

# Artificial Intelligence

☰ Category	
📎 Files	
⌚ Created	@October 29, 2022 2:58 PM
📅 Reminder	
>Status	<span style="background-color: #c8f7e4; border-radius: 10px; padding: 2px 10px; border: 1px solid #a9f5d0;">Open</span>
🔗 URL	
⌚ Updated	@December 7, 2022 4:14 PM

## ▼ Sessional 1

### ▼ Syllabus

What is Artificial Intelligence, AI problems, Task domain of AI, AI Technique, Scope and areas of application of AI representing simple facts in logic- predicate logic, Conversion to clause form, Resolution and Natural Deduction.

Defining the problem as a state space search, Production system, problem characteristics, informed and uninformed search technique: Generate and Test, Hill Climbing, Best first search, A\*, AO\*, Means-ends, analysis, Approaches to Knowledge Representation

definition of ai, uses in diff fields, machine learning vs ai, best first search, mean value, hill climb, resolution tree, predicate logic

Intro to AI and uses -

<https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence>

<https://www.javatpoint.com/application-of-ai>

[https://www.tutorialspoint.com/artificial\\_intelligence/artificial\\_intelligence\\_research\\_areas.htm](https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_research_areas.htm)

### ▼ AI basics

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.

The ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a specific goal.

**Easy Engineering Classes - Free YouTube Lectures**  
 EEC Classes GGSIPU, UPTU, Mumbai Univ., Pune Univ., GTU, Anna Univ., PTU and Others EEC Classes

**Artificial Intelligence:-** AI is the study of How to make computer do things which people do better. [machine + human intelligence]

↳ AI can cause a machine to work as human.

↳ AI → Artificial [Man-Made]  
 ↳ Intelligence [Power of thinking]

**GOALS OF AI:** i) Replication of Human Intelligence.  
 ii) Solving problems that require knowledge.  
 iii) Building a machine that can do human Intelligence task. [CHESS, Proof theorem,

**Reasons of Boost in AI:**

- ↳ i) SW or device can be made to solve Real-time Problems.
- ii) Creation of Virtual assistant [SIRI, CORTANA]
- iii) Robots development.  
 [Helps in dangerous env. cond.]
- iv) New Job opportunities.

### Advantages

- Good at detail-oriented jobs;
- Reduced time for data-heavy tasks;
- Delivers consistent results; and
- AI-powered virtual agents are always available.

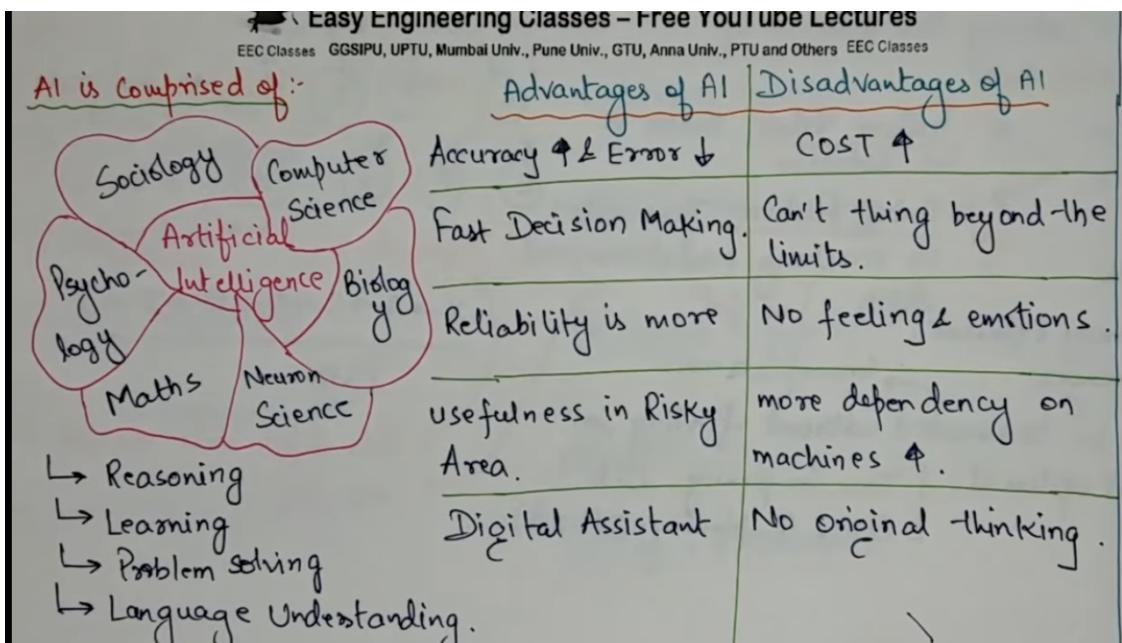
### Disadvantages

- Expensive;
- Requires deep technical expertise;
- Limited supply of qualified workers to build AI tools;
- Only knows what it's been shown; and
- Lack of ability to generalize from one task to another.

### ▼ benefits of ai -

The following are the primary advantages of AI:

- AI drives down the time taken to perform a task. It enables multi-tasking and eases the workload for existing resources.
- AI enables the execution of hitherto complex tasks without significant cost outlays.
- AI operates 24x7 without interruption or breaks and has no downtime
- AI augments the capabilities of differently abled individuals
- AI has mass market potential, it can be deployed across industries.
- AI facilitates decision-making by making the process faster and smarter.



#### ▼ applications of ai

main is - self driving car, recommendation system ( ecommerese, tv series ), chatbots like human, games moves prediction like chess

**AI in healthcare.** The biggest bets are on improving patient outcomes and reducing costs. Companies are applying machine learning to make better and faster diagnoses than humans. One of the best-known healthcare technologies is IBM Watson. It understands natural language and can respond to questions asked of it. The system mines patient data and other available data sources to form a hypothesis, which it then presents with a confidence scoring schema. Other AI applications include using online virtual health assistants and chatbots to help patients and healthcare customers find medical information, schedule appointments, understand the billing process and complete other administrative processes. An array of AI technologies is also being used to predict, fight and understand pandemics such as COVID-19.

**AI in business.** Machine learning algorithms are being integrated into analytics and customer relationship management (CRM) platforms to uncover information on how to better serve customers. Chatbots have been incorporated into websites to provide immediate service to customers. Automation of job positions has also become a talking point among academics and IT analysts.

**AI in education.** AI can automate grading, giving educators more time. It can assess students and adapt to their needs, helping them work at their own pace. AI tutors can provide additional support to students, ensuring they stay on track. And it could change where and how students learn, perhaps even replacing some teachers.

**AI in finance.** AI in personal finance applications, such as Intuit Mint or TurboTax, is disrupting financial institutions. Applications such as these collect personal data and provide financial advice. Other programs, such as IBM Watson, have been applied to the process of buying a home. Today, artificial intelligence software performs much of the trading on Wall Street.

**AI in law.** The discovery process -- sifting through documents -- in law is often overwhelming for humans. Using AI to help automate the legal industry's labor-intensive processes is saving time and improving client service. Law firms are using machine learning to describe data and predict outcomes, computer vision to classify and extract information from documents and natural language processing to interpret requests for information.

