generative AI [see 1 2]

- Identify responsible AI considerations for generative AI

Identify Capabilities of Azure OpenAI Service

- Describe natural language generation capabilities of Azure OpenAI Service

- Describe code generation capabilities of Azure OpenAI Service [see 1]

- Describe image generation capabilities of Azure OpenAI Service

AI Workloads

Anomaly Detection Workloads

Anomaly Detection Workloads

Anomaly Detection Workloads

https://learn.microsoft.com/en-us/azure/architecture/example-scenario/ai/real-time-anomaly-detection-conveyor-belt
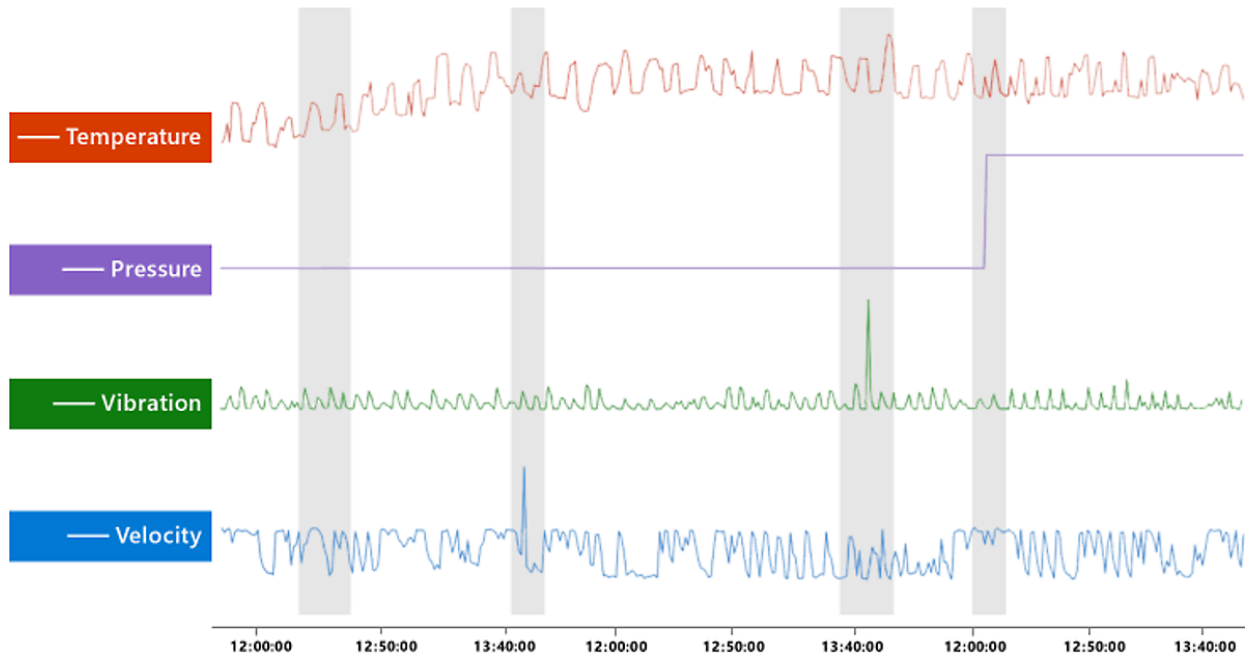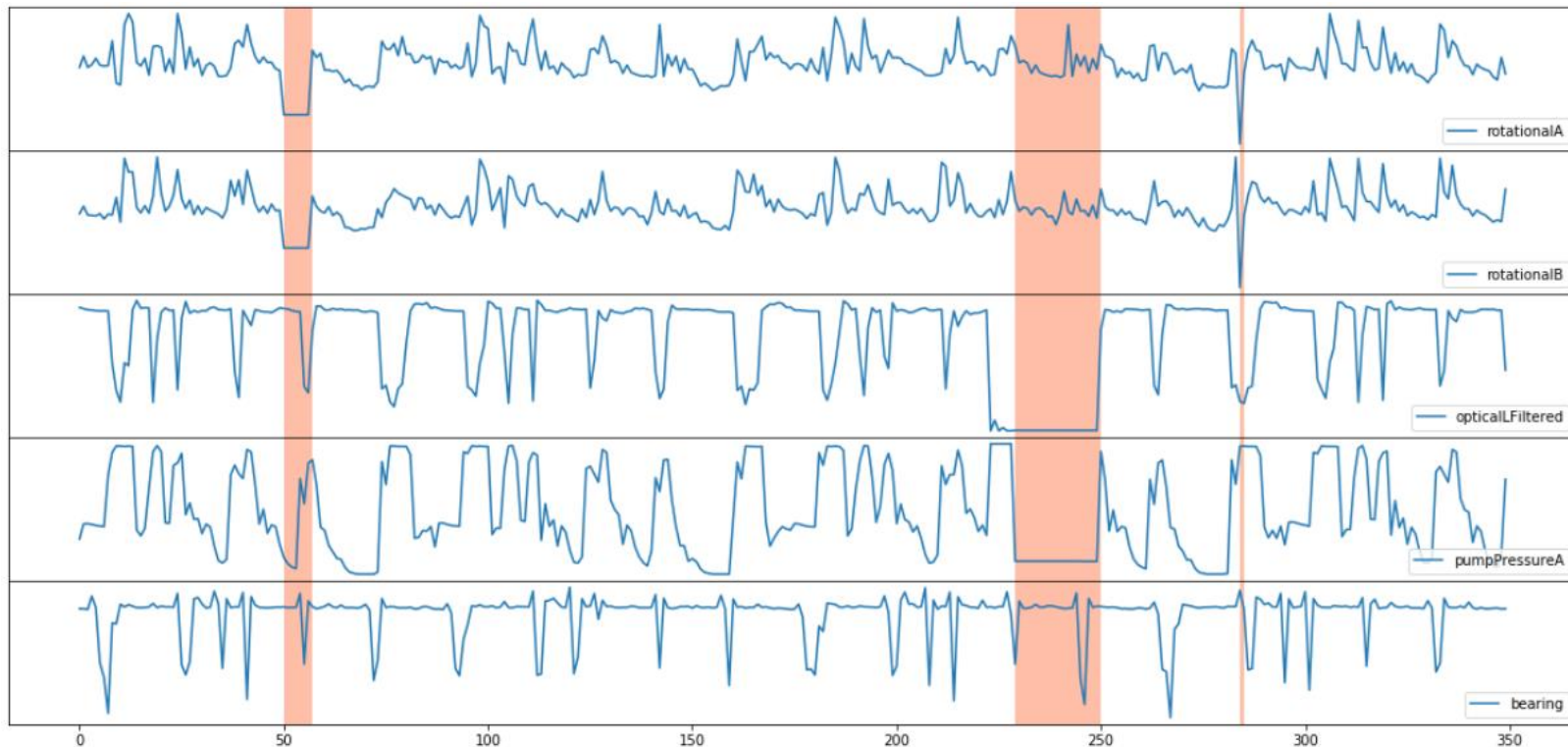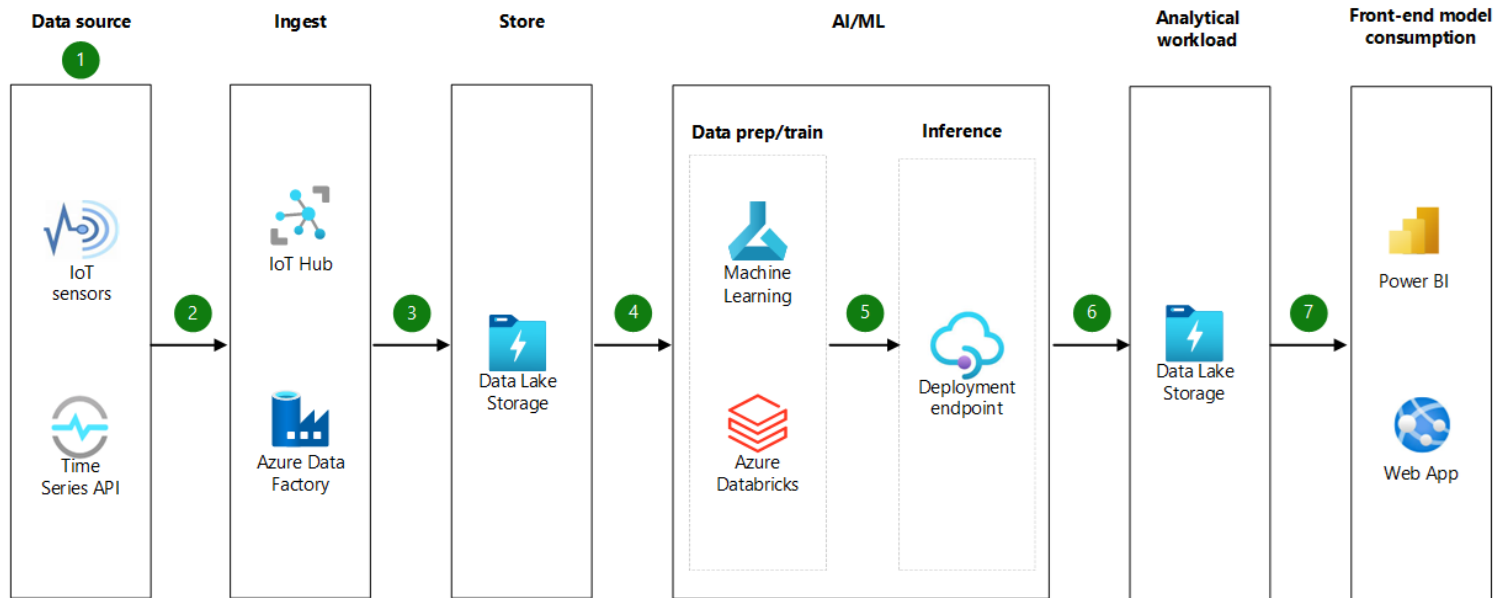
Anomaly Detection Workloads

