AI Summary

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines which helps in allowing them to think and act like humans. It involves creating algorithms and systems that can perform tasks which requiring human abilities such as visual perception, speech recognition, decision-making and language translation.

**Types of AI Based on Capabilities**

AI Systems can be classified into three broad categories based on their capabilities:

1. Narrow AI (Weak AI)
2. General AI (Strong AI)
3. Super intelligent AI

These classifications help us understand the current state and future potential of AI technologies.

**Narrow AI (Weak AI): The AI of Today**

Narrow AI, also known as Weak AI, refers to AI systems that are designed to perform a specific task or a narrow range of tasks. These AI systems are highly specialized and operate within a limited context, excelling at the specific functions for which they are programmed.

**Key Characteristics of Narrow AI**

* **Task-Specific:** Narrow AI is built to perform particular tasks such as facial recognition, language translation, or playing chess.
* **No Generalization:** These systems cannot generalize their knowledge or apply it to tasks outside their designated function.
* **Human-Like Performance:** In their specialized domains, Narrow AI can perform at or even surpass human levels, but they do not possess understanding or consciousness.

**Examples of Narrow AI**

* **Voice Assistants (e.g., Siri, Alexa):** These AI-powered assistants can perform a wide range of tasks, such as setting reminders, answering queries, and controlling smart home devices, but they are limited to their programmed capabilities.
* **Recommendation Systems:** AI-driven recommendation engines used by platforms like Netflix and Amazon suggest products or content based on user behavior and preferences, but their functionality is confined to this specific domain.

**General AI (Strong AI): The AI of the Future**

General AI, also known as Strong AI, refers to AI systems that possess the ability to understand, learn, and apply knowledge across a wide range of tasks—similar to human cognitive abilities. Unlike Narrow AI, General AI would have the capacity to perform any intellectual task that a human can do, with the ability to generalize knowledge and apply it to different contexts.

**Key Characteristics of General AI**

* **Broad Intelligence:** General AI would be able to perform a variety of tasks, not just one, making it versatile and adaptable.
* **Human-Like Reasoning:** It would have the ability to reason, solve problems, and make decisions just like a human being.
* **Self-Learning:** General AI would be capable of learning and improving over time, adapting to new situations and acquiring new skills without human intervention.

As of now, General AI remains theoretical and has not yet been achieved. Researchers are working on creating AI systems that could one day reach this level of capability, but it is considered a long-term goal in AI development.

**Super intelligent AI: Beyond Human Intelligence**

Super intelligent AI represents the most advanced form of AI, surpassing human intelligence in all aspects, including creativity, problem-solving, and emotional intelligence. This type of AI would be capable of outperforming the brightest human minds in any field, from science to art to social skills.

**Key Characteristics of Super intelligent AI**

* **Surpasses Human Intelligence:** Super intelligent AI would exceed human cognitive abilities, potentially making it the most powerful tool or threat in existence.
* **Autonomous Decision-Making:** This AI would be able to make decisions without human input, and its reasoning and actions could be beyond human comprehension.
* **Ethical and Existential Concerns:** The development of Super intelligent AI raises significant ethical questions, including the potential risks it could pose to humanity if not properly controlled.

Like General AI, Super intelligent AI is still a concept explored in theory and science fiction. Its potential development is a subject of intense debate among AI researchers, ethicists, and futurists.

**Conclusion**

Understanding the different types of AI based on their capabilities is crucial for anyone interested in the future of technology. Narrow AI is already a part of our daily lives, transforming industries and creating new possibilities. General AI and Super intelligent AI, while still theoretical, represent the future potential of AI, with implications that could change the world as we know it.

**Searching algorithms** are essential tools in computer science used to locate specific items within a collection of data. In this tutorial, we are mainly going to focus upon searching in an array. When we search an item in an array, there are two most common algorithms used based on the type of input array.

