**WEEK-1**

**AI INFLUENCE IN COMPANIES VIZ, AMAZON, MICROSOFT, GOOGLE, IBM.**

**AI IN AMAZON:**

* Amazon.com, is an American multinational technology company that focuses on e-commerce, cloud computing, digital streaming, and artificial intelligence.
* It has been referred to as "one of the most influential economic and cultural forces in the world".
* Amazon uses AI to improve its business efficiencies.
* AI to predict the number of customers willing to buy a new product to running a cashier-less grocery store, Amazon’s AI capabilities are designed to provide customized recommendations to its customers.
* One of the main areas where Amazon is applying continuous AI is to better understand their customer search queries and what is the reason, they are looking for a particular product.

**AI IN MICROSOFT:**

* Microsoft Corporation is an American multinational technology corporation which produces computer software, consumer electronics, personal computers, and related services.
* From Microsoft’s popular virtual assistant Cortana, web search engine Bing, software Office 365,conversational chatbots, or its communication platforms, the platform has been heavily integrating intelligent functionality into its applications and services.
* **AI for Earth:** This is an initiative that places AI technology and cloud software in the hands of the ones working towards resolving global environmental challenges.
* **AI for Health:** This initiative focuses on empowering researchers and organizations with AI with the purpose of improving the health of people and communities worldwide.
* **AI for Accessibility:** The initiative is committed to enhancing global independence and inclusion in society by primarily focusing on 4 areas namely, Home, community, education, and employment.
* **AI for Humanitarian Action:** Through this initiative, Microsoft partners with organizations working towards supporting disaster response, refugees, displaced persons, human rights, and the needs of women and children.
* **AI for Cultural Heritage:** This initiative resolves to empower people and organizations committed to preserving and enriching the cultural heritage.

**MICROSOFT AI APPLICATIONS:**

* **Microsoft 365**: Through this application, AI powers innovative apps which can aid its users in writing and designing better, visualizing maps and charts in Excel, and streamlining inboxes. The application ensures that office apps are simple to make use of, safer, and more collaborative.
* **Cortana:** Cortana makes use of AI to integrate natural language interactions across Microsoft 365 – use spoken requests to send messages, check schedules, join meetings, add tasks, and much more. From helping its users in preparing for meetings to managing their inbox automatically, it helps users to focus on the important aspects and save more time.
* **Microsoft Dynamics 365:** This application drives the user’s digital transformation through cloud business applications that adopt consumer insights and data, LinkedIn integration, and intelligent technology, like machine learning and predictive analytics, with the purpose of improving the user’s business processes.
* **Bing:** This web search engine adopts AI to make it easier for users to discover what they are searching for. Through its dynamic web comprehension, Bing offers fast and well-structured responses, even for complex queries. It also lets users search within an image to detect what they wish to see.
* **Power BI:** This application allows the user’s organization to make focused and resolute decisions through updated data analytics and insights. It allows users to monitor their business and obtain swift responses through detailed dashboards made available on each device.
* **Scheduler:** The scheduler allows the users to let Cortana handle their meeting scheduling by making use of advanced AI for processing scheduling requests, sending emails for negotiating times, locating available rooms, and sending invites.

**AI INFLUENCE IN GOOGLE:**

* Spelling
* Passages
* Subtopics
* Understanding key moments in videos
* Deepening understanding through data
* Helping quality journalism through advanced search
* Search what you see, and explore information in 3D

**AI INFLUENCE IN IBM:**

* Extracting information from pictures (computer vision)
* Transcribing or understanding spoken words (speech to text and natural language processing)
* Pulling insights and patterns out of written text (natural language understanding)
* Speaking what’s been written (text to speech, natural language processing)
* Autonomously moving through spaces based on its senses (robotics)
* Generally looking for patterns in heaps of data (machine learning)

**FUNDAMENTALS OF AI:**

**Artificial Intelligence/AI:**

**What is artificial intelligence (AI)?**

**Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.** Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

**How AI works?**

**AI** works by combining large amounts of data with fast, iterative processing and intelligent algorithms, allowing the software to learn automatically from patterns or features in the data.

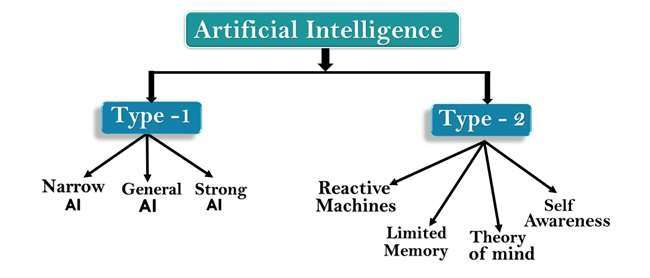
1. **Learning:** AI systems learn by processing data and identifying patterns and relationships in the data.
2. **Reasoning:** Once the AI system has learned from data, it can use its knowledge to reason about new data and make predictions or decisions. This process is called reasoning.
3. **Self-Correction:** AI systems can also self-correct. This means that they can learn from their mistakes and improve their performance over time.