Computer Vision Workloads

Computer Vision Workloads

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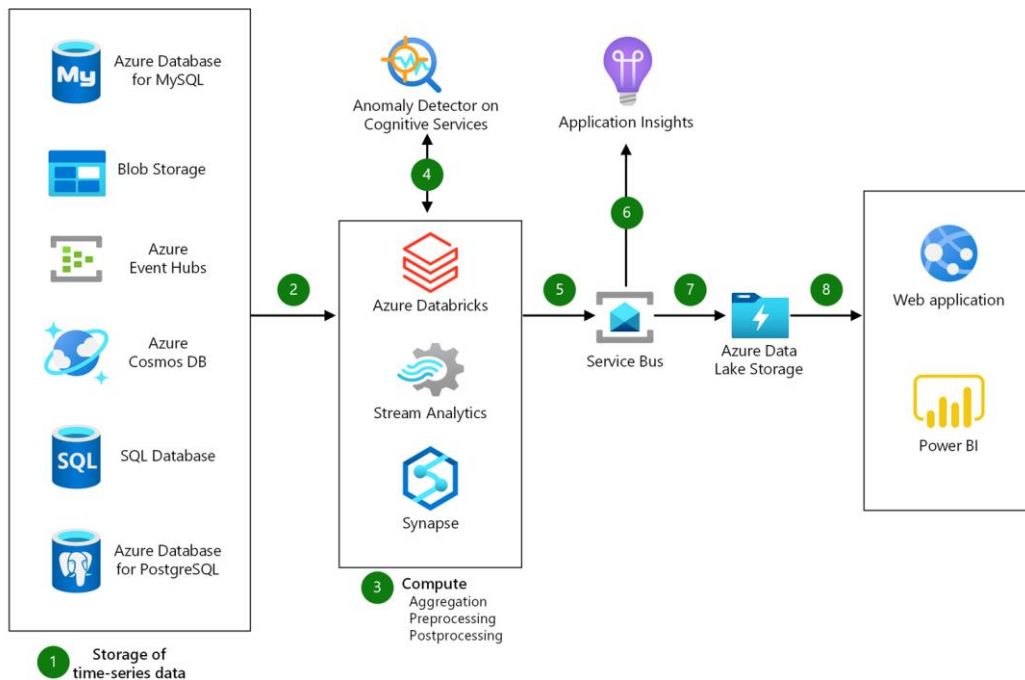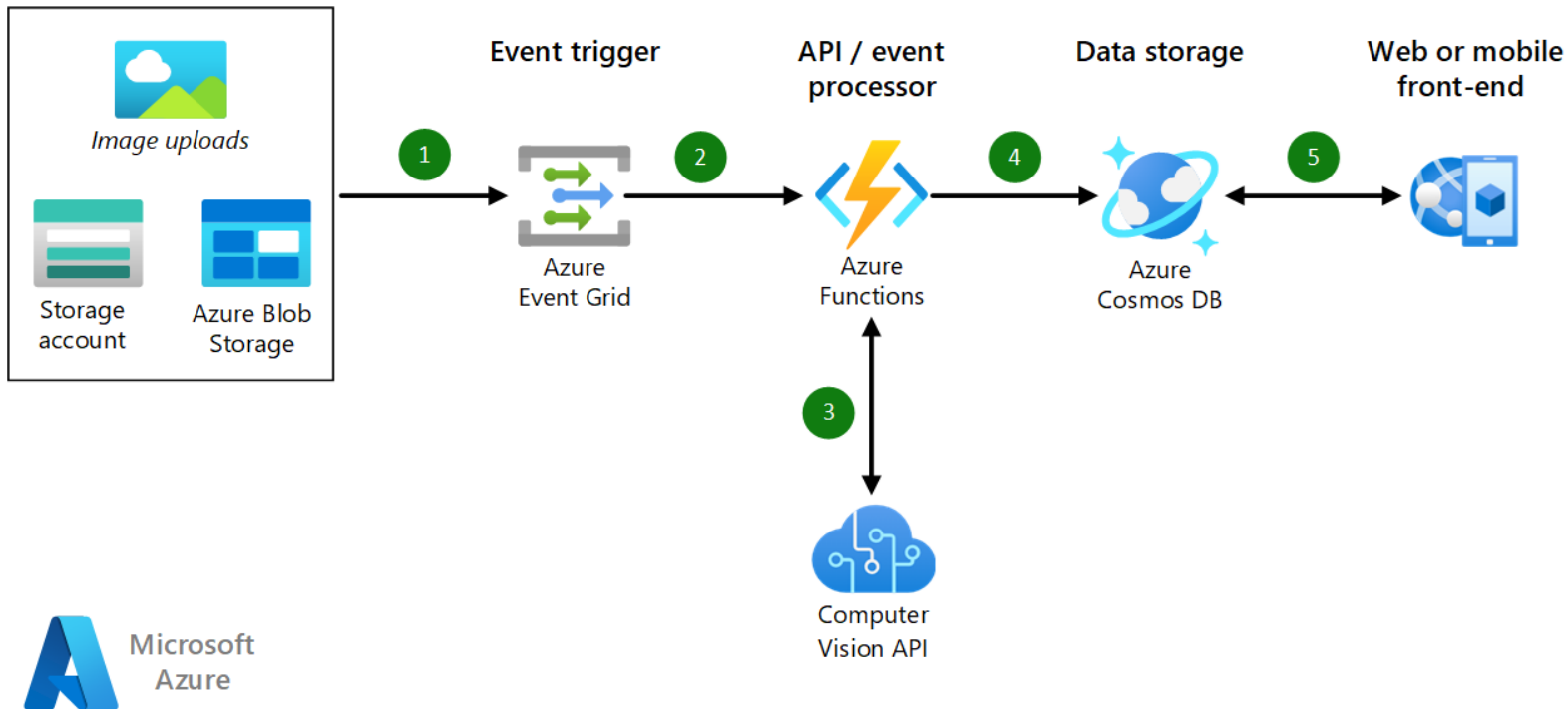
