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AI-100 WhizCard

Quick Bytes for you before the exam!

Microsoft Azure Bing Services

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Bing Auto Suggest API

It helps to improve the users' search experience

Returns a list of suggested queries based on the partial query string in the search box

Easy to call from any programming language that can make HTTP Requests and parse JSON.

How to Use This?

- Create a Cognitive Services API Account.
- Make sure it has access to Bing Search API.
- You must have an Azure Subscription
- Request sent on every search
- Request get processed a[nd] JSON message is returned

Bing Custom Search API

- Customise Search
- Add free
- Specify domain and webpages for Bing
- Enables pinning, boosting and demoting content
- Creates custom view of web search
- Search images, videos, collaborate and test custom instances, and integrate hosted UI using JS code

How to Use This?

- Bing Custom Search Use Portal to create customized search instance
- Call Bing custom Search API to post create and integrate search instances

How to Use This?

- Create a Cognitive Service API account
- Request to API with a valid search Query
- API response is processed by parsing JSON

Bing Image Search API

- Image search capabilities, image only search results
- Filters image by editing query, thumbnail preview for the images returned.
- Expand search capabilities by including Bing's suggested search query

Bing News Search API

- Cognitive news searching capability, Finds news by sending search query
- Send search query to get relevant news articles, Integrated with Bing Autosuggest

Bing Spell Check API

- Contextual grammar check, Spell checking, utilises the machine learning and statistical machine translation.
- Common expression in text, Informal terms used in text, Brands, Titles, and Other popular expression, Accurate corrections and contextual correction

Bing Video Search API

- Adds video searching capabilities, Filters, edits, and display video based on the editing query and thumbnail preview
- Customizing the search for trending videos from the internet

Bing Visual Search API

- Return insights for an image, upload an image and providing URL
- Insights returned are: Visually similar images, Shopping sources, Web pages that include the images, Well-known people, well known places, Well-known things.

Bing Web Search API

- Providing instant answers, search results that can be configured with: Web pages, Images, Videos, News, and translation.
- JSON based and Bing based search, optimal for applications
- Identify and removes unwanted Unicode characters from search results

Bing Entity Search API

- Return results like entities and places, Can be called by many languages like HTTP request, parse JSON and SDK.
- Results can be used by Restaurants, Hotels, and Local Business
- Return Real time search suggestions, returns multiple entities having multiple. meanings

Azure Cognitive Services

- Makes AI accessible without machine-learning expertise requirement

Simply needs an API call to embed the AI capabilities into the apps like the following.

Hear | Speak | Search | Understand | Accelerate

Categories of services:

Vision
helps in recognition, identification, captioning, indexing, and moderating (pictures, videos, and digital ink content

Speech
1. Helps in performing the speech conversion (speech to text, and text to speech).
2. Translation
3. Speaker verification
4. Speaker recognition.

Language
Allows processing pre-built scripts
Sentiment evaluation
Determination of thanks for user acknowledgement

Decision
Helps in apps building to provide recommendations that helps in quick, informed and efficient decision-making.

Search
Facilitates adding of Bing Search APIs with simple API call.

Azure Anomaly Detector

Anomaly detection is performed in real-time.

Anomaly detector performs change points detection as a batch in the data.

The Anomaly Detector API provides two detection modes:
1. Batch: Helps in detecting the anomalies as a batch
2. Streaming: Helps in detecting the anomalies as the data is generated. Performs the anomaly detection of the latest data point.

Anomaly detection API also gives multiple additional information about data.

The anomaly results is returned for each data point's arithmetic mean by the model

Upper and lower anomaly detection boundaries are returned.

The returned values can be used to see the range of normal values, along with the anomalies in the data.

Features:

Anomaly Detector is an Azure offering that offers the following:

- That enables incorporating anomaly detection capabilities in apps and helps users in **quick problem identification.**
- **Does not requires** background in AI and/or ML.
- Anomaly detection API performs **the ingestion of time-series data** irrespective of kind.
- Anomaly detection API **selects the best anomaly detection model for the data** ensures highest accuracy.
- The Anomaly Detector API can be used **as stateless service.**

Anomaly Detector API – Best Practices

- Aptly preparing the time series data.
- Anomaly Detector API parameters needs to be used appropriately

Steps to use:

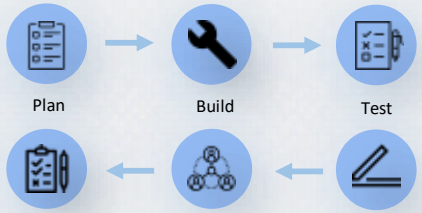
- Azure Subscription and Microsoft Power BI Desktop is required
- Loading and formatting the time series data is needed
- Function needs to be created to send and format the response.
- Data source privacy and authentication needs to be configured
- Anomaly Detector API response could be visualised
- Anomaly data points are displayed

Azure Bot Services

Bot – What is?

