MICROSOFT CERTIFIED: AZURE AI FUNDAMENTALS

INTRO TO AI

- AI enables us to build amazing software that can
  - improve health care,
  - enable people to overcome physical disadvantages,
  - empower smart infrastructure,
  - create incredible entertainment experiences,
  - and even save the planet!


THE FUTURE WE INVENT,
IS THE CHOICE WE MAKE
MICROSOFT

WHAT IS AI?

- Simply put, AI is the creation of software that imitates human behaviors and capabilities. Key workloads include:
- **Machine learning** - This is often the foundation for an AI system, and is the way we "teach" a computer model to make prediction and draw conclusions from data.
- **Anomaly detection** - The capability to automatically detect errors or unusual activity in a system.
- **Computer vision** - The capability of software to interpret the world visually through cameras, video, and images.
- **Natural language processing** - The capability for a computer to interpret written or spoken language, and respond in kind.
- **Knowledge mining** - The capability to extract information from large volumes of often unstructured data to create a searchable knowledge store.

WHAT MACHINE LEARNING DOES?

- Find patterns in data
- Uses those patterns to predict the future.
- Examples:
  - Detecting credit card fraud
  - Determining whether the customer is likely to switch to a competitor

WHAT DOES IT MEAN "TO LEARN"?

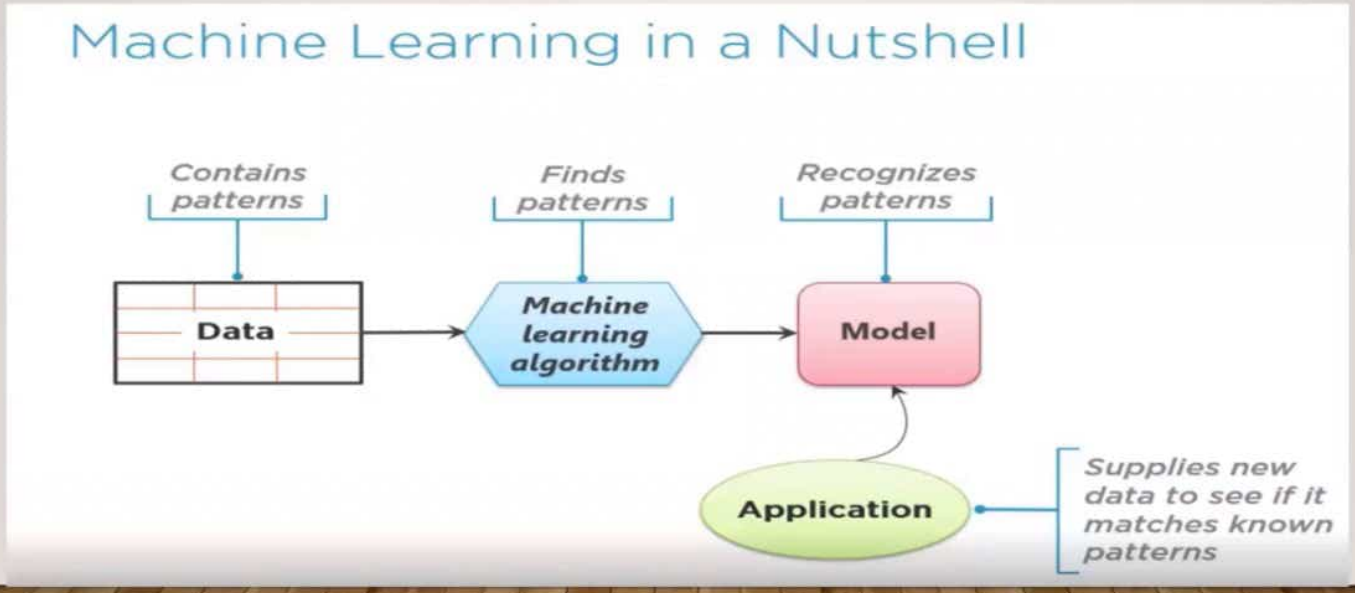
- How do we learn to read?
- Learning requires:
  - Identifying patterns
  - Recognizing those patterns when you see them again