Computer Vision Workloads
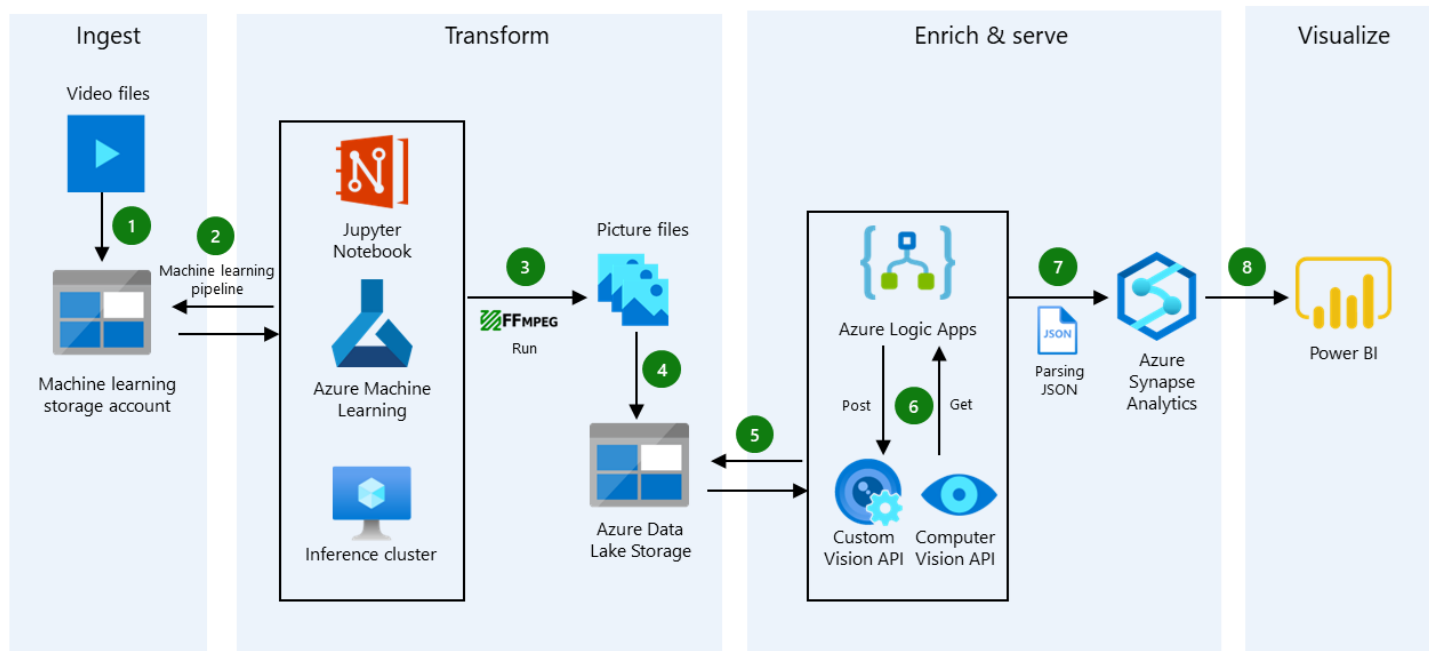
Computer Vision Workloads
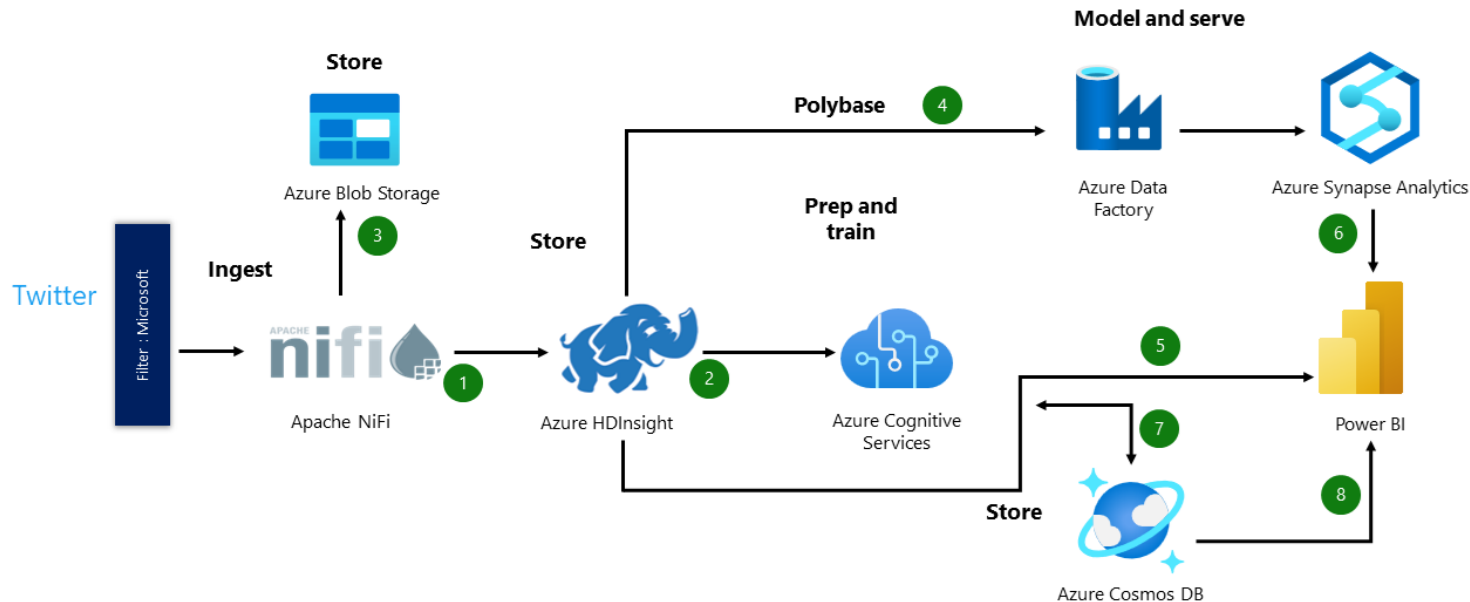
Computer Vision Workloads