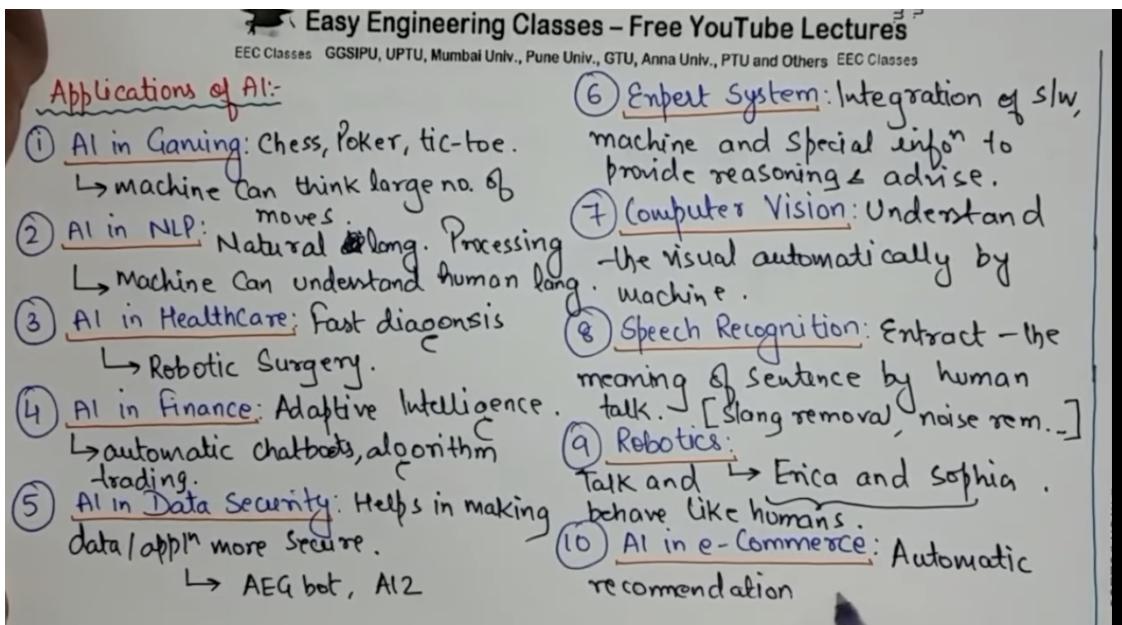
**AI in manufacturing.** Manufacturing has been at the forefront of incorporating robots into the workflow. For example, the industrial robots that were at one time programmed to perform single tasks and separated from human workers, increasingly function as cobots: Smaller, multitasking robots that collaborate with humans and take on responsibility for more parts of the job in warehouses, factory floors and other workspaces.

**AI in banking.** Banks are successfully employing chatbots to make their customers aware of services and offerings and to handle transactions that don't require human intervention. AI virtual assistants are being used to improve and

cut the costs of compliance with banking regulations. Banking organizations are also using AI to improve their decision-making for loans, and to set credit limits and identify investment opportunities.

**AI in transportation.** In addition to AI's fundamental role in operating autonomous vehicles, AI technologies are used in transportation to manage traffic, predict flight delays, and make ocean shipping safer and more efficient.

**Security.** AI and machine learning are at the top of the buzzword list security vendors use today to differentiate their offerings. Those terms also represent truly viable technologies. Organizations use machine learning in security information and event management (SIEM) software and related areas to detect anomalies and identify suspicious activities that indicate threats. By analyzing data and using logic to identify similarities to known malicious code, AI can provide alerts to new and emerging attacks much sooner than human employees and previous technology iterations. The maturing technology is playing a big role in helping organizations fight off cyber attacks.



▼ task domain of ai

#### Expert Systems

Examples – Flight-tracking systems, Clinical systems.

#### Natural Language Processing

Examples: Google Now feature, speech recognition, Automatic voice output.

#### Neural Networks

Examples – Pattern recognition systems such as face recognition, character recognition, handwriting recognition.

#### Robotics

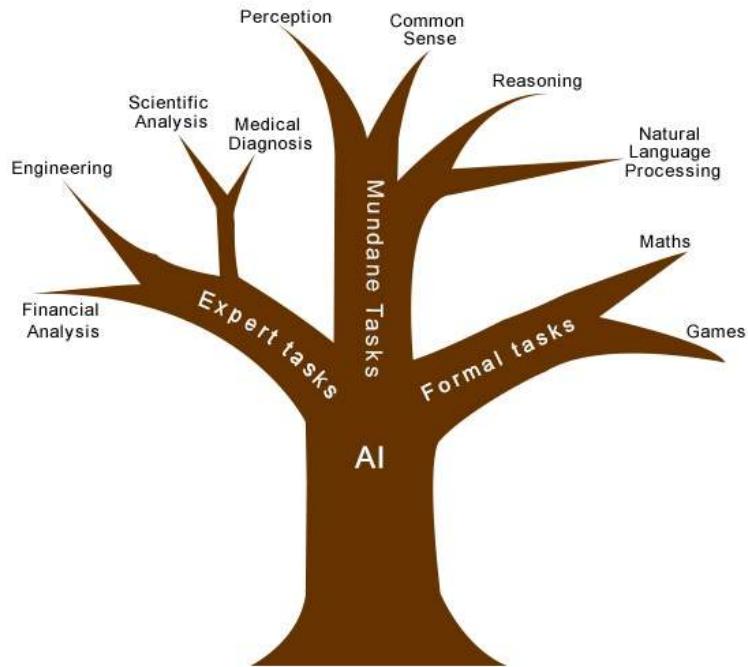
Examples – Industrial robots for moving, spraying, painting, precision checking, drilling, cleaning, coating, carving, etc.

#### Fuzzy Logic Systems

Examples – Consumer electronics, automobiles, etc.

▼ task classification of ai

The domain of AI is classified into **Formal tasks**, **Mundane tasks**, and **Expert tasks**.



▼ clause form -

<https://www.engineeringnotes.com/artificial-intelligence-2/how-to-write-a-sentence-into-clause-forms-artificial-intelligence/34926>

▼ predicate logic -

<https://www.javatpoint.com/first-order-logic-in-artificial-intelligence>

[https://www.youtube.com/watch?v=v6E7\\_Kp4rTk&ab\\_channel=SanjayPathak](https://www.youtube.com/watch?v=v6E7_Kp4rTk&ab_channel=SanjayPathak)

[https://www.youtube.com/watch?v=Q\\_15gjqX-RE&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=Q_15gjqX-RE&ab_channel=EasyEngineeringClasses)

[https://www.youtube.com/watch?v=m78pqNvh2Lk&ab\\_channel=KanikaSharma](https://www.youtube.com/watch?v=m78pqNvh2Lk&ab_channel=KanikaSharma)

[https://www.youtube.com/watch?v=LJFB09RX56Q&ab\\_channel=NishaMittal](https://www.youtube.com/watch?v=LJFB09RX56Q&ab_channel=NishaMittal)

Socrates is mortal

What is a predicate?  
A predicate is property that some object has.

Consider the sentence: "Dogs are blue."

Some object has the property of being a dog.  
That object also has the property of being blue.

$x$  is a blue dog.

$x$  ← Dog  
 $x$  ← Blue

$(x \leftarrow \text{man}) \leftarrow \text{mortal}$   
 $(s \leftarrow \text{man}) \leftarrow \text{mortal}$

Formal Syntax of Predicate Logic.

Predicates:  $A, B, C, \dots, Z, A', B', \dots, Z'$

Terms:

Constants:  $a, b, c, \dots, t$  ← Socrates

Variables:  $x, y, z, \dots, u, v$  ← generic

Connectives:  $\neg, \vee, \wedge, \rightarrow, \leftrightarrow$

Quantifiers:

$\forall$  all

$\exists$  exists

$\forall x$   
 $\exists x$

$\downarrow$   
 $\forall$  dogs are blue  
all

$\exists$  dogs are blue

Universal Quantifier:  $\forall$

How do express the sentence "All dogs are blue"?

We must first formalize some terms.