**PURPOSE OF AI:**

There are some main purposes and features in which artificial intelligence is used in different fields or zones. These are the main purposes of artificial intelligence.

1. **Improves decision making:** AI uses data analysis and pattern recognition to help organizations make more informed and data-driven decisions.
2. **Singularity:** Singularity refers to a hypothetical point in the future when AI surpasses human intelligence, potentially leading to transformative and unpredictable outcomes.
3. **Machine learning:** AI systems are designed to learn from data, allowing them to improve their performance and make predictions or recommendations.
4. **Business process optimization:** AI streamlines and automates various business processes, increasing efficiency and reducing operational costs.
5. **Creative work in technologies:** AI can assist in generating creative content, such as art, music, or design, by analyzing existing examples and creating new works.
6. **Provides financial services:** AI is used in the financial sector for tasks like fraud detection, risk assessment, and algorithmic trading.
7. **Health care:** AI aids in diagnosing diseases, personalizing treatment plans, and improving patient care through data analysis and predictive analytics.
8. **Automotive/Robotics:** AI plays a key role in self-driving cars and robotic systems, enabling them to perceive their environment and make autonomous decisions.
9. **HR & Recruitment:** AI helps HR professionals in talent acquisition by automating candidate screening, analyzing resumes, and matching candidates to job positions more effectively.

**TYPES OF ARTIFICIAL INTELLIGENCE:**



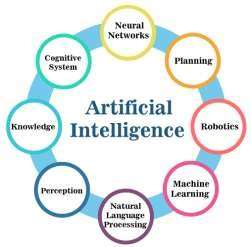
**AI Type-1: Based on Capabilities:**

1. **Weak AI or Narrow AI:** These AI systems are designed for a specific, dedicated task and operate within a predefined range. They can't perform beyond their limitations and are often referred to as "weak" AI. Examples include Apple Siri and IBM's Watson for specific applications like speech recognition and natural language processing.
2. **General AI:** General AI is an advanced form of intelligence that can perform any intellectual task with efficiency similar to humans. Currently, no system exists with general AI capabilities, and it's a research focus for creating machines that can think and learn like humans.
3. **Super AI:** Super AI represents a theoretical level of intelligence where machines surpass human intelligence and possess cognitive abilities, including thinking, reasoning, solving puzzles, making judgments, planning, and learning independently. Super AI is a world-changing concept but remains hypothetical.

**AI Type-2: Based on Functionality:**

1. **Reactive Machines:** These are basic AI systems that don't store memories or past experiences. They react to current situations with predefined responses. Examples include IBM's Deep Blue and Google's AlphaGo for playing chess and Go, respectively.
2. **Limited Memory:** Limited memory AI systems can store and use past experiences or data for a short period. Self-driving cars are an example, as they store information like the speed of nearby cars, distance, and speed limits to navigate safely.
3. **Theory of Mind:** Theory of Mind AI aims to understand human emotions, beliefs, and interact socially like humans. While not fully realized, researchers are working to develop AI systems capable of these attributes.
4. **Self-Awareness:** Self-awareness AI is a futuristic concept where machines possess their own consciousness, sentiments, and self-awareness, surpassing human intelligence. This level of AI is purely hypothetical and doesn't exist in reality.

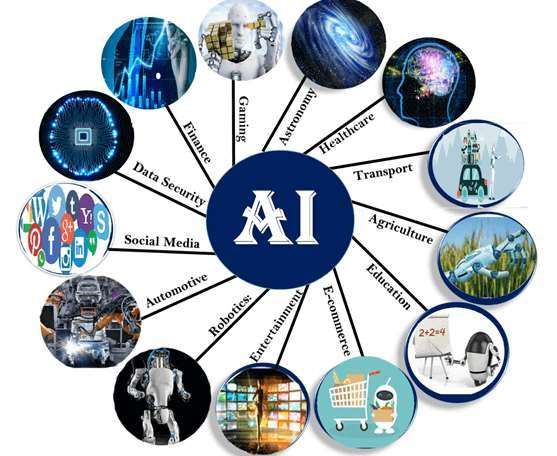
**GOALS OF ARTIFICIAL INTELLIGENCE:**



1. **Logic, problem-solving**: AI aims to use logical reasoning and algorithms to solve complex problems and make informed decisions.
2. **Knowledge representation**: AI seeks to store, organize, and represent knowledge in a way that machines can understand and use to perform tasks.
3. **Planning**: AI involves creating systems that can develop strategies and make plans to achieve specific goals or solve problems.
4. **Learning**: AI aims to enable machines to learn from data and adapt their behavior over time, improving their performance and decision-making.
5. **Social Intelligence**: AI strives to understand and replicate human social interactions, emotions, and communication, enabling machines to interact effectively with humans.
6. **Creativity**: AI seeks to foster the ability of machines to generate novel and creative solutions, such as creating art, music, or innovative designs.
7. **General Intelligence**: The ultimate goal of AI is to develop systems with general intelligence, capable of performing any intellectual task with human-like efficiency and adaptability.