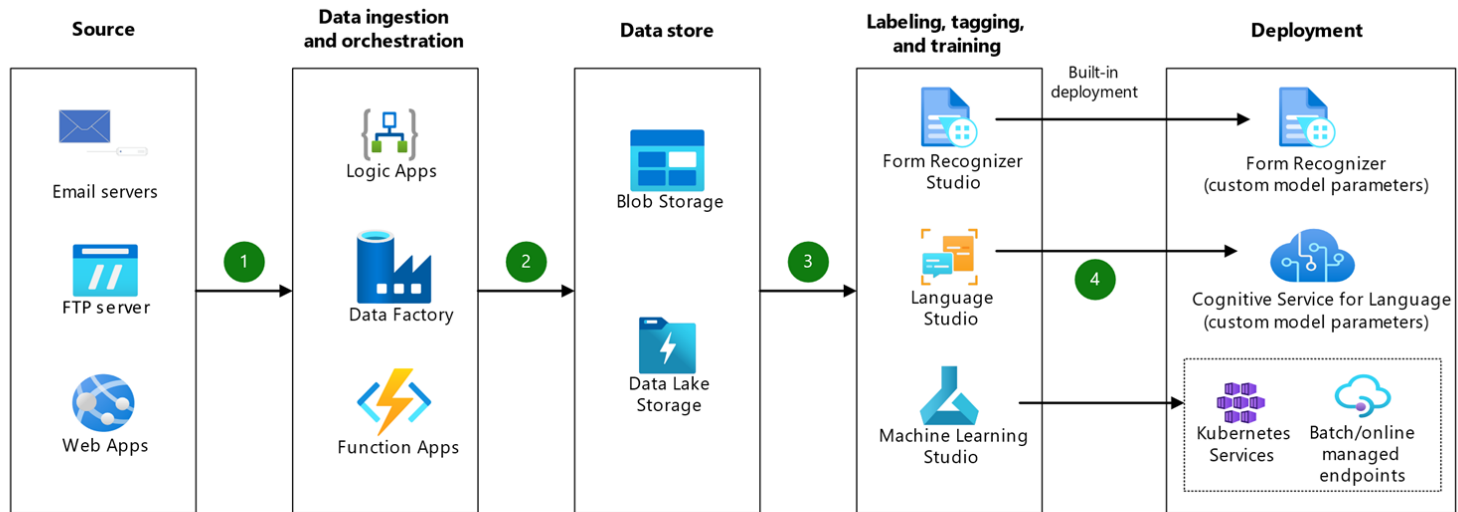
Natural Language Processing Workloads
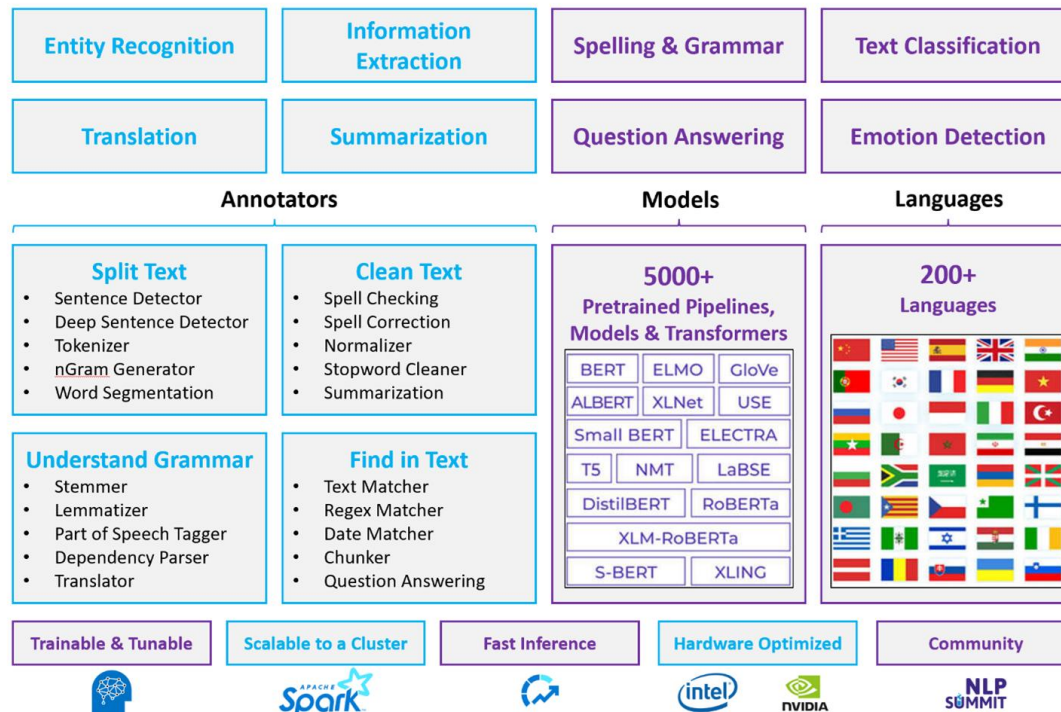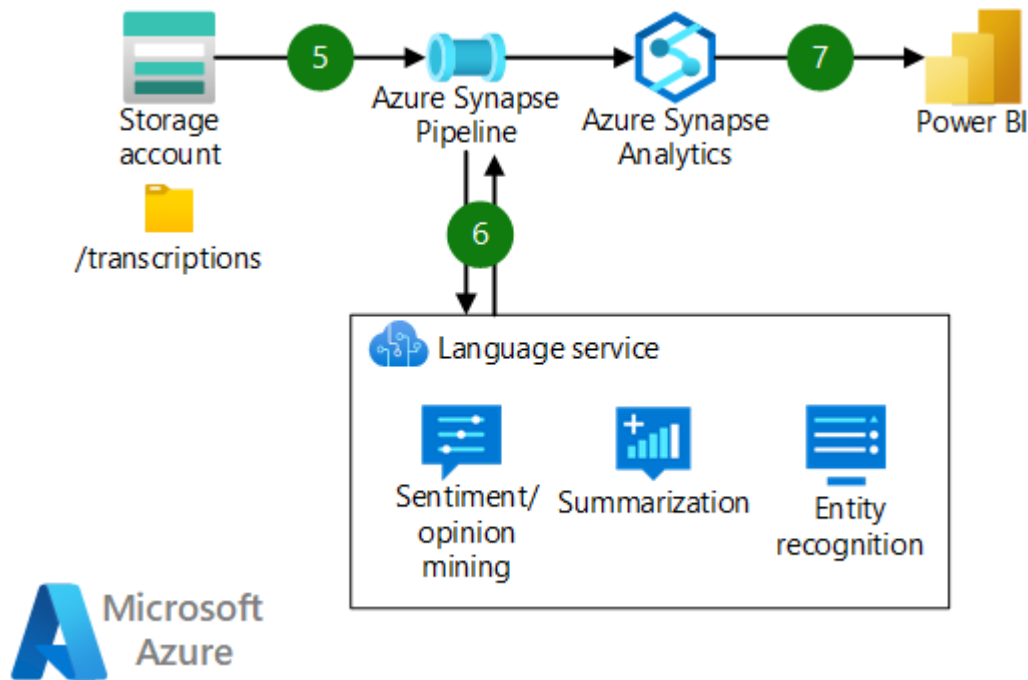
Natural Language Processing Workloads

