

// 5 domains

(6-9 Quest)

15-20% - Describe AI workloads and consideration.

20-25% - Fundamental principle of machine learning  
on Azure (7-12 Quest)15-20% - computer vision on workloads on Azure  
(6-9 Quest)15-20% - Features of Natural language  
processing workloads on Azure. (6-9 Quest)15-20% - Features of generative AI workloads on  
Azure (6-9 Questions)

700 / 1000
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// NO of Q/n's - 37-47 Questions.

\* 10-13 questions goes wrong

Format of Questions

- Multiple choice
- Multiple Answer
- Drag and Drop
- Hot Area

// No negative marks for wrong  
ones //

Duration - 60 mins

~ 1 min Per question.

Seat time ~ 90 mins.

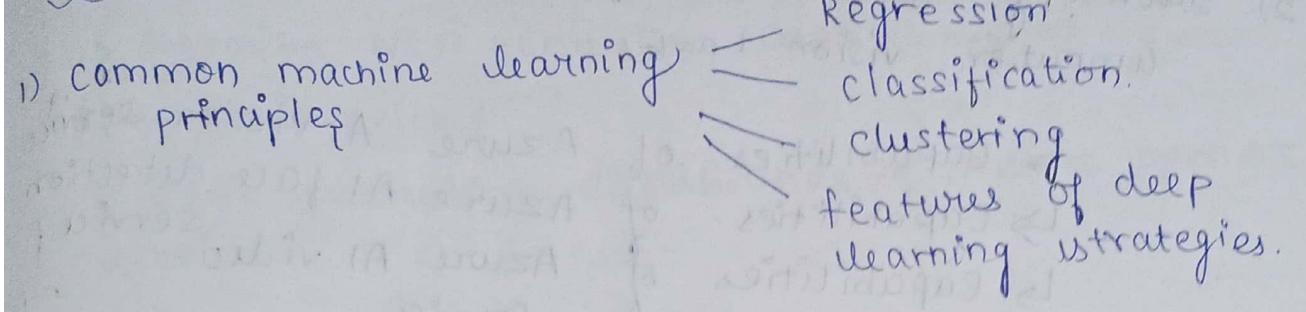
## > AI workloads

- 1) content moderation (filtering out inappropriate (or) harmful content from user generated inputs to ensure a safe and positive user experience).
- 2) personalized workloads (analyze the user behaviour and preferences to tailor content recommendations or experiences to individual users).
- 3) Computer vision workloads - To recognize videos and photos in order recognizing the object and faces and actions.
- 4) Natural language processing Workloads -
- 5) knowledge mining workloads -
- 6) features of Generative AI solutions.

## > principles of AI

- 1) fairness and in AI solution
- 2) reliability and safety
- 3) privacy and security
- 4) Inclusiveness
- 5) Transparency
- 6) accountability

# Fundamental principles of machine learning



## 2) Core machine learning concepts

- \* To identify features and labels in a dataset in ML

\* How training and validation datasets are used in ML

## 3) Azure ML capabilities

- \* Automated machine learning.

\* Data and compute services for data science and ML

\* Model management and deployment capabilities in Azure Machine Learning

## Computer Vision workloads on Azure.

- 1) Identify common types of computer vision sol.
- ↳ Image classification solution
  - ↳ Object detection solution.
  - ↳ Optical character recognition solution.
  - ↳ Features of facial detection and facial analysis solution.

- 2) Identify Azure tools and services for computer vision tasks.
- ↳ capabilities of Azure AI vision service
  - ↳ capabilities of Azure AI face detection service.
  - ↳ capabilities of Azure AI video indexer service.

- > Features of Natural language processing (NLP) workloads on Azure
- 1) common NLP workload
    - > key phrase extraction.
    - > entity recognition
    - > sentiment analysis
    - > language modeling
    - > speech recognition & synthesis.
    - > features & uses for translation

- 2) Azure tools and services for NLP workloads
- > describe capabilities of Azure AI language service
  - > Azure AI speech service
  - > Azure AI translator service

- > Features of Gen AI Workloads on Azure
- 1) Identify features of Gen AI solutions
    - > gen AI models.
    - > Common scenarios of gen AI
    - > responsible AI considerations for gen AI.

2) Capabilities of gen Azure OpenAI service.

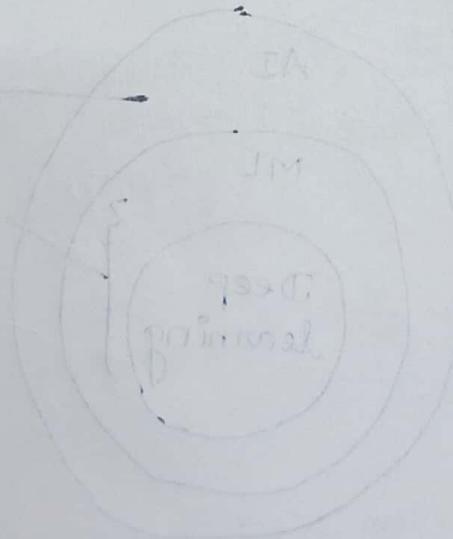
> Describe NLP generation capabilities of Azure Open AI service.