Bots is a software program that performs tasks like a computer. The functions performed by Bots are generally repetitive tasks, and they are based on intelligence.

Building a bot - Important Steps:

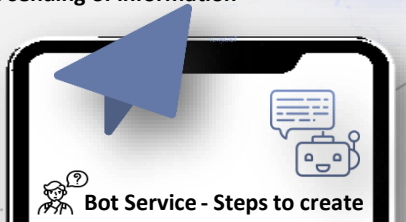


Azure bot service:

- Creating and managing intelligent bots.
- Creation of agents with the capability of performing conversations
- Do not require resources to be developed on any AI
- Provides **integrated connectivity which is scalable**
- Provides development service for developing intelligent bots
- The Bot Framework Service is a component of the Azure Bot Service
- The Bot Framework Service facilitates the **sending of information** (user's app and the bot).

Azure Bot Service/Bot Framework offerings:

- Bot development using the Bot Framework
- Bot Framework Tools to conceal complete workflow of bot development
- Messages and events between bots and channels are **shared by using BSF** (Bot Framework Service)
- Helps the Bot deployment in Azure
- Helps **with channel configuration**



Bot Service - Steps to create

Step – 1: Azure portal login
Step – 2: Click the Create a resource link. Resource link is available on the upper left-hand corner of the Azure portal.
Step – 3: Enter bot in search box Select Web App Bot from the drop-down list
Step – 4: Click the Create button on the Web App Bot page
Step – 5: Make the service and deploy the bot (on to the cloud) by clicking Create

Azure Data Bricks

- Is a data engineering tool based on cloud
- Used for **data processing and reworking** on the massive quantities data
- Helps **in data exploration** assisted by machine learning models.
- Azure Data bricks is used **for reading data from multiple data** sources and then turning the same into **breakthrough insights** by using Spark.

How to Create an Azure Data bricks workspace ?

Step 1: Login to the Azure portal

Navigate to Create a resource > Analytics > Azure Data bricks.

Step 2: Specify values for creating a Data bricks workspace.

Step 3: Select Review + Create → Create

This Service has two offerings:

Azure Data bricks SQL Analytics

- ✓ **Run and execute** SQL queries on their data lake.
- ✓ Helps in **creating visualization dashboards**.
- ✓ **Visualizing and Exploring** the data.

Azure Data bricks Workspace

- ✓ Azure Data bricks Workspace is an **interactive workspace**.
- ✓ The data in a data lake lands here for **persistent long term storage**, either in Azure Blob or Azure Data Lake

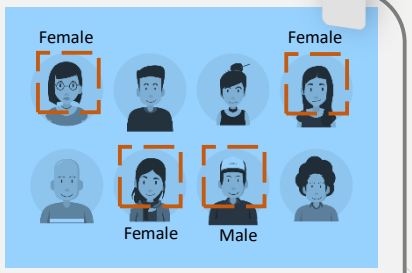
Azure Face Service

AI powered Azure Facial Service can be used to:

- Detect human faces in images,
- Recognize human faces in images
- Analyse human faces in images.

Face Detection

- Helps **to detect faces** in image.
- Detected face is corresponded to **a face Rectangle field**
- **Coordinates** are returned
- **location** of the face and **size** of the face can be determined.
- Faces are **listed in size order In the API response**.



Below face related attributes can be extracted:

Face | Gender | Age | Emotions | Hair Styles | Glasses

- Face Verification, Find similar faces, matching face, authenticate btw objects and recognised face.

Immersive Reader

- ✓ **Improving the reading comprehensions** by use of AI/ML
- ✓ Can be integrated with the web applications
- ✓ Facilitates **improved readability by isolating content**
- ✓ **Pictures are displayed** for common words and terms
- ✓ Highlighting verbs, pronouns, nouns etc.
- ✓ Performs loudly reading of content
- ✓ Speech synthesis is integrated with Immersive Reader service
- ✓ Can **perform the translation** of the content in real-time
- ✓ Can **perform splitting** the words into syllables

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Text -Analytics

Is a part of Azure Cognitive Services

Is a collection of ML and AI algorithms and provides insights related to:
- sentiment,
- entities,
- relations
- key phrases (in unstructured text).

Natural language processing (NLP) is used for:
- ✓ Sentiment analysis,
- ✓ Topic detection,
- ✓ Language detection,
- ✓ Key phrase extraction,
- ✓ Document categorization.
- ✓ Classification of documents,
- ✓ Labelling of documents as sensitive or spam.

Speech-to-Text

Enables speech-to-speech and speech-to-text translation of audio streams, in real-time, and for multi-language.