$D_x$ : x is a dog

$B_x$ : x is blue

| |  
 $(\forall x)(D_x \rightarrow B_x)$

$\cup$   
 $x_{\text{dog}}$   
blue

$L_{xy} \Leftrightarrow x \text{ likes } y$   
 $\text{Likes}(x, y)$

What about the sentence "All men like cake and pie."

$M_x$ : x is a man.

$L_{xy}$ : x Likes y.

c: cake

p: pie

$(\forall x)(M_x \rightarrow (L_x c \wedge L_x p))$

$\forall x(D_x \rightarrow B_x)$

Existential Quantifier

How do express the sentence "Some dog is blue"?

We must first formalize some terms.

$D_x$ : x is a dog

$B_x$ : x is blue

$(\exists x)(D_x \wedge B_x)$

What about the sentence "Some men like cake and pie."

$M_x$ : x is a man.

$L_{xy}$ : x Likes y.

c: cake

p: pie

$(\exists x)(M_x \wedge (L_x c \wedge L_x p))$

# First order Predicate Logic

## 1. What is Knowledge Representation?

i) Propositional Logic

ii) First order Predicate Logic

## 2. Disadvantages of PL

A: Gorilla is Black

B: Gorilla is Hungry

## 3. Advantages of FOL

## 4. Symbol Word

$\neg$	not
$\wedge$	and
$\vee$	or
$\rightarrow$	Implies (If then)
$\leftrightarrow$	iff



3:05 / 15:47 • What is First Order Predicate Logic? >

Examples:

i) Gorilla is Black  
⇒ Gorilla( $x$ ) → Black( $x$ ).

Quantifiers

i) Universal Quantifiers

$\forall$  for all such that ( $\rightarrow$ )

ii) Existential Quantifiers

$\exists$  for some such that ( $\wedge$ )

3) Every Person who buys a Policy is smart  
⇒

4) No Person buys Expensive Policy  
⇒

1. All boys like cricket  
 $\Rightarrow \forall x: \text{boys}(x) \rightarrow \text{like}(x, \text{cricket})$

2. Some boys like football  
 $\Rightarrow \exists x: \text{boys}(x) \wedge \text{like}(x, \text{football})$

3. Some girls hate football  
 $\Rightarrow \exists x: \text{girls}(x) \wedge \text{hate}(x, \text{football})$

4. All girls love pink  
 $\Rightarrow \forall x: \text{girls}(x) \rightarrow \text{love}(x, \text{pink})$

5. Every Person who buys a Policy  
 is smart  
 $\Rightarrow \forall x \forall y: \text{Person}(x) \wedge \text{Policy}(y) \wedge \text{buys}(x, y) \rightarrow \text{Smart}(x)$

6. No Person buys expensive Policy  
 $\forall x \forall y: \text{Person}(x) \wedge \text{Policy}(y) \wedge \text{expensive}(y) \rightarrow \neg \text{buys}(x, y) \rightarrow$

**Quantifiers**  
 i) Universal Quantifier  
 $\forall$  for all such  
 ii) Existential Quantifier  
 $\exists$  for some such  
**Symbol**

► ▶ ⟲ 15:04 / 15:47 • more examples > ▾

#### ▼ State Space Representation

Generally, a problem consists of 04 major components as States, Actions/Operations, Goals, Path

State-space consists of all the possible states together with actions to solve a specific problem. In the graphical representation of state space (such as trees), the states are represented by nodes while the actions are represented by arcs. Any state space has an initial 'Start' node and an ending 'Goal' node or multiple Goal States. The path from the initial start node to the final goal node is known as the 'Solution' for the particular problem.

<https://www.javatpoint.com/first-order-logic-in-artificial-intelligence>

[https://www.youtube.com/watch?v=v6E7\\_Kp4rTk&ab\\_channel=SanjayPathak](https://www.youtube.com/watch?v=v6E7_Kp4rTk&ab_channel=SanjayPathak)

## Problem Solving in AI

- Problem solving is the major area in Artificial intelligence.
- It is the Process to provide solution from given data.
- To solve a particular problem, we need to build a system or method that can provide required solution.
- Some steps are here to build that type of system:
  - Define the problem.
  - Analyze the problem
  - Isolate and represent the task knowledge.



## Representation of State Space Search

- SS:  $(S, A, \text{Action}(S), \text{Result}(S, a), \text{cost}(S, a))$

- S: All Possible states .
- A: Set of all possible actions.
- Action(S): Fun – Which action is possible for current state.
- Result(S, a) : State reached by performing action 'a' on state 's'.
- Cost(S, a): Costing

**Easy Engineering Classes – Free YouTube Lectures**  
EEC Classes GGSIPU, UPTU, Mumbai Univ., Pune Univ., GTU, Anna Univ., PTU and Others EEC Classes

State Space Search: Used in Problem Solving.

→ It is a process used in AI in which Successive Configurations or States of an instance are considered with intention of finding a GOAL State with desired property.

→ Problems are modelled as State Space

→ Representation:  
 $S: (S, A, \text{Action}(S), \text{Result}(S, a), \text{Cost}(S, a))$

Set of all possible States.

Set of all possible actions

Costing.

Cost( $s, a$ )

Set of states in which a problem can be solved.

EIGHT TILE PUZZLE

Start ( $S$ )      Goal ( $G$ )