**APPLICATIONS OF AI:**

**Following are some sectors which have the application of Artificial Intelligence:**

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1. **AI in Healthcare:** AI is used for faster and more accurate diagnoses, enabling early intervention and improving patient care.
2. **AI in Gaming:** AI can play strategic games like chess, requiring the ability to think through numerous possible moves.
3. **AI in Finance:** AI is employed in finance for automation, chatbots, algorithmic trading, and machine learning to optimize financial processes.
4. **AI in Social Media:** AI efficiently manages and analyzes vast amounts of user data on platforms like Facebook and Twitter to identify trends and user needs.
5. **AI in Automotive Industry:** AI is used to provide virtual assistants, like TeslaBot, and develop self-driving cars for safer transportation.
6. **AI in Robotics:** AI enables the creation of intelligent robots that can learn and perform tasks without pre-programming, including humanoid robots like Erica and Sophia.
7. **AI in Entertainment:** AI-based applications, like Netflix and Amazon, recommend programs and shows based on user preferences using machine learning algorithms.
8. **AI in Agriculture:** AI aids in agriculture through robotics, crop monitoring, and predictive analysis, making farming more efficient.
9. **AI in E-commerce:** AI enhances the e-commerce industry by providing recommendations for products based on user preferences.
10. **AI in Education:** AI automates grading and can act as a virtual tutor, communicating with students and providing personalized assistance, potentially revolutionizing education.

**ETHICS IN AI:**

AI ethics is a set of guidelines that advise on the design and outcomes of artificial intelligence. Human beings come with all sorts of cognitive biases, such as recency and confirmation bias, and those inherent biases are exhibited in our behaviours and subsequently, our data.

1. **Respect for Persons:** This principle recognizes the autonomy of individuals and upholds an expectation for researchers to protect individuals with diminished autonomy, which could be due to a variety of circumstances such as illness, a mental disability, age restrictions.

2. **Beneficence:** This principle takes a page out of healthcare ethics, where doctors take an oath to “do no harm.”

3. **Justice:** This principle deals with issues, such as fairness and equality. Who should reap the benefits of experimentation and machine learning? The Belmont Report offers five ways to distribute burdens and benefits, which are by:

* Equal share
* Societal contribution
* Individual need
* Merit
* Individual effort

**EXAMPLES OF AI IN REAL WORLD:**

1. **Self-Driving and Parking Vehicles:** Companies like Nvidia provide AI-powered technology for self-driving cars, enabling them to navigate complex driving scenarios. AI is used by automakers such as Toyota, Mercedes-Benz, Audi, Volvo, and Tesla to revolutionize the automotive industry.
2. **Digital Assistants:** Digital assistants like Apple's Siri, Google Now, Amazon's Alexa, and Microsoft's Cortana leverage AI to perform tasks like scheduling, web searches, and app interactions. They learn from user interactions to offer personalized results.
3. **Vehicle Recognition and Identification:** AI technology is used in traffic cameras to read license plates. Companies like PlateSmart, IntelliVision, and Sighthound employ computer vision and deep learning to monitor vehicles and make surveillance videos searchable for specific plate numbers.
4. **Robots:** AI is integrated into robots like the Roomba 980 vacuum cleaner, allowing it to scan room size, detect obstacles, and remember optimal cleaning routes. These robots can adapt their cleaning cycles based on the room's size and specific cleaning requirements.

**AI SOFTWARE DEVELOPMENT LIFE CYCLE:**

The AI software development life cycle (SDLC) is the process of developing, testing, deploying, and maintaining AI-powered software applications. It is an iterative process that involves multiple phases, including:

1. **Requirement’s analysis**: This phase involves understanding the business problem or need that the AI solution is intended to address. Once the requirements are understood, they can be translated into specific technical requirements for the AI system.
2. **Data collection and preparation**: AI systems are trained on data, so it is important to collect and prepare a high-quality dataset that is relevant to the problem or need being addressed. This may involve cleaning the data, removing outliers, and splitting the data into training and test sets.
3. **Model development and training:** This phase involves choosing an appropriate AI algorithm and training the model on the prepared dataset. The model should be trained to achieve a high level of accuracy on the test set.
4. **Model evaluation and testing**: Once the model is trained, it needs to be evaluated on its performance on the test set. This helps to ensure that the model is able to generalize to new data and that it is not overfitting the training data.
5. **Model deployment**: Once the model is evaluated and approved, it can be deployed to production. This may involve integrating the model into an existing software application or developing a new application around the model.
6. **Model monitoring and maintenance**: Once the model is deployed, it needs to be monitored and maintained to ensure that it is performing as expected. This may involve retraining the model on new data or making adjustments to the model parameters.