Natural Language Processing Workloads
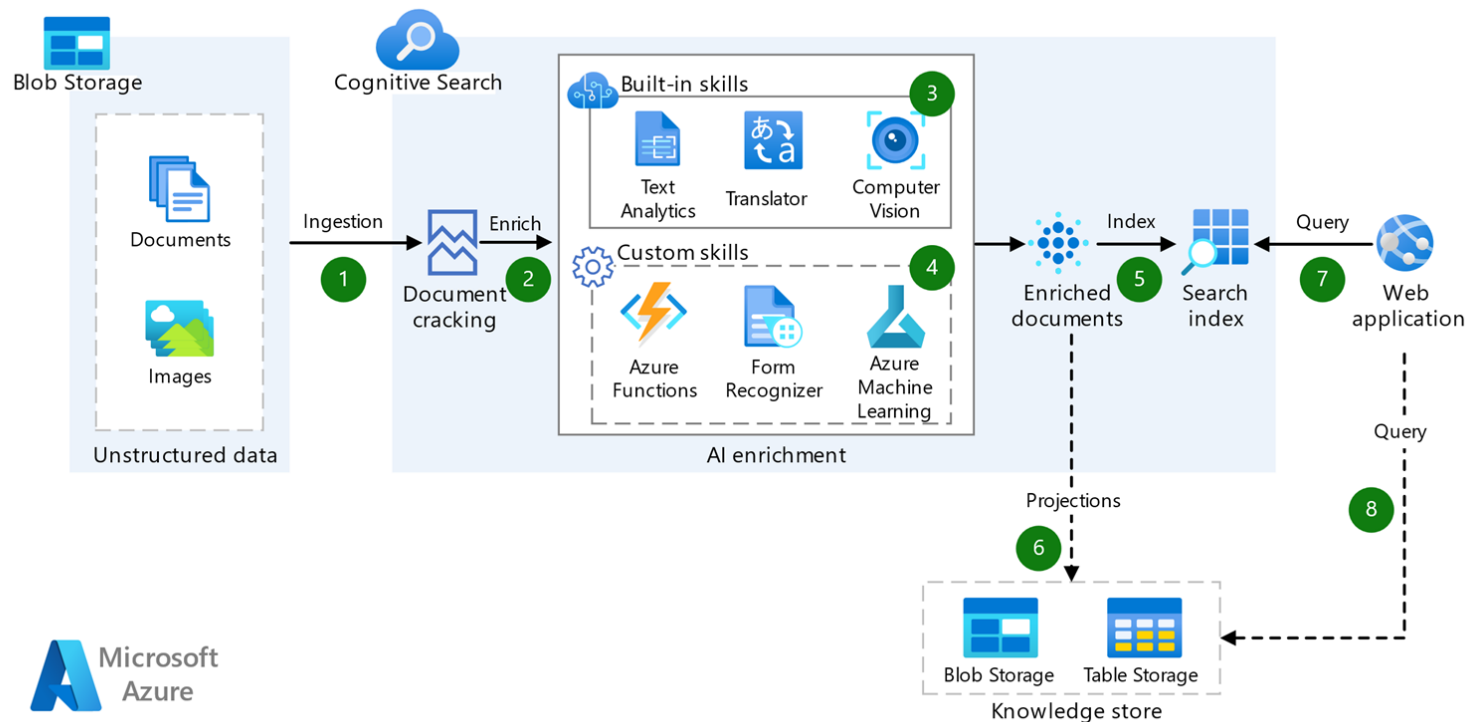
Knowledge Mining Workloads
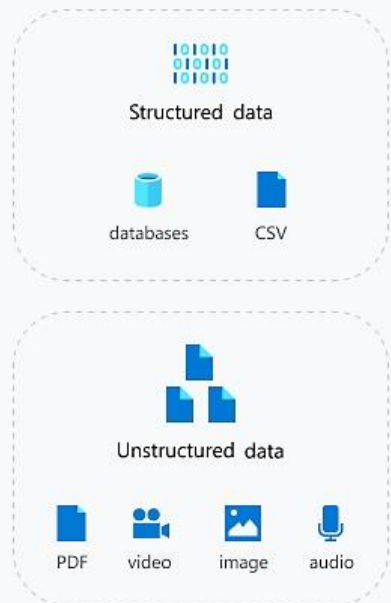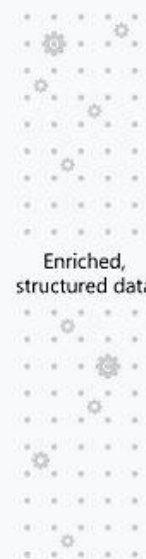
Knowledge Mining Workloads