1	4	3
2		5
8	6	7

1	2	3
8		4
7	6	5

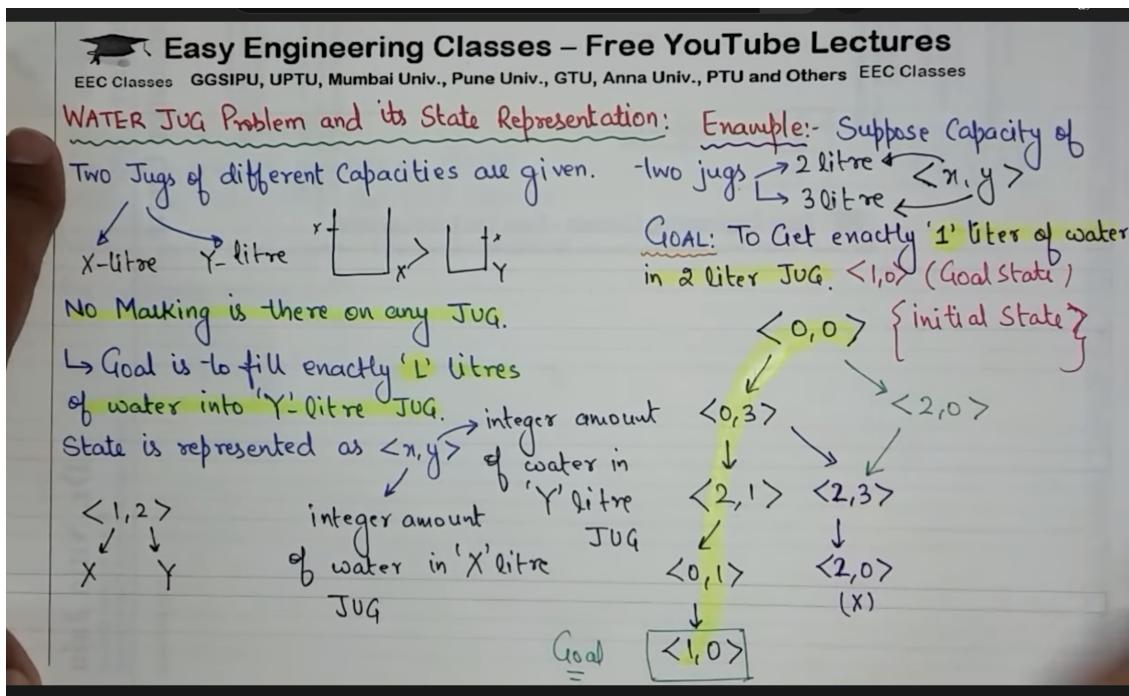
Actions Possible:-  
up  
down

▼ search algos in ai -

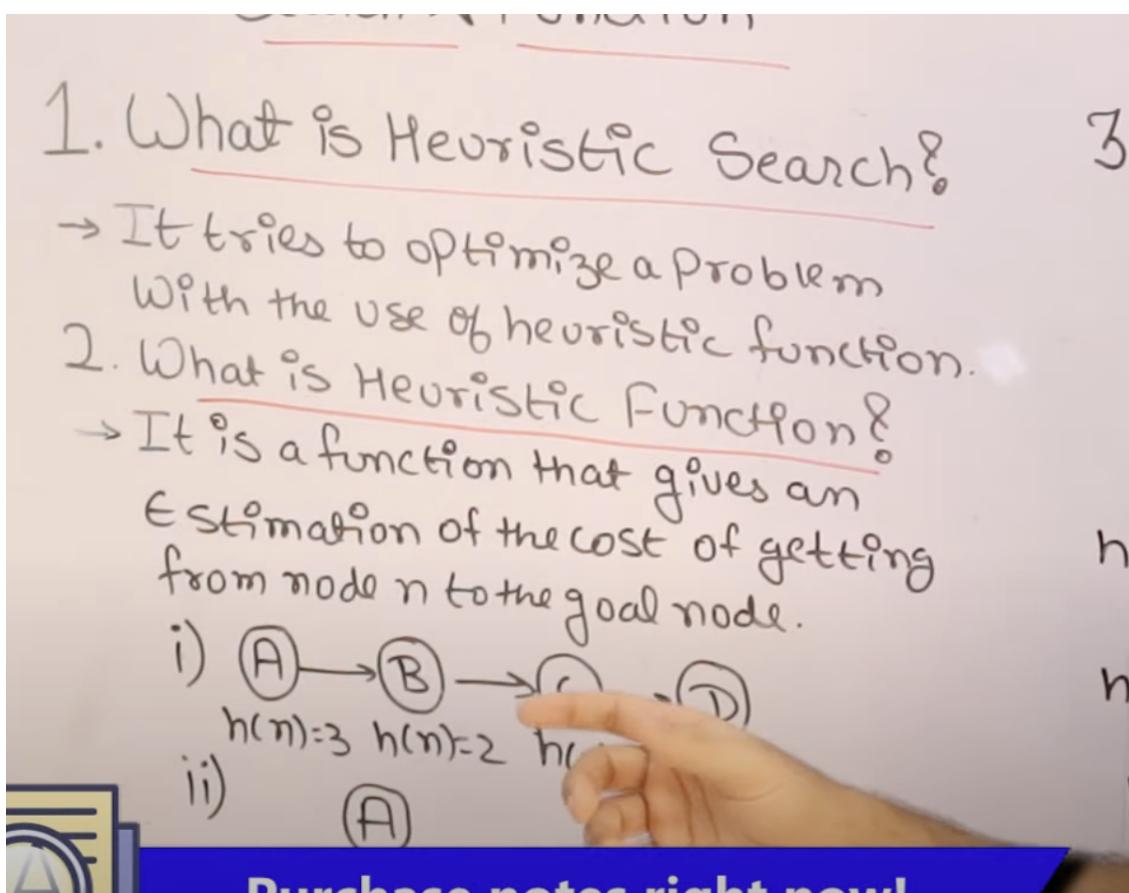
<https://www.geeksforgeeks.org/search-algorithms-in-ai/>

<https://medium.com/nerd-for-tech/ai-search-algorithms-with-examples-54772c6d973a>

▼ water jug problem -



▼ Heuristic -



▼ Generate and test -

# Easy Engineering Classes – Free YouTube Coaching

For Engineering Students of GGSIPU, UPTU and Other Universities, Colleges of India

Generate and Test Search in AI: In this technique all the solution are generated and tested for best solution.

↳ It ensures that the best sol<sup>n</sup> is checked from all possible generated solutions.

↳ Also known as British Museum Search Algo.

↳ Heuristic, DFS with backtracking

↳ If the sol<sup>n</sup> is found Quit.

Properties of Good Generators:-

↳ (1) Complete

(2) Non-Redundant

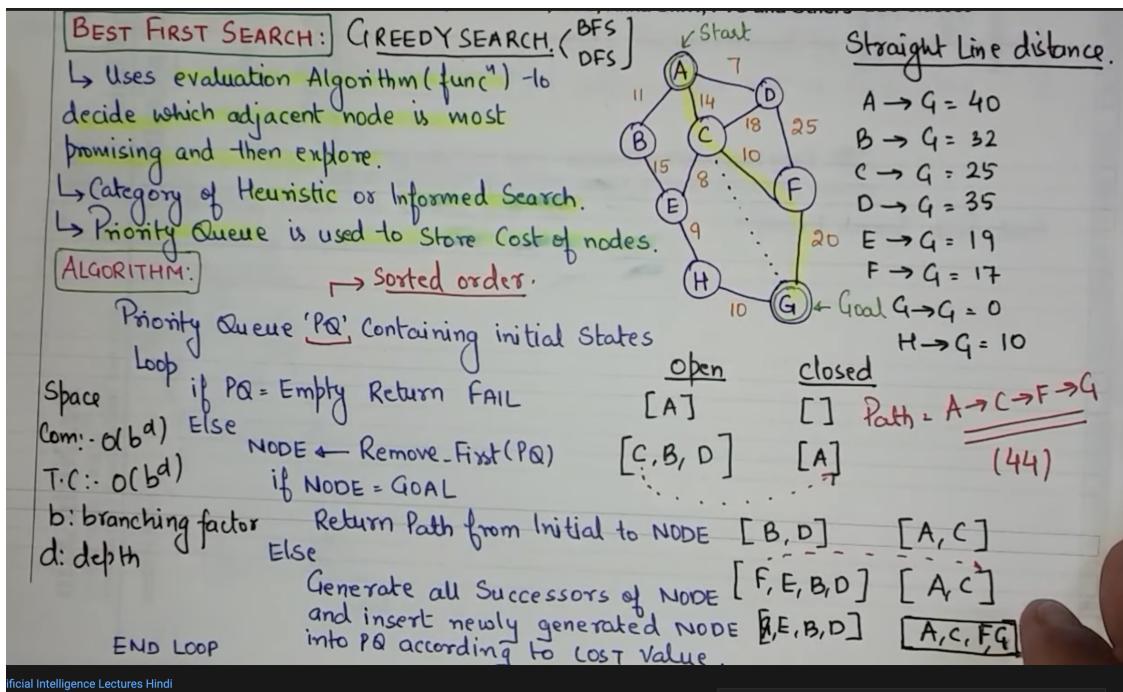
(3) Informed.

Generate a possible sol<sup>n</sup>  
↓  
Test it for actual sol<sup>n</sup> by  
choosing pointers/endpoints  
to set of acceptable

→ Quit,  
sol<sup>n</sup>

## ▼ Best First Search -

<https://www.geeksforgeeks.org/best-first-search-informed-search/>



## ▼ Beam Search -

if beta = 1, then it is same as hill climb

[https://www.youtube.com/watch?v=r6h9hydNhPw&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=23&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=r6h9hydNhPw&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=23&ab_channel=EasyEngineeringClasses)

**Easy Engineering Classes – Free YouTube Lectures**  
 EEC Classes GGSIPU, UPTU, Mumbai Univ., Pune Univ., GTU, Anna Univ., PTU and Others EEC Classes

**BEAM SEARCH:**

Optimized Version of **Best first Search**. { Only Predetermined no. of Best Partial Solutions are kept as candidates. }

- ↳ Heuristic Search Algorithm.
- ↳ Explores a Graph by expanding the most promising node in a **Limited Set**.
- ↳ Reduces Memory Requirement.
- ↳ GREEDY Algorithm.