With the Speech SDK, the applications, devices, and tools have access to:
- source transcriptions
- translation outputs for provided audio.
- Interim transcription
- as speech is detected, the translation results are returned, and the resultant final results could be converted to synthesized speech.

Below two different approaches power Microsoft's translation engine:
- statistical machine translation **(SMT)**
- neural machine translation **(NMT).**

Core features

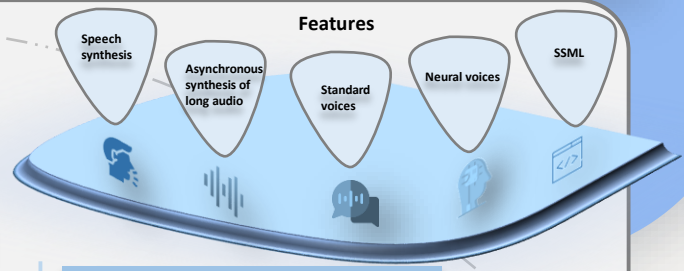
Supports translation to multiple languages.

Recognition results are provided along with Speech-to-text translation

Provides Interim recognition results and translation results

Text-to-Speech

- Facilitates **conversion of text to speech** (the speech is human like synthesised)Can be used to enable not only applications but also tools, and, or devices to perform the conversion of the text and output it as speech.



Speech synthesis

To perform conversion from text-to-speech. The conversion from text-to-speech can be done by using standard, neural, or custom voices.
Can be done by using:
- Speech SDK
- REST API

When doing the conversion using the above two the responses are provided in near to real-time

Asynchronous synthesis of long audio

Is ideal to be performed for the files with duration longer than typically 10 mins, in scenarios like, audio books or lectures.
- The synthesis performed is **asynchronous.**
- The responses returned are generally not in real-time.
- The requests are generally sent asynchronously and then the **polling of the responses happens.**
- The downloadable synthesised audio is made available via the service.
- Neural voices that are supported is custom neural voices. **Can be done by using:** Long Audio API

Standard voices

Is created by the use of Statistical Parametric Synthesis/Concatenation Synthesis techniques and the output voices are:
- **highly intelligible**
- sound natural.
- Easily facilitates the applications to speak in multiple languages (45 languages)

Neural voices

Generally used to perform chat-bot interactions and voice assistants interactions in a more natural and more engaging manner.

Can be used for **audiobooks** as it can convert digital texts (e-books) to audiobooks
Can be used in in-car navigation systems.

Speech Synthesis Markup Language (SSML)

Is XML-based markup language used for customization of speech-to-text outputs.

Can help with:
- Pitch adjustment,
- Adding of pauses,
- Improvement of pronunciation,
- speeding up or slowing down speaking rate,
- increasing or decreasing volume,
- attributing multiple voices to a single document

Speech CLI

Command line tool that facilitates Speech service without need of code. Requires no to minimal setup, is production-ready and scalable for running larger processes by use of automated .bat and/or shell scripts.

When to use?

In case of requirement of experimenting with Speech service features with:
- ✓ minimal setup, and
- ✓ no code

when the requirement is simple requirement involving production application to use Speech service

When to Use - Speech SDK:

- When integration is required for Speech service functionality within a specific language/platform (example. C#, Python, C++)
- In complex and needs advanced service requests
- When it requires developing custom behaviour or response streaming

Features:

Speech synthesis Convert text-to-speech using : input from text files, input directly from the command line.

Speech recognition
Converts speech-to-text from audio files ,directly from a microphone, performs transcription

Speech translation performs audio translation

Translator

Machine translation service which is Microsoft Azure cloud-based

Can be used to:
- Translate text in near real-time by using REST API call.
- uses neural machine translation technology
- offers a technology known as statistical machine translation

Custom Translator:

Is extension of Translator, allows building neural translation systems

Can be used to:
- Perform the translation of the text with Translator
- Perform the translation of the text with Microsoft Speech Services.

Custom Translator can be used along with Translator to
- customize neural translation system
- provide improved translation (terminology-specific and style-specific).

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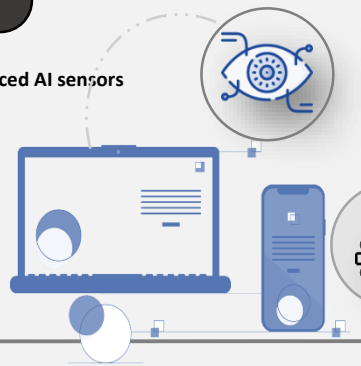
Azure Kinect DK

Is a developer kit enabled with advanced AI sensors provides:

- computer vision models
- Speech models.

Contains:

- ✓ depth sensor,
- ✓ spatial microphone array (including video camera, orientation sensor, and SDKs).



Metrics Advisor

Is part of Azure Cognitive Services uses AI and performs monitoring of data and detection of anomaly in time series data.