* [**Linear Search**](https://www.geeksforgeeks.org/linear-search/): It is used for an unsorted array. It mainly does one by one comparison of the item to be search with array elements. It takes linear or O(n) Time.
* [**Binary Search**](https://www.geeksforgeeks.org/binary-search/) : It is used for a sorted array. It mainly compares the array's middle element first and if the middle element is same as input, then it returns. Otherwise it searches in either left half or right half based on comparison result (Whether the mid element is smaller or greater). This algorithm is faster than linear search and takes O (Log n) time.

**What is an AI Agent?**

An AI agent is a software or hardware entity that performs actions autonomously with the goal of achieving specific objectives.

* [AI agent](https://www.geeksforgeeks.org/artificial-intelligence/agents-artificial-intelligence/)
* [types of AI Agents](https://www.geeksforgeeks.org/artificial-intelligence/types-of-agents-in-ai/)

**Problem Solving in AI**

Problem-solving is a fundamental aspect of AI which involves the design and application of algorithms to solve complex problems systematically.

**1. Search Algorithms in AI**

Search algorithms navigate through problem spaces to find solutions.

* [Search algorithms](https://www.geeksforgeeks.org/dsa/searching-algorithms/)
* [Breadth-First Search (BFS)](https://www.geeksforgeeks.org/breadth-first-search-or-bfs-for-a-graph/)
* [Depth-First Search (DFS)](https://www.geeksforgeeks.org/depth-first-search-or-dfs-for-a-graph/)
* [Uniform Cost Search (UCS)](https://www.geeksforgeeks.org/artificial-intelligence/uniform-cost-search-ucs-in-ai/)
* [Bidirectional search](https://www.geeksforgeeks.org/bidirectional-search/)
* [Greedy Best-First Search](https://www.geeksforgeeks.org/greedy-best-first-search-algorithm/)
* [A Search\* Algorithm](https://www.geeksforgeeks.org/dsa/searching-algorithms/)

**2. Local Search Algorithms**

Local search algorithms operates on a single current state (or a small set of states) and attempt to improve it incrementally by exploring neighboring states.

* [Local search algorithms](https://www.geeksforgeeks.org/artificial-intelligence/local-search-algorithm-in-artificial-intelligence/)
* [Hill-Climbing Search Algorithm](https://www.geeksforgeeks.org/artificial-intelligence/introduction-hill-climbing-artificial-intelligence/)
* [Local Beam Search](https://www.geeksforgeeks.org/machine-learning/introduction-to-beam-search-algorithm/)

**3. Adversarial Search in AI**

Adversarial search deal with competitive environments where multiple agents (often two) are in direct competition with one another such as in games like chess, tic-tac-toe or Go.

* [Adversarial search](https://www.geeksforgeeks.org/artificial-intelligence/adversarial-search-algorithms/)
* [Minimax Algorithm](https://www.geeksforgeeks.org/dsa/minimax-algorithm-in-game-theory-set-1-introduction/)
* [Alpha-Beta Pruning](https://www.geeksforgeeks.org/artificial-intelligence/alpha-beta-pruning-in-adversarial-search-algorithms/)

**4. Constraint Satisfaction Problems**

Constraint Satisfaction Problem (CSP) is a problem-solving framework that involves variables each with a domain of possible values and constraints limiting the combinations of variable values.

* [Constraint Satisfaction Problem (CSP)](https://www.geeksforgeeks.org/constraint-satisfaction-problems-csp-in-artificial-intelligence/)
* [Constraint Propagation in CSP’s](https://www.geeksforgeeks.org/artificial-intelligence/constraint-propagation-in-ai/)
* [Backtracking Search for CSP’s](https://www.geeksforgeeks.org/artificial-intelligence/explain-the-concept-of-backtracking-search-and-its-role-in-finding-solutions-to-csps/)

**Knowledge, Reasoning and Planning in AI**

Knowledge representation in Artificial Intelligence (AI) refers to the way information, knowledge and data are structured, stored and used by AI systems to reason, learn and make decisions.