Beam Value ( $B$ ) = Predetermined no. of best partial soln are kept as candidates.

**Best-first Search. Beam-Search** ( $B = 2$ )

▼ Hill Climb -

<https://www.geeksforgeeks.org/introduction-hill-climbing-artificial-intelligence/>

(AI-24) **Easy Engineering Classes – Free YouTube Lectures**

**Ques:- Write Short note on "Hill-Climbing Search"** ↗ Local Search algo ↗ Greedy Approach ↗ No Backtracking.

↳ Variant of generate and test method in which feedback from test procedure is used to help generator decide which dir<sup>n</sup> to move in Search Space. ↗ always moves in a Single dir<sup>n</sup>.

↳ It is like DFS

Eg:-

1	2	4
5	7	
3	6	8

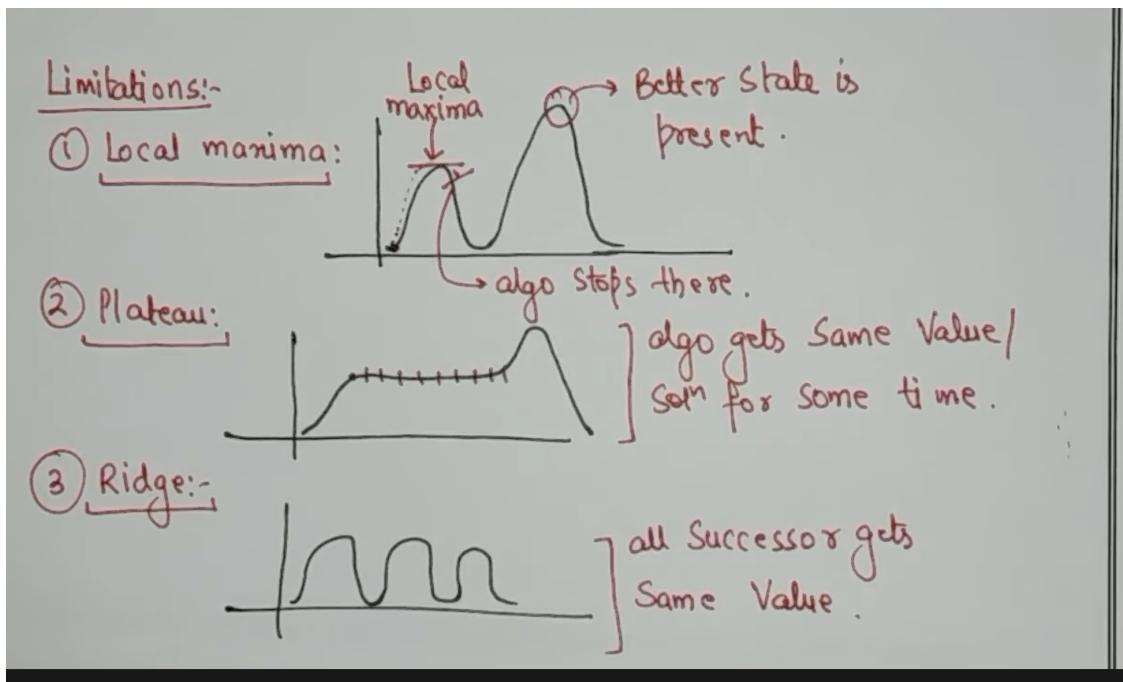
(Starting State)

↳ we will choose this

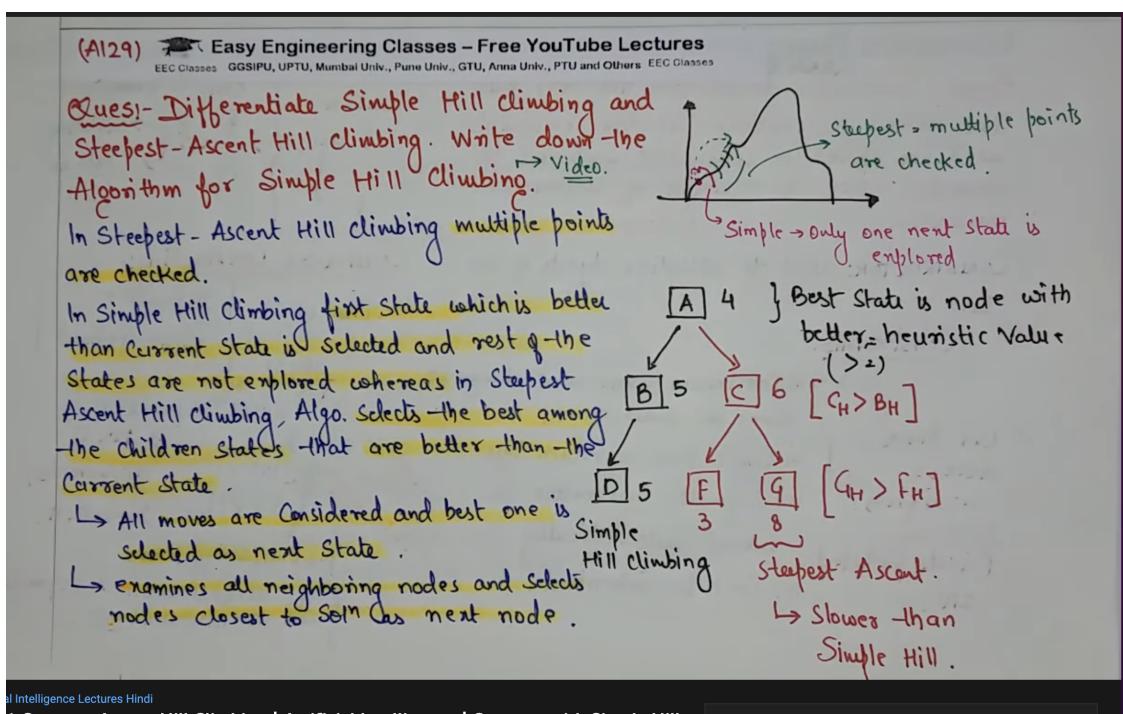
Flowchart:-

```

graph TD
    Start(( )) --> Evaluate[Evaluate Initial State]
    Evaluate --> GoalState{Goal State}
    GoalState -- Yes --> SetM[Set M] --> Quit[Quit]
    GoalState -- No --> CurrentState[Current State = Initial State]
    CurrentState --> ApplyOp[Apply operator 'O' and get new state. (NS)]
    ApplyOp --> GoalState2{Goal State}
    GoalState2 -- Yes --> SetM2[Set M] --> Quit
    GoalState2 -- No --> NSIsBetter{NS is better CS}
    NSIsBetter -- Yes --> CSNS[CS = NS]
    NSIsBetter -- No --> Quit
  
```



Steepest -



#### ▼ A\* Algo and AO\*

[https://www.youtube.com/watch?v=95s0b0HBe3w&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=24&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=95s0b0HBe3w&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=24&ab_channel=EasyEngineeringClasses)