Azure Cognitive Search
Identify and explore relevant content with the only cloud search service with built-in AI capabilities.

Azure Cognitive Services
Employ cognition capabilities to expand understanding across content types.

Azure Machine Learning
Apply machine learning models as custom skills for specific requirements like industry-specific regulations.

Azure Bot Services
Design interactive experiences that enable users to extract information from their data via bot interface.

https://azure.microsoft.com/en-us/solutions/knowledge-mining

Knowledge Mining Workloads

Documents

Printed text recognition

Key phrase extraction

Shaper skill

Technical key-word sanitation

Format definition miner

Large scale vocabulary matcher

Search index

Searchable reference library

Ingest

Enrich

Explore

Microsoft Azure

https://learn.microsoft.com/en-us/azure/architecture/solution-ideas/articles/content-research
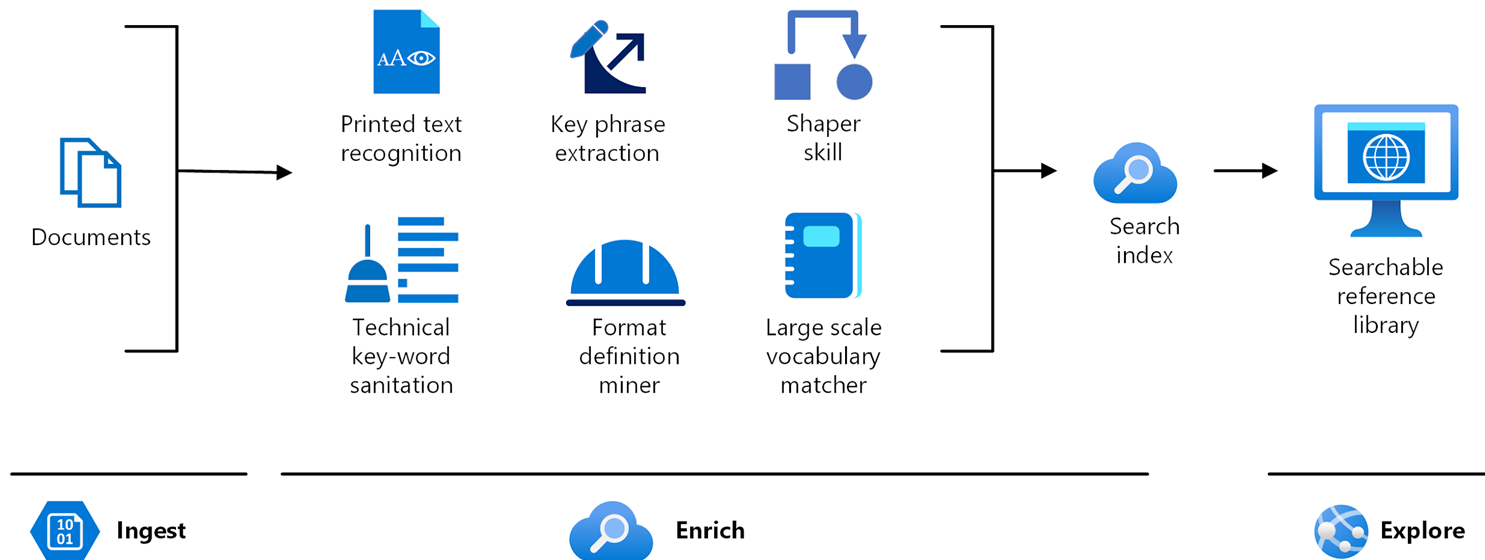
Knowledge Mining Workloads

Knowledge Mining Workloads

Regression Machine Learning

- Estimate missing data

- Estimate future data (prediction)
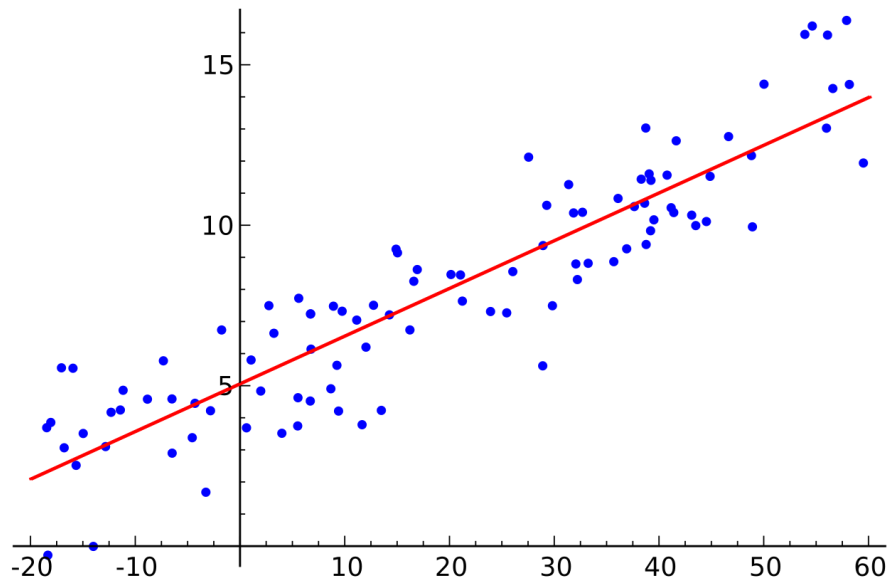
Classification Machine Learning

- Group images into categories

Clustering Machine Learning

- Grouping unlabeled examples

Machine Learning Algorithm Cheat Sheet

This cheat sheet helps you choose the best machine learning algorithm for your predictive analytics solution. Your decision is driven by both the nature of your data and the goal you want to achieve with your data.

Microsoft Azure

What do you want to do?

Text Analytics
Derives high-quality information from text
Answers questions like: What info is in this text?

- Latent Dirichlet Allocation → Unsupervised topic modeling, group texts that are similar
- Extract N-Gram Features from Text → Creates a dictionary of n-grams from a column of free text
- Feature Hashing → Converts text data to integer encoded features using the Vowpal Wabbit library
- Preprocess Text → Performs cleaning operations on text, like removal of stop-words, case normalization
- Word2Vector → Converts words to values for use in NLP tasks, like recommender, named entity recognition, machine translation

Extract information from text

Predict between several categories

Multiclass Classification
Answers complex questions with multiple possible answers
Answers questions like: Is this A or B or C or D?

- Multiclass Logistic Regression → Fast training times, linear model
- Multiclass Neural Network → Accuracy, long training times
- Multiclass Decision Forest → Accuracy, fast training times
- One-vs-All Multiclass → Depends on the two-class classifier
- One-vs-One Multiclass → Depends on binary classifier, less sensitive to an imbalanced dataset with larger complexity
- Multiclass Boosted Decision Tree → Non-parametric, fast training times and scalable

Generate recommendations

Predict between two categories

Recommenders
Predicts what someone will be interested in
Answers the question: What will they be interested in?

- Use the Train Wide & Deep Recommender module → Hybrid recommender, both collaborative filtering and content-based approach
- SVD Recommender → Collaborative filtering, better performance with lower cost by reducing dimensionality

Regression
Makes forecasts by estimating the relationship between values
Answers questions like: How much or how many?