Helps by automating the process of:

- Models application

providing web-based API workspace for:

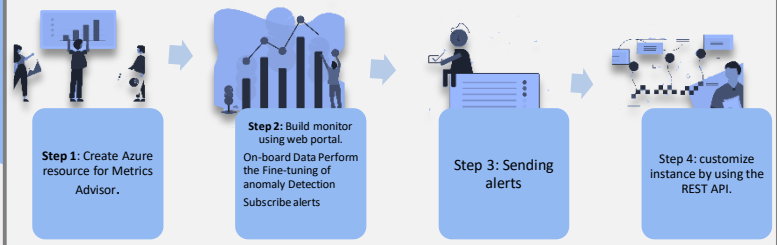
- Data ingestion
- Anomaly detection, and
- Diagnostics

Does not requires machine learning knowledge.

Metrics Advisor can be used for:

- ✓ Multi-dimensional data analysis via multiple data sources
- ✓ Identification and correlation of anomalies
- ✓ Configuration and fine-tuning of anomaly detection model used
- ✓ Diagnosis of anomalies and helping with root cause analysis.

Workflow - On boarding the data, fine-tuning anomaly detection, creating configurations:



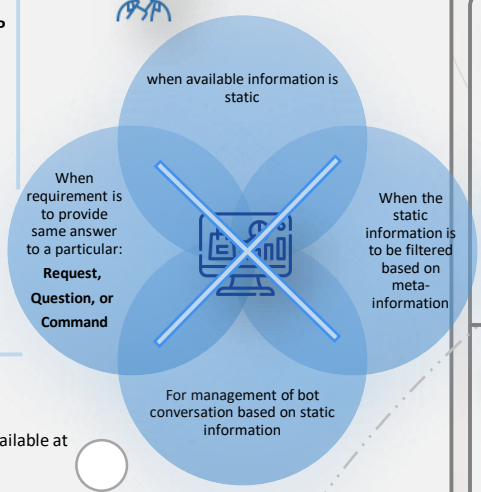
QnA Maker

Is cloud-based service that facilitates NLP (Natural Language Processing)

- Helps to create a conversational (question-and-answer layer) on top of existing data.
- Could be used to build knowledge base
- Knowledge base could be built by performing extraction of questions and answers from:

FAQs,
manuals
documents

When to use:



Steps How to make – QnA maker

Step 1: Pre-Req: Login to Azure Account.
Step 2: Click on "Create a Resource" (Available at screen's left side corner).
Step 3: Click "AI + Machine Learning"
Step 4: Select Web App Bot Service.
Step 5: Provide values for the below:
Bot name,
resource group, etc
Step 6: Select Bot Template as question and answer.

Personalizer

Is an API service offering from Microsoft

- Helps to **increase customer engagement**, customer loyalty, and customer advocacy by utilizing customer data.
- Does not require any ML knowledge or expertise

Use Cases

Product Suggestion

Correct rankings of products

Uses reinforcement learning and continues learning on the best course of action that is to be taken. The best action to be taken is determined **based on reinforcement learning** (reward scores and collective behaviour).

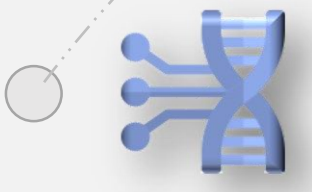
Bonsai

AI development platform, which is Low-code.

- Improves production and reduces downtime
- Provides guidance for optimization
- Is enabled to make decisions independently.
- Runs on Microsoft Azure
- Resource costs are charged to Azure subscription
- Simplifies machine teaching by integrating it with deep reinforcement learning, which enables the user to perform training and deploying systems that are smart and autonomous.

Microsoft Genomics

Is an offering from Microsoft Azure and it implements BWA (Burrows-Wheeler Aligner) and **GATK** (Genome Analysis Toolkit) in Microsoft Azure Cloud.



Speaker Recognition

Provides **solution related to voice recognition**

- Facilitates organizations to utilize deep learning algorithms and **overcome issues pertaining to poor sound quality and perform speaker's identification** accurately by use of distinctive characteristics of the voice.
- Speech information is protected by the use of security protocols which are enterprise-grade
- Prevent hacking attempts and hackers attempts to gain unauthorized access to confidential data and ensures compliance.

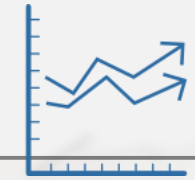
Certified by

Microsoft Azure Speaker Recognition - Main features

- ✓ Verification of Speaker
- ✓ Identification of Speaker
- ✓ Security features are Built-in
- ✓ Compliance Management
- ✓ Intelligence API
- ✓ Voice Authentication
- ✓ Customer Support
- ✓ Customer Engagement

Microsoft Azure Speaker Recognition – Benefits

- **Dynamic speaker** identification
- Compliance management
- Flexible pricing.