> code generation capabilities of Azure open AI service.

import random

to avoid to the problem - please, go to  
of beginning greater than less than  
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When this does A - takes what is  
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answering well

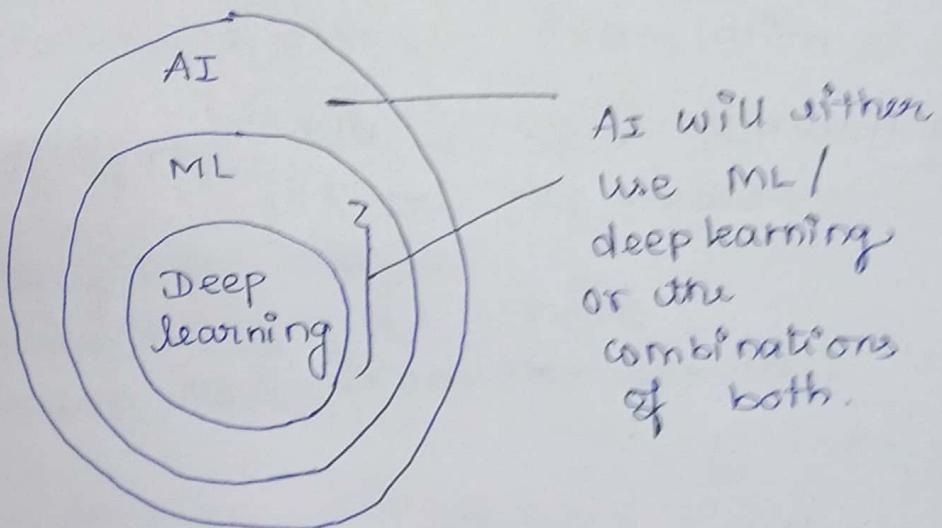


10.2 strength point

domain setting truth answer in EA  
abilities has received

## The layers of machine learning

- 1) AI - machine that performs job that mimic human behaviour.
- 2) ML - machine that get better at a task without explicit human programming.
- 3) Deep learning - machine that have an artificial neural network <sup>and</sup> inspired by the human brain to solve complex problems.
- 4) Data scientist - A person with multi disciplinary skill in math, statistics, predictive modelling and machine learning to make future predictions.



## Key elements of AI

AI is the software that imitates, human behaviour and capabilities.

Key elements (according to Microsoft / Azure) :-

- > machine learning - The foundation of an AI system, learn and predict like a human.
- > Anomaly detection - detect outliers or things out of place like a human.
- > computer vision - be able to see like a human.
- > natural language processing - be able to process human languages and infer context.
- > conversational AI - be able to hold a conversation with a human.

### Datasets

- 1) It is a logical grouping of units (of data) that are closely related and share the same data structure.
- 2) There are publicly available datasets that are used in the learning of statistics, data analytics, machine learning.

### Mnist database :-

\* Images of handwritten digits used to test classification, clustering and image processing algorithm.

commonly used when learning how to build computer vision ML models to translate handwriting into digital, text, no. of pixels

Common objects in context (COCO) dataset.

> A dataset which contains many common images using a JSON file (COCO format) that identifies object or segments within an image.

↳ Features of this dataset:-

- 1) Object segmentation
- 2) Recognition in context
- 3) Superpixel stuff segmentation.
- 4) 329k images (> 200k labeled)
- 5) 0.5 million object instances
- 6) 79 object categories
- 7) 90 stuff categories.
- 8) 4 captions per image
- 9) 2,49,000 people with key points.

• Azure machine learning studio have data labelling service. → coco dataset



Azure data pipeline.

Data labeling:-

> The process of identifying raw data (images, text files, videos, etc..,) and adding one or more meaningful and informative labels to provide context so that ML model

with (supervised ML), labeling is a prerequisite to produce training data and each piece of data will generally be labeled by a human.

[Today, no constraint to assign one label to each item]

with (unsupervised ML), labeling will be produced by the machine and may not be human readable.

what is a ground truth?

> A properly labeled dataset that you use as the objective standard to train and assess a given model is often called "ground truth". The accuracy of your trained model will depend on the accuracy of the ground truth.

// supervised and unsupervised Reinforcement //

// Supervised learning // (SL)

• Data that has been labelled for training

[Task - driven - make a prediction]

when the labels are known and you

1) want a precise outcome.