- Fast Forest Quantile Regression → Predicts a distribution
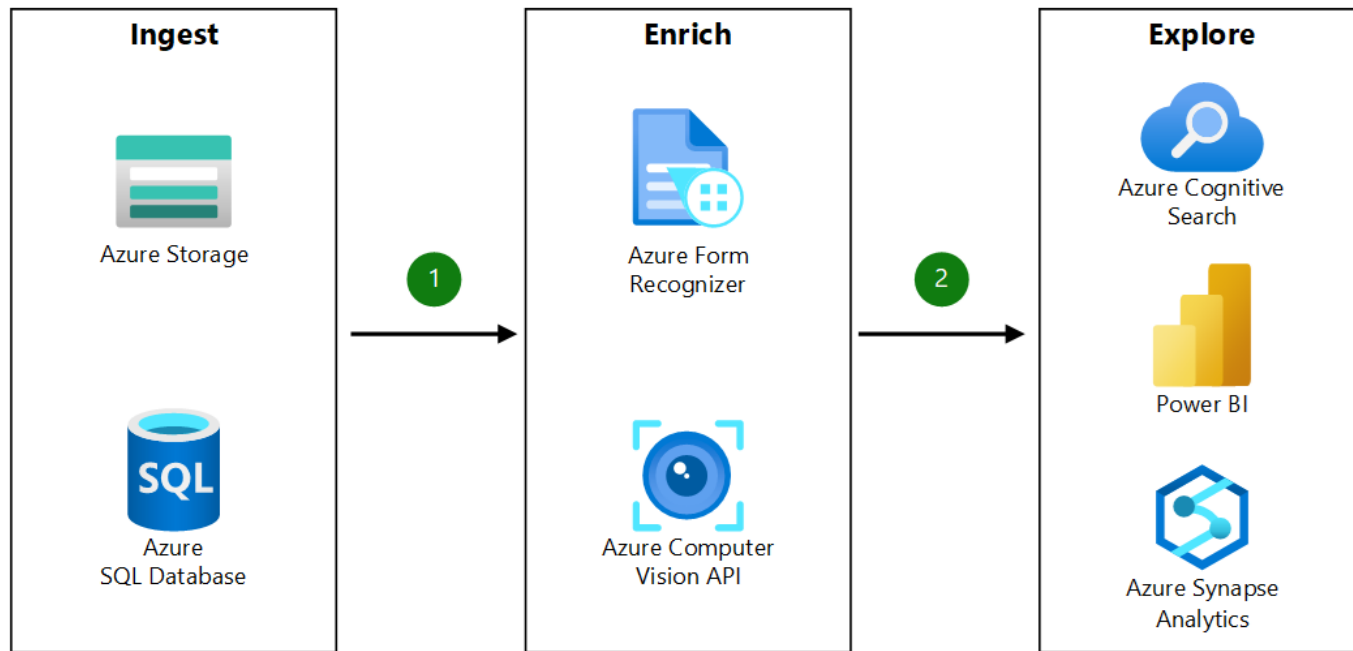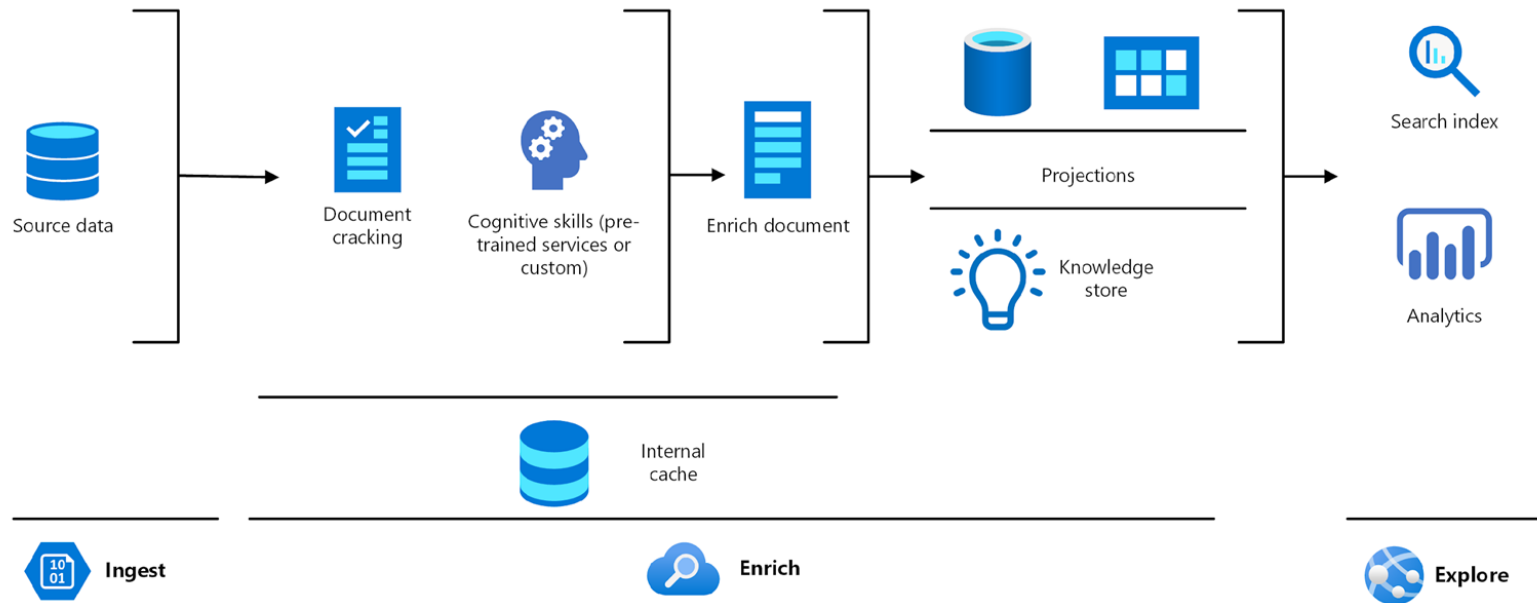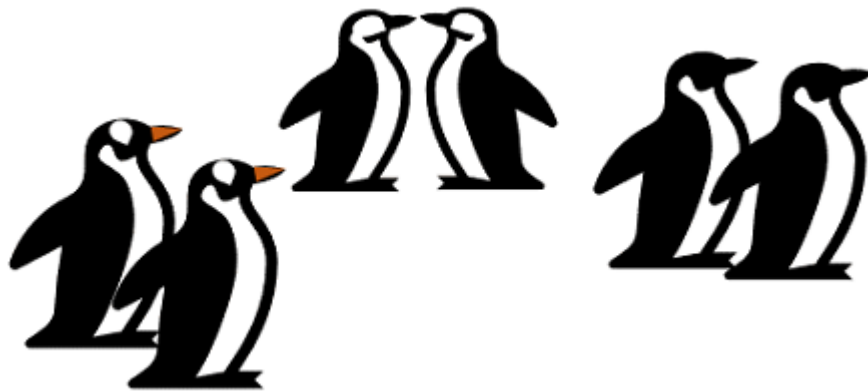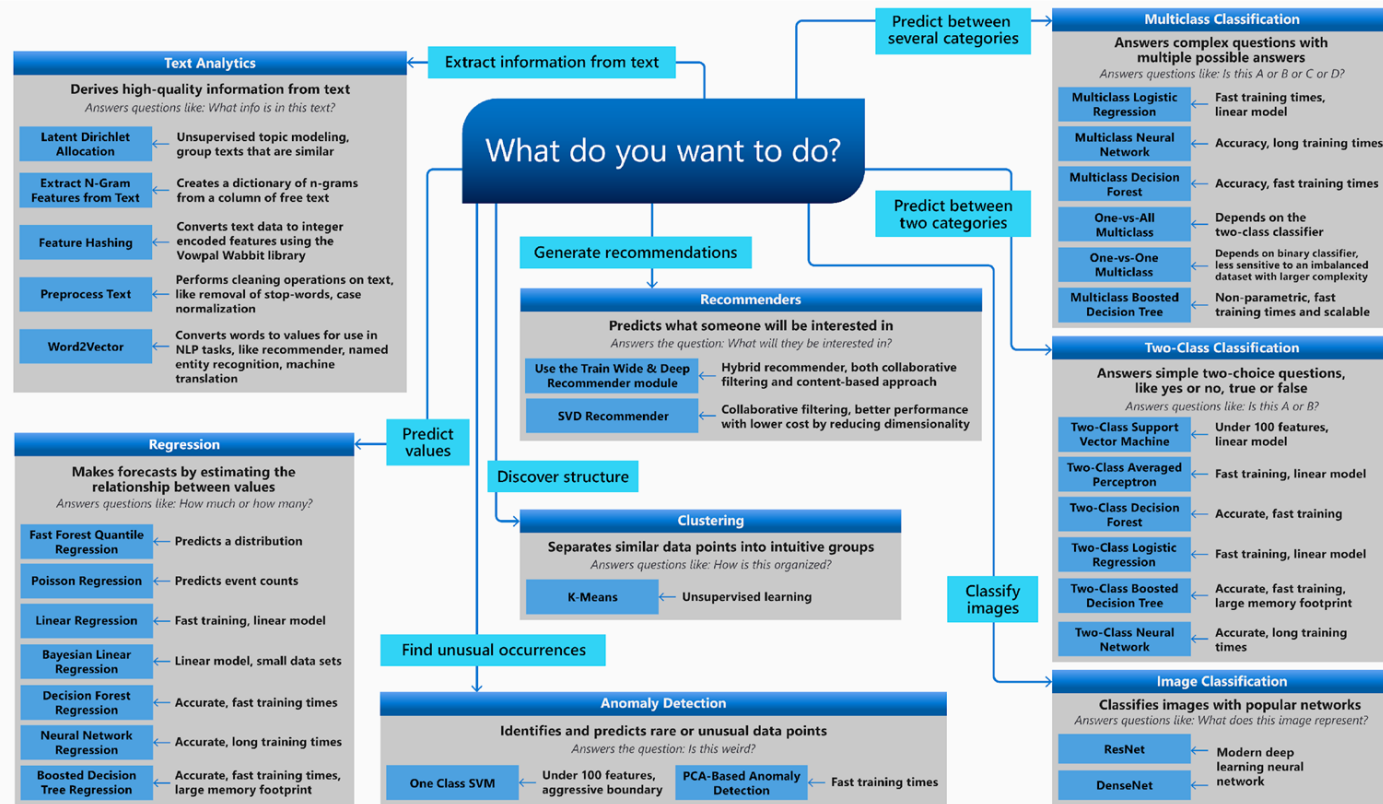- Poisson Regression → Predicts event counts
- Linear Regression → Fast training, linear model
- Bayesian Linear Regression → Linear model, small data sets
- Decision Forest Regression → Accurate, fast training times
- Neural Network Regression → Accurate, long training times
- Boosted Decision Tree Regression → Accurate, fast training times, large memory footprint

