Azure we can directly create virtual machine with the rhelp of azure vm service

We can host application on these virtual machine

The underline infrastructure (the physical servers, storage and the networking) is managed by azure themselves (azure platform)

Key benefits

1. We don’t need to invest in hardware upfront
2. We can terminate the resources
3. We only pay for how much we use.

Machine Learning is the foundation for most AI solutions.

We can  use sensors, data, and machine learning to help farmers make informed decisions related to weather, soil, and plant conditions.

Using AI we can reduce waste and produce more food

Using Microsoft Ai To make local predictions about light , wind, rain. This helps farmers to know when to plant , irrigate, harvest

So Ai makes farmers to grow more while wasting less

So how do machines learn?

The answer is, from data. In today's world, we create huge volumes of data as we go about our everyday lives. From the text messages, emails, and social media posts we send to the photographs and videos we take on our phones, we generate massive amounts of information. More data still is created by millions of sensors in our homes, cars, cities, public transport infrastructure, and factories.

Data scientists can use all of that data to train machine learning models that can make predictions and inferences based on the relationships they find in the data.

For example, suppose an environmental conservation organization wants volunteers to identify and catalog different species of wildflower using a phone app. The following animation shows how machine learning can be used to enable this scenario.

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**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:

|  |  |
| --- | --- |
| 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. |

# Understand anomaly detection

Creating a  software system to monitor credit card transactions and detect unusual usage patterns that might indicate fraud. Or an application that tracks activity in an automated production line and identifies failures. Or a racing car telemetry system that uses sensors to proactively warn engineers about potential mechanical failures before they happen.

These kinds of scenario can be addressed by using anomaly detection - a machine learning based technique that analyzes data over time and identifies unusual changes.

Let's explore how anomaly detection might help in the racing car scenario.

1. Sensors in the car collect telemetry, such as engine revolutions, brake temperature, and so on.
2. An anomaly detection model is trained to understand expected fluctuations in the telemetry measurements over time.
3. If a measurement occurs outside of the normal expected range, the model reports an anomaly that can be used to alert the race engineer to call the driver in for a pit stop to fix the issue before it forces retirement from the race.

## Anomaly detection in Microsoft Azure

In Microsoft Azure, the **Anomaly Detector** service provides an application programming interface (API) that developers can use to create anomaly detection solutions.

# Understand computer vision

Computer Vision is an area of AI that deals with visual processing.

The **Seeing AI** app is a great example of the power of computer vision. Designed for the blind and low vision community, the Seeing AI app harnesses the power of AI to open up the visual world and describe nearby people, text and objects.

Scanning documents

**Computer vision services in Microsoft Azure**

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

| **Service** | **Capabilities** |
| --- | --- |
| **Azure AI Vision** | You can use this service to analyze images and video, and extract descriptions, tags, objects, and text. |
| **Azure AI Custom Vision** | Use this service to train custom image classification and object detection models using your own images. |
| **Azure AI Face** | The Azure AI Face service enables you to build face detection and facial recognition solutions. |
| **Azure AI Document Intelligence** | Use this service to extract information from scanned forms and documents. |

# Understand 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.

For example, Starship Commander is a virtual reality (VR) game from Human Interact that takes place in a science fiction world. The game uses natural language processing to enable players to control the narrative and interact with in-game characters and starship systems.

**Natural language processing in Microsoft Azure**

In Microsoft Azure, you can use the following Azure AI services to build natural language processing solutions:

| **Service** | **Capabilities** |
| --- | --- |
| **Azure AI 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. |
| **Azure AI Translator** | Use this service to translate text between more than 60 languages. |
| **Azure AI Speech** | Use this service to recognize and synthesize speech, and to translate spoken languages. |
| **Azure AI Bot Service** | 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. |

# Understand 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.

## Knowledge mining in Microsoft Azure

One of these knowledge mining solutions is **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.

Azure Cognitive Search can utilize the built-in AI capabilities of Azure AI services such as image processing, content extraction, and natural language processing to perform knowledge mining of documents. The product's AI capabilities makes it possible to index previously unsearchable documents and to extract and surface insights from large amounts of data quickly.

# 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.

The following table shows some of the potential challenges and risks facing an AI application developer.

| **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

At Microsoft, AI software development is guided by a set of six principles, designed to ensure that AI applications provide amazing solutions to difficult problems without any unintended negative consequences.

## Fairness

AI systems should treat all people fairly. For example, suppose you create a machine learning model to support a loan approval application for a bank. The model should predict whether the loan should be approved or denied without bias. This bias could be based on gender, ethnicity, or other factors that result in an unfair advantage or disadvantage to specific groups of applicants.

Azure Machine Learning includes the capability to interpret models and quantify the extent to which each feature of the data influences the model's prediction. This capability helps data scientists and developers identify and mitigate bias in the model.

Another example is Microsoft's implementation of [Responsible AI with the Face service](https://azure.microsoft.com/blog/responsible-ai-investments-and-safeguards-for-facial-recognition/), which retires facial recognition capabilities that can be used to try to infer emotional states and identity attributes. These capabilities, if misused, can subject people to stereotyping, discrimination or unfair denial of services.

## Reliability and safety

AI systems should perform reliably and safely. For example, consider an AI-based software system for an autonomous vehicle; or a machine learning model that diagnoses patient symptoms and recommends prescriptions. Unreliability in these kinds of systems can result in substantial risk to human life.

AI-based software application development must be subjected to rigorous testing and deployment management processes to ensure that they work as expected before release.

## Privacy and security

AI systems should be secure and respect privacy. The machine learning models on which AI systems are based rely on large volumes of data, which may contain personal details that must be kept private. Even after the models are trained and the system is in production, privacy and security need to be considered. As the system uses new data to make predictions or take action, both the data and decisions made from the data may be subject to privacy or security concerns.

## Inclusiveness

AI systems should empower everyone and engage people. AI should bring benefits to all parts of society, regardless of physical ability, gender, sexual orientation, ethnicity, or other factors.

## Transparency

AI systems should be understandable. Users should be made fully aware of the purpose of the system, how it works, and what limitations may be expected.

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