2) when you need a specific value returned

e.g.: classification, Regression

// "unsupervised learning" (SL)

- 1) Data has not been labeled, then ML model needs to do its own labelling [Data driven - Recognize a structure or pattern]

- 2) when the labels are not known and the outcomes does not need to be precise. when you're trying to make sense of data

eg:- clustering, Dimensionality Reduction,

Association.

// "Reinforcement learning"

- 1) There is no data, there is an environment and an ML model generates data, any many attempt to reach a goal

[Decision - driven - Game, AI, Learning]

Tasks, Robot Navigation]

Note:-

\* Supervised and unsupervised machine learning is classical machine learning that heavily rely on statistics and math to produce the outcome.

# Neural Network and Deep Learning (ANN)

what is neural network? (NN) also called as Neural nets.

- > often described as mimicking the brain, a neuron / node represents an algorithm.
- > Data is inputted into a neuron and based on the output the data will be passed to one of many other connected neurons.
- > the connection between neurons is weighted.
- > the network is organized in layers.
- > It has a input layer, 2 to many hidden layers and an output layer.

what is Deep learning?

- > A neural network that has 3 or more hidden layers is considered deep learning.
- > It is not human readable. (what the working is going on with those layers are not under known)

what is feed forward (FNN)

Neural Networks where connections between nodes do not form a cycle (always move forward)

what is Backpropagation (BP)?

Moves backwards through the neural network adjusting weights to improve outcome on next iteration. This is how the neural net learns.

## Back propagation/

Loss function:-

A function, that compares the ground truth to the prediction to determine the error rate (how bad the network formed)

- It goes to the end it performs calculation and then it's going to do its back propagation and adjust the weights.

## Activation function:-

- An function algorithm applied to a hidden layer node that affects connected output eg: ReLu.
- > It is a part of back propagation.

Dense

when the next layer increases the amount of nodes.

sparse

when the next layer decreases the amount of nodes.

when dense layer goes to a sparse layer that's called as dimensionality reduction.  
(Reducing the dimensions/nodes).

## Graphics processing unit (GPU)

what is GPU?

- > A general processing unit that is specially designed to quickly render high resolution images and video concurrently.
- > GPU can perform parallel operations on multiple sets of data, and so they are commonly used for non-graphical tasks such as machine learning and scientific computation.

> CPU can have average 4 to 16 processor cores.

> GPU can have thousands of processor cores.

> GPU can provide as many as

> 4 to 8 GPUs can have up to 40,000 cores.

CPU

GPU

> Optimized for serial tasks

> Optimized for many parallel tasks

> GPU are best suited for repetitive and highly parallel computing tasks such as.

- Rendering graphics

- Cryptocurrency mining

- Deep learning and ML.

# Compute unified Device architecture (CUDA)

what is NVIDIA?

- NVIDIA is a company that manufactures graphical processing units (GPUs) for gaming and professional markets.

what is CUDA?

compute unified device architecture (CUDA) is a parallel computing platform and API by NVIDIA that allows developers to use CUDA - enabled GPUs for general purpose computing on GPUs (GPGPU).

- > All major deep learning frameworks are integrated with NVIDIA deep learning SDK (Software development kit)
- > NVIDIA deep learning SDK is a collection of NVIDIA libraries for deep learning.
- > One of those libraries is the CUDA Deep Neural Network library (cuDNN).

cuDNN provides highly tuned implementations for standard routines such as:

- Forward and Backward convolution (convolution is great for computer vision)
- pooling
- Normalization
- activation layers.

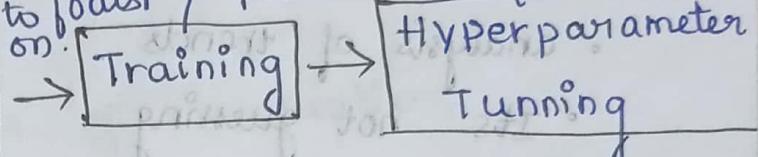
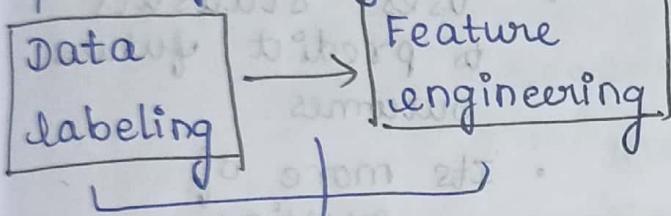
# Simple ML Pipeline :-

for supervised learning you need to label your data so that ML model can learn by eg ↑ during training

ML models only work with the numerical data. so you need to translate it into a format that it can understand! extract out the imp data that ML needs to focus on.