Language Understanding

Helps identify information of value in conversations and **performs interpretation** of user goals (also known as intents). It extracts valuable information from sentences (also known as entities) **and helps in easily creating language bots**

Social Media Feedback, monitoring and response

Speech Enabled desktop apps for order tracking

Steps: Integrating app with LUIS

Steps to Create Luis chat bot:

- **Step 1**: Perform sign in to LUIS portal.
- **Step 2**: Select subscription & authoring resource.
- **Step 3**: Create new app.
- **Step 4**: Add prebuilt domain.
- **Step 5**: Intents and entities.
- **Step 6**: Train the LUIS app.
- **Step 7**: Test app.
- **Step 8**: Publish app and get endpoint URL.

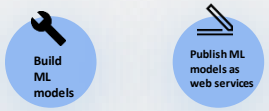
Azure Machine Learning

Azure machine learning Is a cloud-based service that helps **in building, testing, and deploying predictive analytics solutions**

Machine Learning Studio (MLS):

- Is an interactive workspace
- Enables drag-and-drop of datasets
- Facilitates modules analysis into an interactive canvas
- Helps to connect interactive canvas to make an experiment
- Help in : **editing the experiment , reserve experiment , running experiment , converting training experiment to predictive experiment , publishing experiment as an internet service**

Is a drag-and-drop tool used to:



Custom apps could consume the models.

Experiments - Characteristics:

has a minimum of one dataset

- has a minimum of one module.
- Datasets can also be connected only to modules.
- Modules in general are connected to either:
  - ✓ datasets
  - ✓ other modules.

All required parameters must be set for every module.

Dataset – What

A dataset is a data uploaded to MLS to be consumed in modelling process.

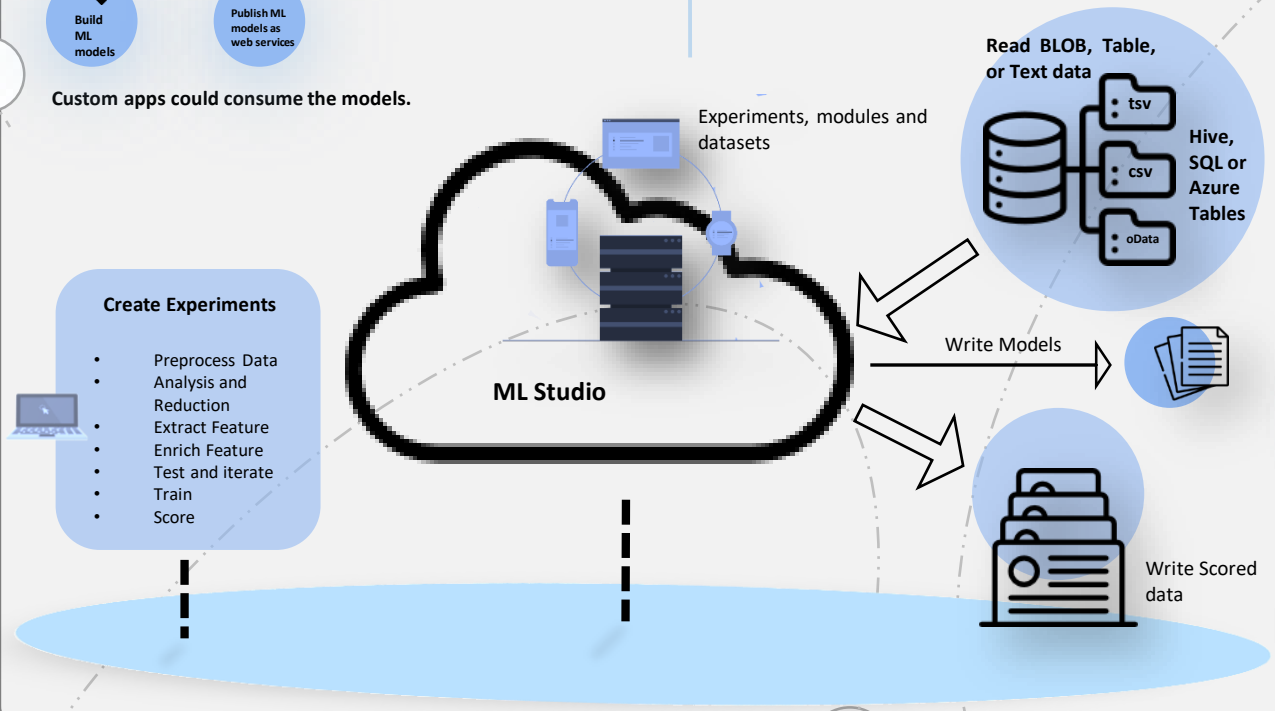
- Variety of datasets are available at MLS.
- The list of the datasets is available at the left of the canvas.