**AI software development VS Traditional Software development:**

There are many aspects should be compared while comparing the traditional software development with AI software development like type of problem solving, infrastructure etc. While developing the AI software we generally consider or implement the agile software development methodology which involves below phases:

|  |  |  |
| --- | --- | --- |
| Feature | AI Software Development | Traditional Software Development |
| Focus | Data-driven, adaptive, and intelligent | Rules-based, deterministic, and predictable |
| Development process | Iterative and agile | Waterfall or V-model |
| Tools and technologies | Machine learning, deep learning, natural language processing, etc. | Programming languages, software development kits, databases, etc. |
| Application areas | Self-driving cars, fraud detection, medical diagnosis, etc. | Enterprise applications, consumer applications, etc. |

**Each iteration of agile SDLC consists of cross-functional teams working on various phases:**

1. Requirement gathering and analysis

2. Design the requirements

3. Construction/ iteration

4. Testing

5. Deployment/installation and maintenance

6. Feedback

**GIT AND GIT HUB:**

**Git:**

Git is a DevOps tool used for source code management. It is a free and open-source version control system used to handle small to very large projects efficiently. Git is used to tracking changes in the source code, enabling multiple developers to work together on nonlinear development.

**GitHub:**

GitHub is a web-based platform for hosting, sharing, and collaborating on code and software projects, enhancing the capabilities of Git, a version control system.

**Steps to Create repository in GitHub and add file:**

**1. Log in to your GitHub account and go to the GitHub homepage.**

**2. Click on the "+" button in the top right corner and select "New repository" from the drop-down menu.**

**3. Give your repository a name and a brief description. You can also select whether the repository should be public or private.**

**4. Click on the "Create repository" button.**

**5. Once the repository is created, you will be taken to the repository's main page. To add a file, click on the "Create new file" button.**

**6. Type a name for the file and add the content to the file.**

**7. At the bottom of the page, type a commit message describing the changes you've made, then click on the "Commit new file" button.**

**8. The file will now be added to the repository, and you can view it by clicking on the file name in the repository's file list.**

**Note: If you want to add files from your local machine, you can use GitHub built-in feature called GitHub Desktop or you can use Git commands to push the files from your local machine to the repository.**

**HOW GIT WORKS:**

**Here is a basic overview of how Git works:**

1. Create a "repository" (project) with a git hosting tool (like Bitbucket).
2. Copy (or clone) the repository to your local machine.
3. Add a file to your local repo and "commit" (save) the changes.
4. "Push" your changes to your main branch.
5. Make a change to your file with a git hosting tool and commit.
6. "Pull" the changes to your local machine.
7. Create a "branch" (version), make a change, commit the change.
8. Open a "pull request" (propose changes to the main branch).
9. "Merge" your branch to the main branch.

**BASIC GIT COMMANDS THAT YOU MUST KNOW:**

|  |  |
| --- | --- |
| Commands | Description |
| git init | Initializes a new Git repository in the current directory. |
| git clone <url> | Clones a remote Git repository to your local machine. |
| git add <file> | Adds the specified file to the staging area. |
| git add . | Adds all changed files in the current directory and its subdirectories to the staging area. |
| git commit | Commits the staged changes to the local repository. |
| git status | Displays the status of the current repository, including which files have been changed, staged, and committed. |
| git diff | Shows the differences between the working directory and the staging area, or the differences between two commits. |
| git checkout <branch> | Switches to the specified branch. |
| git branch | Lists all branches in the current repository, or creates a new branch. |
| git merge <branch> | Merges the specified branch into the current branch. |
| git push <remote> | Pushes the local changes to the remote repository. |
| git pull <remote> | Fetches the latest changes from the remote repository and merges them into the local repository. |

**Important Questions:~**

1. Artificial Intelligence (AI) is promising cutting-edge technology providing intelligent solutions in all sectors today. Define AI and describe applications of AI in different domain.
2. Groups of developers want to work Collaboratively on big software project. Each developer in team is assigned one module. How git and GitHub help these developers to build project effectively?
3. How AI Software Development life cycle differs from traditional software development? Explain
4. Write steps to Create repository in GitHub and add file.
5. Is data which is collected by various applications ethical in nature? Justify your answer.
6. Describe AI and its application in various fields.