<https://www.redblobgames.com/pathfinding/a-star/introduction.html>

<https://www.gatevidyalay.com/a-algorithm-a-algorithm-example-in-ai/>

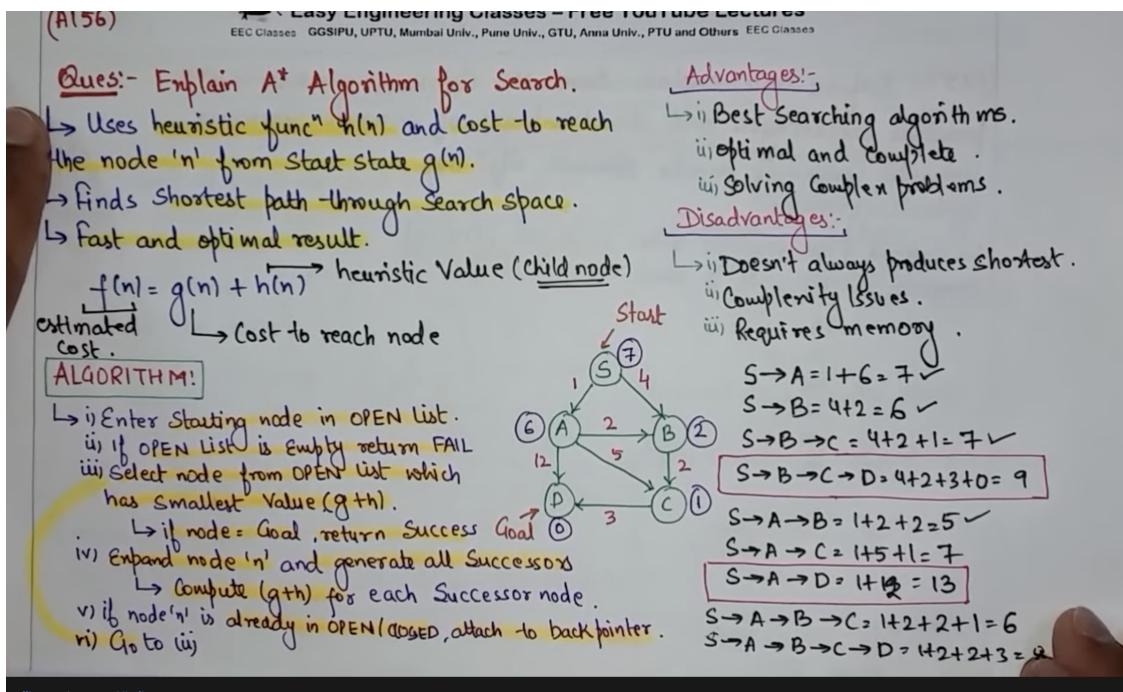
[https://www.brainkart.com/article/AO--Search\(Graph\)--Concept,-Algorithm,-Implementation,-Advantages,-Disadvantages\\_8884/](https://www.brainkart.com/article/AO--Search(Graph)--Concept,-Algorithm,-Implementation,-Advantages,-Disadvantages_8884/)

<https://www.vtupulse.com/artificial-intelligence/ao-search-and-or-graph-artificial-intelligence/>

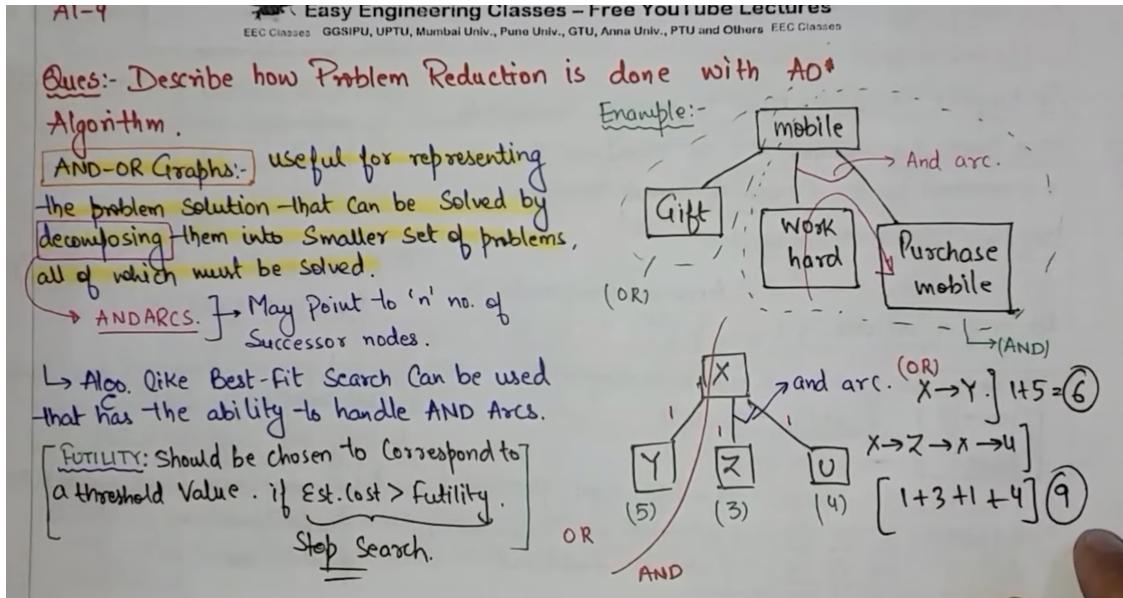
<https://iq.opengenus.org/a-search/>

<https://iq.opengenus.org/ao-algorithm/>

[https://www.youtube.com/watch?v=1Tk1SBvp-lg&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=1Tk1SBvp-lg&ab_channel=EasyEngineeringClasses)



Intelligence Lectures Hindi



Means End Analysis -

<https://www.section.io/engineering-education/basics-of-means-end-analysis-in-ai/>

<https://www.javatpoint.com/means-ends-analysis-in-ai>

Knowledge Representation

[https://www.youtube.com/watch?v=Ogp5X1lsG4&ab\\_channel=SanjayPathak](https://www.youtube.com/watch?v=Ogp5X1lsG4&ab_channel=SanjayPathak)

[https://www.youtube.com/watch?v=h5UTvdcgFHw&ab\\_channel=TrevTutor](https://www.youtube.com/watch?v=h5UTvdcgFHw&ab_channel=TrevTutor)