Module – What

An algorithm for your data. MLS features a number of ML algorithms including for:

- training,
- scoring
- validating

- To configure internal algorithms of module, a module can **have group of paramaters**.
- Upon selecting module on the canvas, the module's parameters are displayed within **the Properties pane** to the proper of the canvas.
- Modification of the parameters can be done for model tuning.



Machine Learning implementation

- **Dataset samples preparation**
- **Dataset samples Analysis.**
- **System training by using dataset samples.**
- **Evaluation of the resulting dataset outcome and gauging the accuracy.**

Azure Cognitive Search

Azure Cognitive Search is a cloud search service offering
- Has built-in AI capabilities and Highly scalable

Enriches and facilitates to easily perform
- ✓ **Identification of relevant content at scale.**
- ✓ **Explore the required relevant content**

Service provided by Cognitive Search:
- Indexing of query
- Query execution
- **Provides persistent storage** for the search indexes
- Facilitates a language for composing queries
- **Simple and complex queries** could be composed
- Analysis is AI-centered
- Helps in creating searchable content from:
  - ✓ Images
  - ✓ Raw text
- Application **files Integration** with Azure data is enable through:
- ✓ Search indexers
- ✓ Automation of data import
- ✓ Automation of data refresh

Cognitive Search is a search service residing between data stores (external) containing data (specifically the un-indexed), and enables the client app to send query requests to a search index and performs the handling of the response.

Core search features end-to-end exploration - Steps

Step 1: Create a search service (Can be done on Free tier and also on paid tier for dedicated resources)

Step 2: Create a search index
Can be done using:
Azure portal
REST API.
.NET SDK,
Any other SDK.

Step 3: Perform Upload of content to index.
"Push" model can be used to push JSON documents (from any source),
"Pull" model (indexers) can be used if source data is residing on Azure.

Step 4: Query index
Index can be queried by using:
Search explorer in the portal,
REST API,
.NET SDK,
Any other SDK.

Azure Cognitive Search - AI enrichment

- AI enrichment is a capability of Azure Cognitive Search indexing
- AI enrichment is used to:
  - Text extraction from
    - **Images,**
    - **blobs**
    - **other unstructured data sources.**
- Enrichment and extraction:
  - Make content searchable in an:
    - **Index**
    - **knowledge store.**
  - Implemented using cognitive skills (Using indexing pipeline).

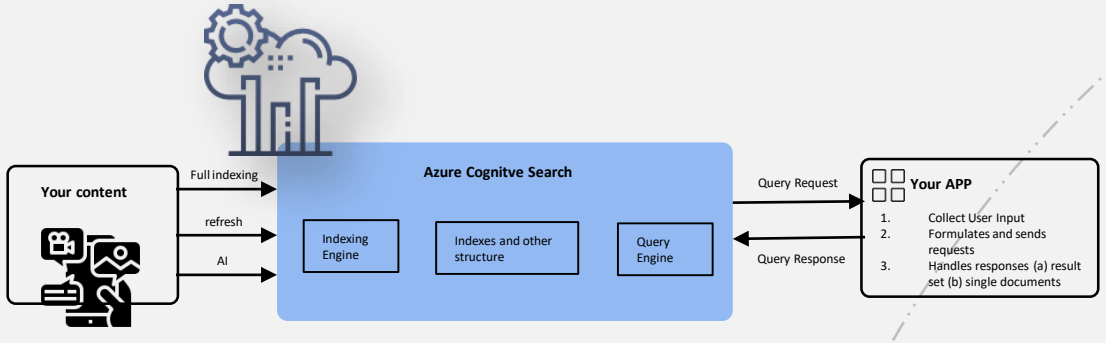
Steps in an enrichment Pipeline

Pipeline based on **indexers**

Indexers populate an index on field-to-field mappings between the index and your data source

Skills, now attached to indexers, intercept and enrich documents according to the skillset you define

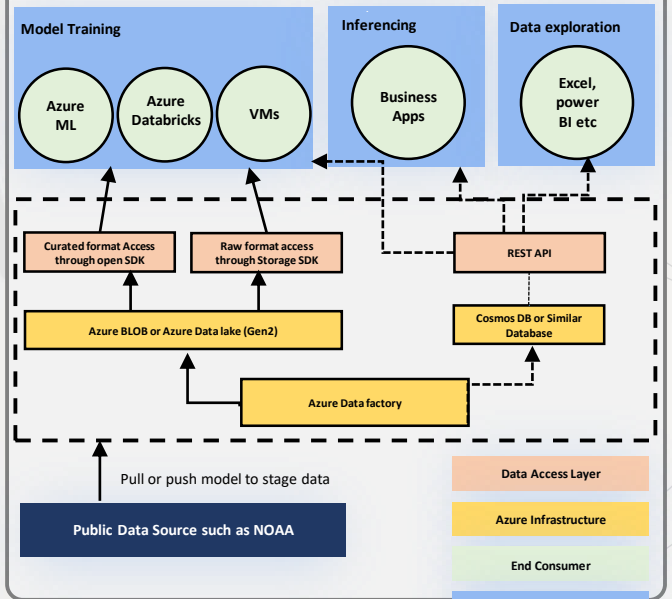
Once indexed, you can access content via search requests through all query