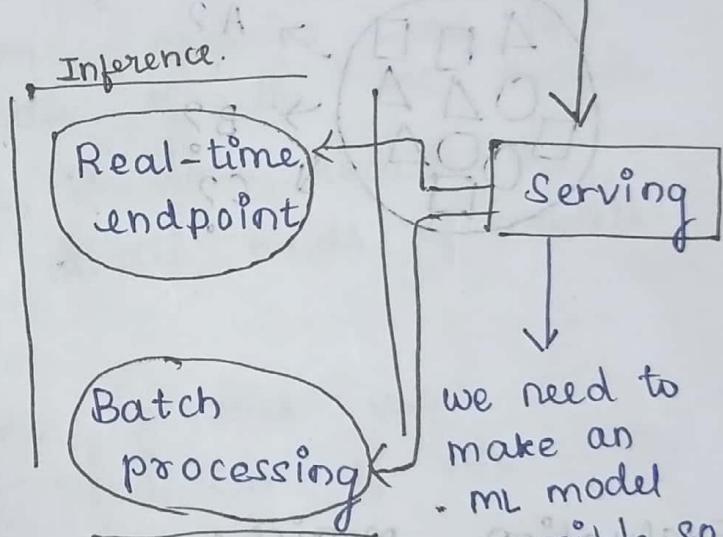
your model needs to learn how to become smarter. with each iteration because it performs multiple iterative procedure to optimize the outcome.

An ML model can have different parameters we can use ML to try out many different parameters to optimize the outcome.



Preprocessing procedures

> coz, we are preparing our data to be trained for the model.



a) Inference - It is the act of requesting

to make a prediction

> you will send your payload with either CSV and get results.

we need to make an ML model accessible, so we serve by hosting a VM or container.  
eg:- Azure kubernetes service or container instance.

## Forecast vs prediction

Trade-off aimed at most extremity of outcomes. It's no Forecast

- Future prediction with relevant data

- analysis of trends
- It's not guessing

who takes it

but this area believe in  
not to human, not believe  
at least way of prediction.

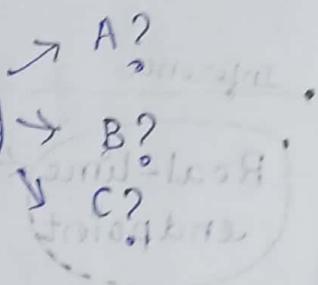
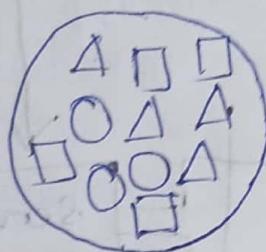
• future prediction

without relevant data

• uses statistics  
to predict future  
outcomes.

• It's more of  
guessing

• uses decision  
theory



## Evaluation Metrics :-

Performance / evaluation metrics are used to evaluate different machine learning algorithms.

- > For different types of problems, different metrics matter
- . Classification Metrics (accuracy, precision, recall, F1 score, ROC, AUC)

- Regression metrics (MSE, RMSE, MAE)
- Ranking metrics (MRR, DCG, NDCG)
- Statistical Metrics (correlation)
- Computer vision metrics (PSNR, SSIM, IoU)
- NLP metrics (perplexity, BLEU, Meteor, Rouge)
- Deep learning related metrics (Inception score, Frechet Inception distance)

## Two categories of Evaluation Metrics

- 1) Internal evaluation - Metrics used to evaluate the internals of the ML model.
- 2) External evaluation - Metrics used to evaluate the final prediction of the ML model.

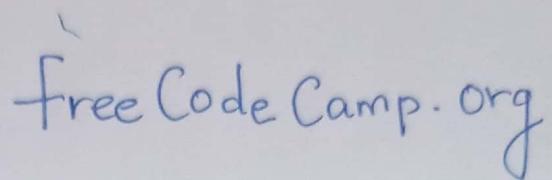
## Jupyter Notebook

- > It is a web based application for authoring documents that contain combine.
  - Live-code
  - narrative-text
  - Equations
  - visualizations

> ipython notebook feature became jupyter notebook

- » Jupyter Notebooks were overhauled and better integrated into an IDE called JupyterLab.
- » You generally want to open Notebooks in labs.
- » The legacy web based interface is known as Jupyter classic Notebook.
- » JupyterLab is a next generation web-based user interface.
- » All the familiar features of the classic Jupyter Notebook in a flexible and powerful user interface.
  - Notebook
  - Terminal
  - Text editor
  - File browser
  - Rich outputs
- » JupyterLab will eventually replace the classic Jupyter Notebook.

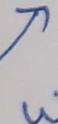
These are all the basic key points to know before studying in depth.

Youtube channel  
Preferred :-  FreeCodeCamp.org

» Take certain practice assessment in microsoft learn.

» For registration use the website

www.microsoftlearn

»  where you can find more resources and mock test for Preparation.

All the best !!! 