<https://www.javatpoint.com/propositional-logic-in-artificial-intelligence>

Playlists -

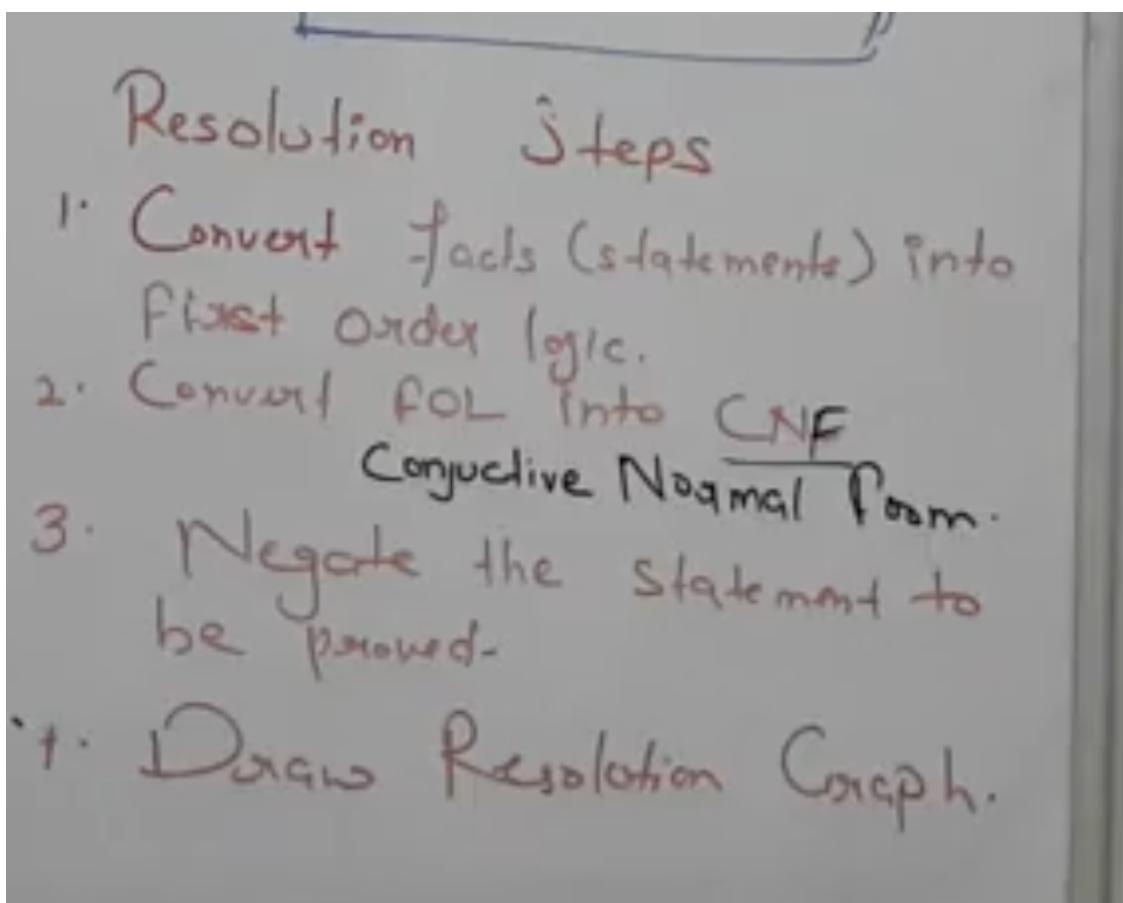
[https://www.youtube.com/playlist?list=PL5-M\\_tYf311YXhOOv6Cy4YgnwTslHOH5](https://www.youtube.com/playlist?list=PL5-M_tYf311YXhOOv6Cy4YgnwTslHOH5)

<https://www.youtube.com/playlist?list=PLPIwNoolb9vgB1DQEftkKA3qOdeC4vonA>

<https://www.youtube.com/playlist?list=PLPIwNoolb9vgB1DQEftkKA3qOdeC4vonA>

▼ Resolution Tree

[https://www.youtube.com/watch?v=lWIP2NuwhBQ&ab\\_channel=Lastmomenttuitions](https://www.youtube.com/watch?v=lWIP2NuwhBQ&ab_channel=Lastmomenttuitions)



[https://www.youtube.com/watch?v=ftPk1N0RVII&list=PL41Z-nyV-Dsh5hrjnSuKRNqXbB8S28lzM&index=20&ab\\_channel=NishaMittal](https://www.youtube.com/watch?v=ftPk1N0RVII&list=PL41Z-nyV-Dsh5hrjnSuKRNqXbB8S28lzM&index=20&ab_channel=NishaMittal)

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/c752259c-dd15-45a9-994f-8e94bd472141/Untitled.pdf>

▼ forward vs backward reasoning -

<https://techdifferences.com/difference-between-forward-and-backward-reasoning-in-ai.html#:~:text=The%20forward%20and%20backward%20reasoning%20are%20differentiated%20on%20the%20basis%2C%20the%20basic%20data%20and%20facts.>

<https://www.tutorialspoint.com/difference-between-forward-and-backward-reasoning-in-ai>

▼ ai vs deep learning vs ml -

## AI VS. MACHINE LEARNING VS. DEEP LEARNING

- **Artificial Intelligence:** a program that can sense, reason, act and adapt.
- **Machine Learning:** algorithms whose performance improve as they are exposed to more data over time.
- **Deep Learning:** subset of machine learning in which multilayered neural networks learn from vast amounts of data.

Artificial Intelligence is the concept of creating smart intelligent machines.

Machine Learning is a subset of artificial intelligence that helps you build AI-driven applications.

Deep Learning is a subset of machine learning that uses vast volumes of data and complex algorithms to train a model.

Amazon Echo is a smart speaker that uses Alexa, the virtual assistant AI technology developed by Amazon.

Amazon Alexa is capable of voice interaction, playing music, setting alarms, playing audiobooks, and giving real-time information such as news, weather, sports, and traffic reports

### Machine learning

is a discipline of computer science that uses computer algorithms and analytics to build predictive models that can solve business problems.

Deep learning is a subset of machine learning that deals with algorithms inspired by the structure and function of the human brain. Deep learning algorithms

can work with an enormous amount of both structured and unstructured data. Deep learning's core concept lies in artificial neural networks, which enable machines to make decisions.

The major difference between deep learning vs machine learning

is the way data is presented to the machine. Machine learning algorithms usually require structured data, whereas deep learning networks work on multiple layers of artificial neural networks.

<https://www.geeksforgeeks.org/artificial-intelligence-vs-machine-learning-vs-deep-learning/>

▼ convert fol to cnf

### ▼ Sessional 2

1. Procedural Verus Declarative Knowledge
2. Forward vs Backward Reasoning
3. Intro to Nonmonotonic Reasoning
4. Logics for Nonmonotonic Reasoning
5. Fuzzy Logic
6. Semantic Nets
7. Frames
8. Conceptual Dependency
9. Scripts
10. The Minimax Search Procedure
11. Adding Alpha-Beta Cutoffs

- 12. Natural Language Processing (full)
  - 13. Fundamentals of AI
  - 14. Machine Learning
  - 15. Deep Learning
  - 16. Application of Machine Learning
  - 17. IOT

## procedural vs declarative knowledge -

[https://www.youtube.com/watch?v=2ONm2TdQEh0&list=PLV8vIYTIdSnYsdt0Dh9KkD9WFEi7nVgbe&index=61&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=2ONm2TdQEh0&list=PLV8vIYTIdSnYsdt0Dh9KkD9WFEi7nVgbe&index=61&ab_channel=EasyEngineeringClasses)

(A168) Easy Engineering Classes - Free YouTube Lectures  
EEC Classes GGSIPU, UPTU, Mumbai Univ., Pune Univ., GTU, Anna Univ., PTU and Others EEC Classes

Ques:- Differentiate b/w monotonic reasoning and non-monotonic reasoning.

Monotonic Reasoning: Once the Conclusion is taken, then it will remain same even if we add some other info to existing info in our knowledge base.

$(inf_1) \rightarrow \text{Decision}$

+  $\begin{cases} \text{decision are not affected by new facts,} \\ \text{not suitable for real-time Sys.} \end{cases}$

↳ Earth revolves around SUN ] earth is not round ]

① All old proofs are Valid ] adv. new info.

① Can't real world Scenarios. ] disadv.

② New Knowledge from real world can't be added.

Non-Monotonic Reasoning: In this some Conclusion may be invalidated if we add some more info to our knowledge base.

$(inf_1) \rightarrow d_1 \rightarrow d_2$  ] decision can be changed by new facts.

↳ Helpful in Real-world Scenarios.] adv.

Eg:- Birds can fly ] Alex can fly.  
Penguins can't fly ] Alex is a bird.  
Alex is a Penguin ] Alex can't fly.

↳ Can't be used for theorem Proving. ] disadv.

## Reasoning -

[https://www.youtube.com/watch?v=JVclXaq00Pk&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=JVclXaq00Pk&ab_channel=EasyEngineeringClasses)

(A168) Easy Engineering Classes - Free YouTube Lectures  
EEC Classes GGSPU, UPTU, Mumbai Univ., Pune Univ., GTU, Anna Univ., PTU and Others EEC Classes

Ques:- Differentiate b/w monotonic reasoning and non-monotonic reasoning.