Predict values

Discover structure

Clustering
Separates similar data points into intuitive groups
Answers questions like: How is this organized?

- K-Means → Unsupervised learning

Two-Class Classification
Answers simple two-choice questions, like yes or no, true or false
Answers questions like: Is this A or B?

- Two-Class Support Vector Machine → Under 100 features, linear model
- Two-Class Averaged Perceptron → Fast training, linear model
- Two-Class Decision Forest → Accurate, fast training
- Two-Class Logistic Regression → Fast training, linear model
- Two-Class Boosted Decision Tree → Accurate, fast training, large memory footprint
- Two-Class Neural Network → Accurate, long training times

Classify images

Find unusual occurrences

Anomaly Detection
Identifies and predicts rare or unusual data points
Answers the question: Is this weird?

- One Class SVM → Under 100 features, aggressive boundary
- PCA-Based Anomaly Detection → Fast training times

Image Classification
Classifies images with popular networks
Answers questions like: What does this image represent?

- ResNet → Modern deep learning neural network
- DenseNet

https://learn.microsoft.com/en-us/azure/machine-learning/algorithm-cheat-sheet

The Exam

AI-900 Exam FAQ

- Number of Questions: between 40 and 60

- Duration: 120 minutes

- Questions

  - See the exam sandbox

- There are no hands-on labs

- Pass Score: 700 (on a scale of 1-1000)

AI-900

- [Exam AI-900](#)

- [Skills measured](#)

- [Exam Sandbox](#)

Schedule exam

Exam AI-900: Microsoft Azure AI Fundamentals

United States ⌄

Languages: English, Japanese, Chinese (Simplified), Korean, German, French, Spanish, Portuguese (Brazil), Russian, Indonesian (Indonesia), Arabic (Saudi Arabia), Chinese (Traditional), Italian
Retirement date: none

Prove that you can describe the following: AI workloads and considerations; fundamental principles of machine learning on Azure; features of computer vision workloads on Azure; and features of Natural Language Processing (NLP) workloads on Azure.

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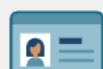Use a personal computer that has a reliable webcam and internet connection.

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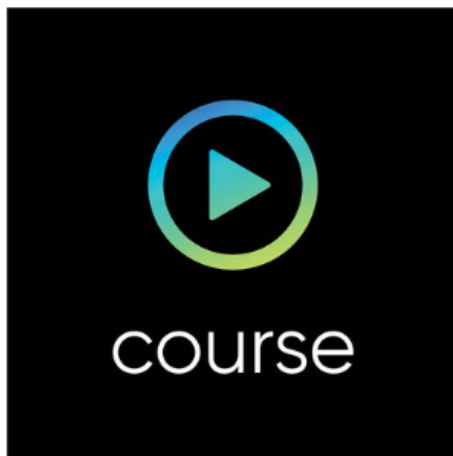Run the OnVUE application from your Downloads folder.

Course Repository

https://github.com/zaalion/oreilly-ai-900

Microsoft Azure Fundamentals (AZ-900) Certification Course

★★★★★ 1 review

By **Reza Salehi**

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Azure Cookbook

Recipes to Create and Maintain Cloud Solutions in Azure

Reza Salehi

Thank you!

Reza Salehi

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