Age	Estimated	Purchased
19	19000	0
32	150000	1
25	33000	0
47	30000	1
29	43000	0

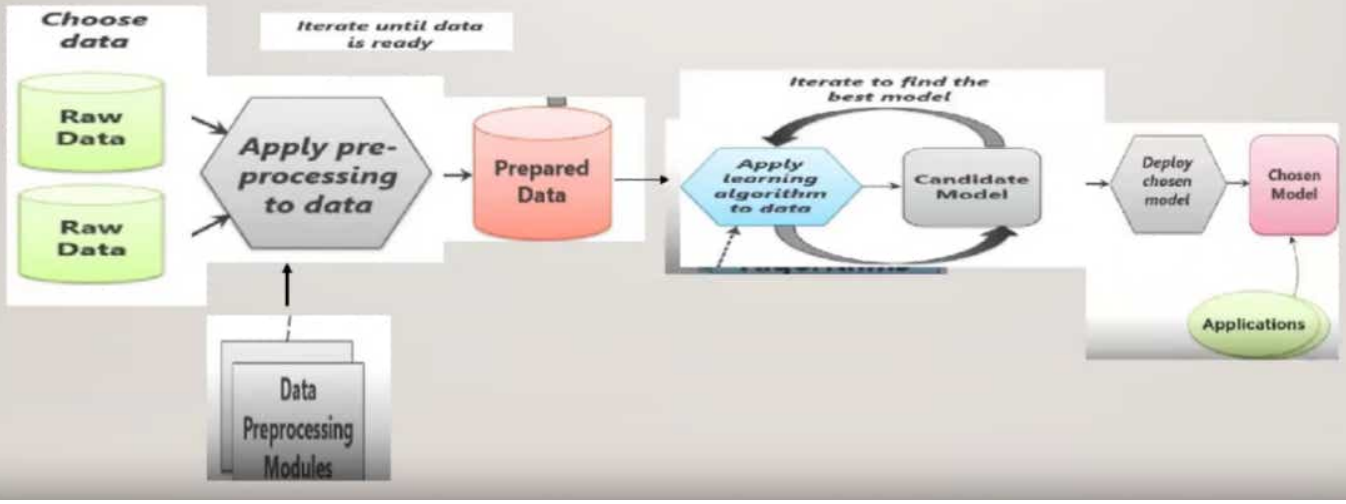
Age	Estimated	Purchased
19	19000	0
32	150000	1
25	33000	0
47	30000	1
29	43000	0
26	80000	0
26	52000	0
47	49000	1
48	41000	1
45	22000	1

More the Data, Better is the understanding!!