Common techniques for knowledge representation include**:**

* [Knowledge representation in Artificial Intelligence (AI)](https://www.geeksforgeeks.org/artificial-intelligence/knowledge-representation-in-ai/)
* [Semantic Networks](https://www.geeksforgeeks.org/artificial-intelligence/semantic-networks-in-artificial-intelligence/)
* [Frames](https://www.geeksforgeeks.org/artificial-intelligence/frames-in-ai-knowledge-representation-and-inheritance/)
* [Ontologies](https://www.geeksforgeeks.org/machine-learning/introduction-to-ontologies/)
* [Logical Representation](https://www.geeksforgeeks.org/artificial-intelligence/propositional-logic-in-artificial-intelligence/)

**First Order Logic in Artificial Intelligence**

First Order Logic (FOL) is use to represent knowledge and reason about the world. It allows for the expression of more complex statements involving objects, their properties and the relationships between them.

* [First Order Logic (FOL)](https://www.geeksforgeeks.org/artificial-intelligence/first-order-logic-in-artificial-intelligence/)
* [Knowledge Representation in First Order Logic](https://www.geeksforgeeks.org/artificial-intelligence/knowledge-representation-in-first-order-logic/)
* [Syntax and Semantics of First Order Logic](https://www.geeksforgeeks.org/artificial-intelligence/syntax-and-semantics-of-first-order-logic-in-ai/)
* [Inference Rules in First Order Logic](https://www.geeksforgeeks.org/rules-of-inference/)

**Reasoning in Artificial Intelligence**

Reasoning in Artificial Intelligence (AI) is the process by which AI systems draw conclusions, make decisions or infer new knowledge from existing information.

Types of reasoning used in AI are:

* [Reasoning in Artificial Intelligence (AI)](https://www.geeksforgeeks.org/artificial-intelligence/reasoning-mechanisms-in-ai/)
* [Types of Reasoning in AI](https://www.geeksforgeeks.org/artificial-intelligence/types-of-reasoning-in-artificial-intelligence/)
* [Deductive Reasoning](https://www.geeksforgeeks.org/maths/deductive-reasoning/)
* [Inductive Reasoning](https://www.geeksforgeeks.org/artificial-intelligence/inductive-reasoning-in-ai/)
* [Abductive Reasoning](https://www.geeksforgeeks.org/artificial-intelligence/abductive-reasoning-in-ai/)
* [Fuzzy Reasoning](https://www.geeksforgeeks.org/artificial-intelligence/fuzzy-logic-introduction/)

**Planning in AI**

Planning in AI generates a sequence of actions that an intelligent agent needs to execute to achieve specific goals or objectives. Some of the planning techniques in artificial intelligence includes:

* [Planning in AI](https://www.geeksforgeeks.org/artificial-intelligence/what-is-the-role-of-planning-in-artificial-intelligence/)
* [Forward State Space Search](https://www.geeksforgeeks.org/artificial-intelligence/forward-state-space-planning-fssp-in-ai/)
* [Markov Decision Processes (MDPs)](https://www.geeksforgeeks.org/machine-learning/markov-decision-process/)
* [Hierarchical State Space Search (HSSS)](https://www.geeksforgeeks.org/artificial-intelligence/hierarchical-state-space-search-in-ai/)

**Uncertain Knowledge and Reasoning**

Uncertain Knowledge and Reasoning in AI refers to the methods and techniques used to handle situations where information is incomplete, ambiguous or uncertain. For managing uncertainty in AI following methods are used:

* [Uncertain Knowledge and Reasoning in AI](https://www.geeksforgeeks.org/artificial-intelligence/representing-knowledge-in-an-uncertain-domain-in-ai/)
* [Dempster-Shafer Theory](https://www.geeksforgeeks.org/ml-dempster-shafer-theory/)
* [Probabilistic Reasoning](https://www.geeksforgeeks.org/artificial-intelligence/probabilistic-reasoning-in-artificial-intelligence/)
* [Fuzzy Logic](https://www.geeksforgeeks.org/artificial-intelligence/fuzzy-logic-introduction/)
* [Neural Networks with dropout](https://www.geeksforgeeks.org/machine-learning/dropout-in-neural-networks/)