Azure Open Dataset

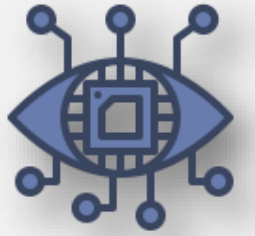
- Public datasets that are curated
- Can be used for **adding scenario-specific features** to ML solutions
- Usage of Azure open datasets helps to achieve **models with more accuracy.**
- These datasets are available in the Azure cloud
- These datasets are integrated into Machine Learning from Azure
- The datasets readily available to:
  - ✓ Azure Databricks
  - ✓ Machine Learning Studio (classic).
- The datasets are accessible through the APIs
- Can be used with other products, like:
  - ✓ Power BI,
  - ✓ Azure Data Factory
- **Includes the data in public domain**

Building Blocks of Open Dataset



Azure Computer Vision

Helps **in processing images and returning visual features** based information by providing access to advanced algorithms.



- Facilitates determination of whether

Helps in:

- ✓ Finding brands
- ✓ Finding objects
- ✓ Finding human faces

- Enables multiple DAM (digital asset management) scenarios.
- Has **OCR** (Optical Character Recognition) capabilities.
- Extraction of printed text and handwritten text can be done from images and documents by use of Read API.
- Is optimized to work with:

Receipts, posters, business cards, letters, whiteboards

- Can be used to do object detection.

Object Detection using Computer Vision

- Is similar to tagging
- **Bounding box coordinates** (in pixels) are included in the result for each object found.
- Enabled to be used for **processing the images and finding the relationship** between the objects in the particular image(s).
- Helps in the determination of the same tag multiple instances in an image.
- **Tag application** on the basis **of objects in an image** or identified living things in an image can be done by the use of Detect API.

Computer Vision algorithms provides tags when an image is uploaded or an image URL provided based on below:

- ✓ Objects in image,
- ✓ living beings in image,
- ✓ actions identified in image

The tagging is performed for the below along with the main subject:

Computer Vision can:

- Detect human face

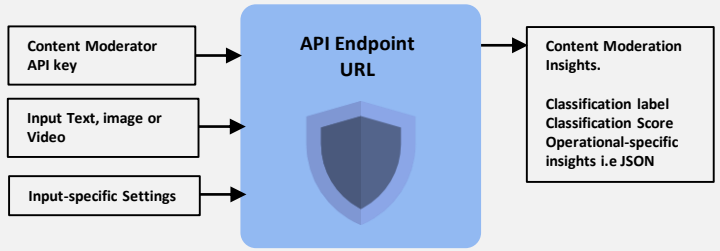
Generate various aspects related to human face like:

- ✓ **age,**
- ✓ **gender**
- Rectangle for each detected face.
- The face detection feature of computer vision is done through the Analyze Image API.
- Analyse Image API can be called by native SDK and REST calls.

Azure Content Moderator

- Is an AI service that performs Artificial Intelligence powered content moderation including handling:
  - ✓ **offensive, potentially offensive content**
  - ✓ **risky content**
  - ✓ **Content that is not desirable**
- Performs the moderation of the content by scanning the text, scanning the image, and scanning the videos
- Upon doing the scanning of the object (image, text, video) automatically applies flags to the content.
- Consists of web service APIs and is readily available through:
  - ✓ **REST calls**
  - ✓ **.NET SDK**.
- Review tool (facilitates reviewers to assist service and improves the moderation) is also included.

Moderation APIs



Text moderation: performs text scanning and identifies and moderates the content for:

- ✓ offensive content material,
- ✓ sexually explicit or suggestive content material,
- ✓ profanity in the content, and personal data.

Custom term lists – Performs the scanning of text against a list of custom defined terms and built-in terms. Custom lists can be used to block/allow content in accordance with content policies.