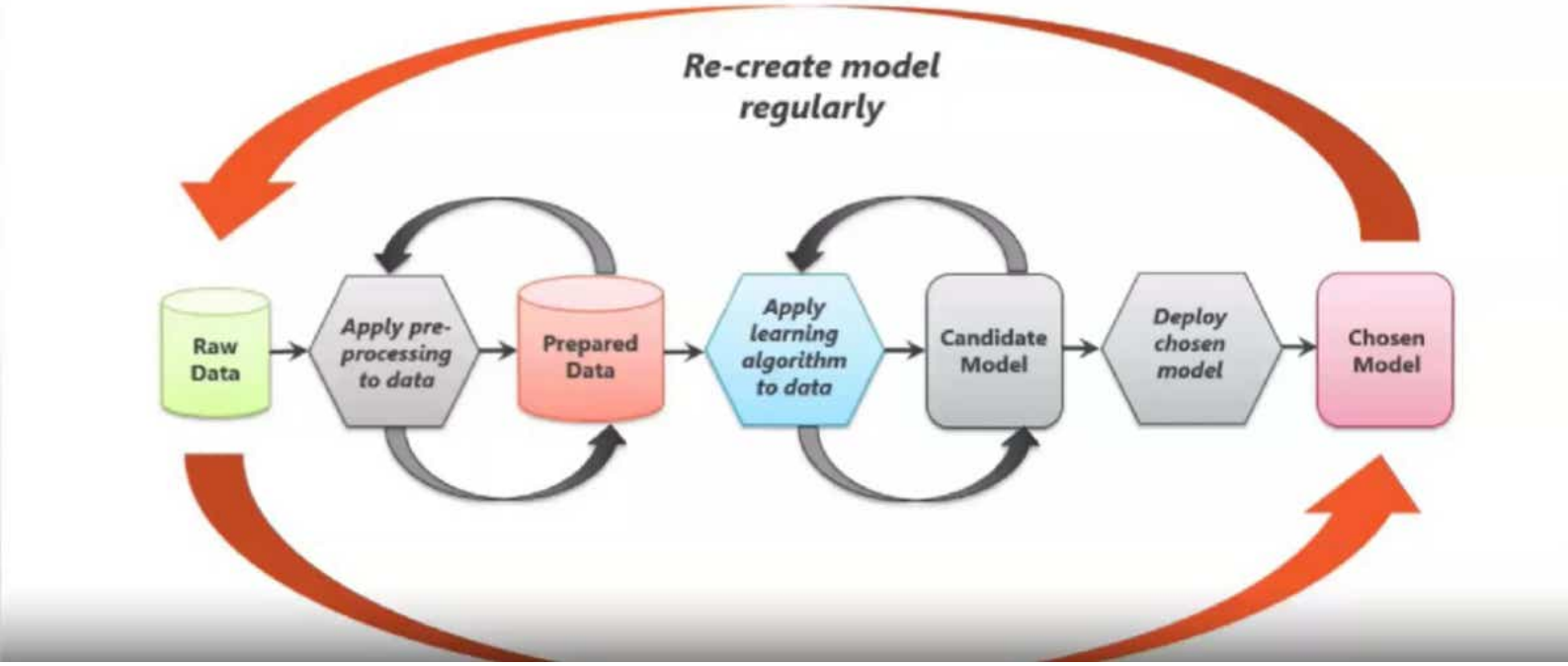
Machine Learning lets us find patterns in existing data, then create and use a model that recognizes those patterns in new data.



MACHINE LEARNING PROCESS



Repeating the Machine Learning Process



EXAMPLE : SUPPOSE AN ENVIRONMENTAL CONSERVATION ORGANIZATION WANTS VOLUNTEERS TO IDENTIFY AND CATALOG DIFFERENT SPECIES OF WILDFLOWER USING A PHONE APP

1. A team of botanists and scientists collect data on wildflower samples.
2. The team labels the samples with the correct species.
3. The labeled data is processed using an algorithm that finds relationships between the features of the samples and the labeled species.
4. The results of the algorithm are encapsulated in a model.
5. When new samples are found by volunteers, the model can identify the correct species label.

MACHINE LEARNING IN MICROSOFT AZURE

- Microsoft Azure provides the **Azure Machine Learning** service - a cloud-based platform for creating, managing, and publishing machine learning models. Azure Machine Learning provides the following features and capabilities:

Feature	Capability
Automated machine learning	This feature enables non-experts to quickly create an effective machine learning model from data.
Azure Machine Learning designer	A graphical interface enabling no-code development of machine learning solutions.
Data and compute management	Cloud-based data storage and compute resources that professional data scientists can use to run data experiment code at scale.
Pipelines	Data scientists, software engineers, and IT operations professionals can define pipelines to orchestrate model training, deployment, and management tasks.

ANOMALY DETECTION AI

- Anomaly : Any abnormal thing. A marked deviation from the norm or a standard.
- Anomaly Detection : Process of finding outliers within dataset
- Anomaly detection by hand is very tedious process. Using machine learning is the better way.
- **ANOMALY DETECTOR** : Detect anomalies in data to quickly identify and troubleshoot issues.

USE CASES FOR ANOMALY DETECTION

- Data Cleaning
- Intrusion Detection
- Fraud Detection
- System health monitoring
- Event detection in sensor networks
- Ecosystem disturbances
- Detection of critical and cascading flaws

COMPUTER VISION

CV IS USING ML NN TO GAIN HIGH LEVEL UNDERSTANDING FROM DIGITAL IMAGES OR VIDEOS

- Type of Computer Vision
- Image Classification
- Object Detection
- Semantic Segmentation
- Image Analysis
- Optical Character Recognition
- Facial Detection

COMPUTER VISION SERVICES IN MICROSOFT AZURE

- Microsoft Azure provides the following cognitive services to help you create computer vision solutions:

Service	Capabilities
Computer Vision	You can use this service to analyze images and video, and extract descriptions, tags, objects, and text.
Custom Vision	Use this service to train custom image classification and object detection models using your own images.
Face	The Face service enables you to build face detection and facial recognition solutions.
Form Recognizer	Use this service to extract information from scanned forms and invoices.

NATURAL LANGUAGE PROCESSING

NATURAL LANGUAGE PROCESSING (NLP) IS THE AREA OF AI THAT DEALS WITH CREATING SOFTWARE THAT UNDERSTANDS WRITTEN AND SPOKEN LANGUAGE.

- NLP enables you to create software that can:
- Analyze and interpret text in documents, email messages, and other sources.
- Interpret spoken language, and synthesize speech responses.
- Automatically translate spoken or written phrases between languages.
- Interpret commands and determine appropriate actions.

NATURAL LANGUAGE PROCESSING IN MICROSOFT AZURE

Service	Capabilities
Language	Use this service to access features for understanding and analyzing text, training language models that can understand spoken or text-based commands, and building intelligent applications.
Translator	Use this service to translate text between more than 60 languages.
Speech	Use this service to recognize and synthesize speech, and to translate spoken languages.
Azure Bot	This service provides a platform for conversational AI, the capability of a software "agent" to participate in a conversation. Developers can use the *Bot Framework* to create a bot and manage it with Azure Bot Service - integrating back-end services like Language, and connecting to channels for web chat, email, Microsoft Teams, and others.

KNOWLEDGE MINING

KNOWLEDGE MINING

- Knowledge mining is the term used to describe solutions that involve extracting information from large volumes of often unstructured data to create a searchable knowledge store.

- **Azure Cognitive Search** : a private, enterprise, search solution that has tools for building indexes. The indexes can then be used for internal only use, or to enable searchable content on public facing internet assets.

RESPONSIBLE AI

DAMAN VIRDI

CHALLENGES AND RISKS WITH AI

- Artificial Intelligence is a powerful tool that can be used to greatly benefit the world. However, like any tool, it must be used responsibly

Challenge or Risk	Example
Bias can affect results	A loan-approval model discriminates by gender due to bias in the data with which it was trained
Errors may cause harm	An autonomous vehicle experiences a system failure and causes a collision
Data could be exposed	A medical diagnostic bot is trained using sensitive patient data, which is stored insecurely
Solutions may not work for everyone	A home automation assistant provides no audio output for visually impaired users
Users must trust a complex system	An AI-based financial tool makes investment recommendations - what are they based on?
Who's liable for AI-driven decisions?	An innocent person is convicted of a crime based on evidence from facial recognition – who's responsible?

UNDERSTAND RESPONSIBLE AI

- 1. **Fairness**
- 2. **Reliability and safety**
- 3. **Privacy and security**
- 4. **Inclusiveness**
- 5. **Transparency**
- 6. **Accountability**