Image moderation – Performs the scanning of the images and moderates for:

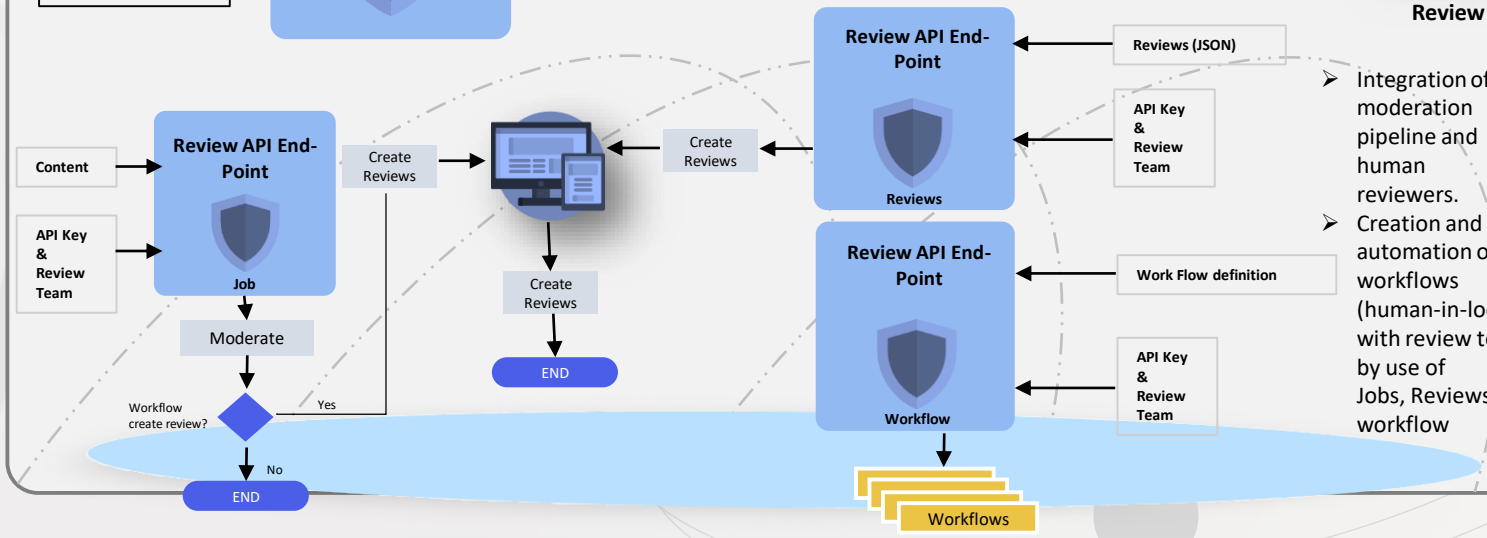
- ✓ Images with adult or racy content,
- ✓ Helps in identifying and detecting the text in images with assistance of Optical Character Recognition (OCR) capability,
- ✓ Performs the detection of the faces.

Custom image lists – Scanning of the images is performed against a custom list of images. Using custom image lists helps in filtering out content that recur and is unintended.

Video moderation – Performs scanning of the videos and identifies and moderates:

- ✓ adult video content
- ✓ racy video content
- ✓ time markers for content is returned.

Review APIs



- Integration of the moderation pipeline and human reviewers.
- Creation and automation of workflows (human-in-loop) with review tools by use of Jobs, Reviews and workflow

Azure Data Science Virtual Machine

Azure Data Science Virtual Machine (DSVM) is customized VM image built solely for data science on Microsoft's Azure cloud .

- Has pre-configured and pre-installed data science tools that are popular
- User can readily start using and building advanced analytics intelligent applications

Steps to setup Azure Data Science Virtual Machine (DSVM)

Azure Custom Vision

Is an Image recognition service that **helps in building, deploying, and improving image identifiers**. Image identifier performs the application of the labels (representing classes /objects) to:

Images, based on their visual characteristics

- Allows specifying labels and training custom models to detect the labels
- Computer Vision service does not Allows specifying labels and training custom models to detect the labels
- Image analysis by the Custom Vision service is done by the use of ML algorithms.

The below are needed to be created by the user upon using the Custom Vision Service:

- ✓ Custom Vision Training,
- ✓ Prediction resources, in Azure.

Steps to Build object detector (with the Custom Vision website)

Step 1: Create
- ✓ Custom Vision resources
- ✓ New project

Step 2: Choose training images
Step 3: Upload images
Step 4: tag images
Step 5: Train detector
Step 6: Evaluate detector
Step 7: Manage training iterations

Steps to Test and retrain model (with Custom Vision Service)

Testing the model

Select project From the Custom Vision web page.

s elect **Quick Test** from top menu bar which opens **Quick Test** window.

Click **Submit Image** Field In the **Quick Test** window and enter URL of intended image

The selected image shall appear in the middle of the page and the results would come up below the image with two columns

(**Tags** and **Confidence**) **table .**

Training model using predicted image

View previously submitted images to the classifier by: Opening Custom Vision selecting **Predictions** tab.

Hover above image and see the tag prediction performed by the classifier.

Retrain the classifier, by using **Train** button.

Building image Classifier (by using web portal) –