Monotonic Reasoning: Once the Conclusion is taken, then it will remain same even if we add some other info to existing info in our knowledge base.

$(inf_1) \rightarrow \text{Decision}$

+  $\begin{cases} \text{decision are not affected by new facts,} \\ \text{not suitable for real-time Sys.} \end{cases}$

↳ Earth revolves around SUN ] earth is not round ]

① All old proofs are Valid ] adv. new info.

① Can't real world Scenarios. ] disadv.

② New knowledge from real world can't be added.

Non-Monotonic Reasoning: In this some conclusion may be invalidated if we add some more info to our knowledge base.

$(inf_1) \rightarrow d_1 \rightarrow d_2$  ] decision can be changed by new facts.

↳ Helpful in Real-world Scenarios.] adv.

Eg:- Birds can fly  
Penguins can't fly ] Alex can Fly.  
Alex is a bird. ] Alex can't fly.  
Alex is a Penguin ]

↳ Can't be used for theorem Proving. ] disadv.

## Fuzzy logic -

[https://www.youtube.com/watch?v=vof2vhfqoBo&ab\\_channel=GateSmashers](https://www.youtube.com/watch?v=vof2vhfqoBo&ab_channel=GateSmashers)

'Fuzzy Logic' (Lotfi Zadeh)

- Represent uncertainty  $[0,1]$
- Represent with degree  $[0,1]$
- Represent the belongingness of a member of a crisp set to fuzzy set.

Membership function ( $\mu$ )

Speed of CAR	Membership function ( $\mu$ )
30	39.9
40	40.1
50	40.1
60	40.2

Membership function ( $\mu$ )

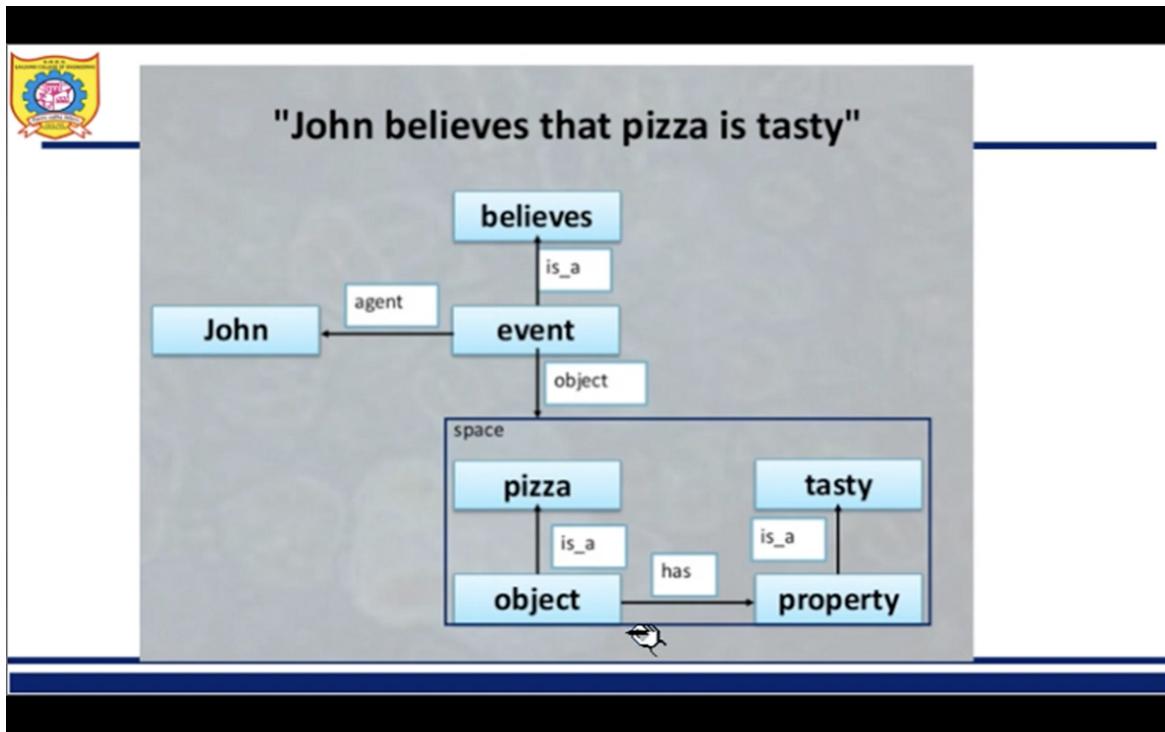
Check the degree of fastness

$$\left\{ \begin{array}{l} 0, \text{ if } Speed(x) \leq 40 \\ \frac{Speed(x) - 40}{10}, \text{ if } 40 < Speed(x) < 50 \\ 1, \text{ if } Speed(x) \geq 50 \end{array} \right.$$

$x = 30 \quad (30, 0)$   
 $x = 60 \quad (60, 1)$   
 $x = 42 \quad \frac{42-40}{10} = \frac{2}{10} = \frac{1}{5} = .2$   
 $x = 45 \quad \frac{45-40}{10} = \frac{5}{10} = \frac{1}{2} = .5$   
 $x = 48 \quad \frac{48-40}{10} = \frac{8}{10} = .8$

## Sematic Net -

[https://www.youtube.com/watch?v=lFurEuOud\\_k&ab\\_channel=ChetnaDangi](https://www.youtube.com/watch?v=lFurEuOud_k&ab_channel=ChetnaDangi)



Frames -

[https://www.youtube.com/watch?v=nDHcPXSGYT4&ab\\_channel=ChetnaDang](https://www.youtube.com/watch?v=nDHcPXSGYT4&ab_channel=ChetnaDang)

```

Class
  instance: Class
  isa: Class
  *cardinality:
Team
  instance: Class
  isa: Class
  cardinality:
  *team-size:
ML-Baseball-Team:
  instance: Class
  isa: Mammal
  cardinality: 26
  *team-size:24
  *manager

```

Conceptual Dependency -

[https://www.youtube.com/watch?v=OVTV7cXlx6g&ab\\_channel=ChetnaDang](https://www.youtube.com/watch?v=OVTV7cXlx6g&ab_channel=ChetnaDang)

[https://www.youtube.com/watch?v=ieZr\\_TpRwnQ&t=680s&ab\\_channel=CseGirl](https://www.youtube.com/watch?v=ieZr_TpRwnQ&t=680s&ab_channel=CseGirl)

<http://www.nitttrc.edu.in/nptel/courses/video/106106140/lec29.pdf>

Script -

[https://www.youtube.com/watch?v=K-EAtV9l7mA&t=884s&ab\\_channel=MukeshBarapatre](https://www.youtube.com/watch?v=K-EAtV9l7mA&t=884s&ab_channel=MukeshBarapatre)

[https://www.youtube.com/watch?v=Woyd7K1mUk8&t=112s&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=Woyd7K1mUk8&t=112s&ab_channel=EasyEngineeringClasses)

<https://tutorialslink.com/Articles/Explain-scripts-in-details-with-example-for-artificial-intelligence/1582>

MinMax theorem -

[https://www.youtube.com/watch?v=S7L4-KDTvEE&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=S7L4-KDTvEE&ab_channel=EasyEngineeringClasses)

(A155) Easy Engineering Classes – Free YouTube Lectures  
EEC Classes GGSIPU, UPTU, Mumbai Univ., Pune Univ., GTU, Anna Univ., PTU and Others EEC Classes

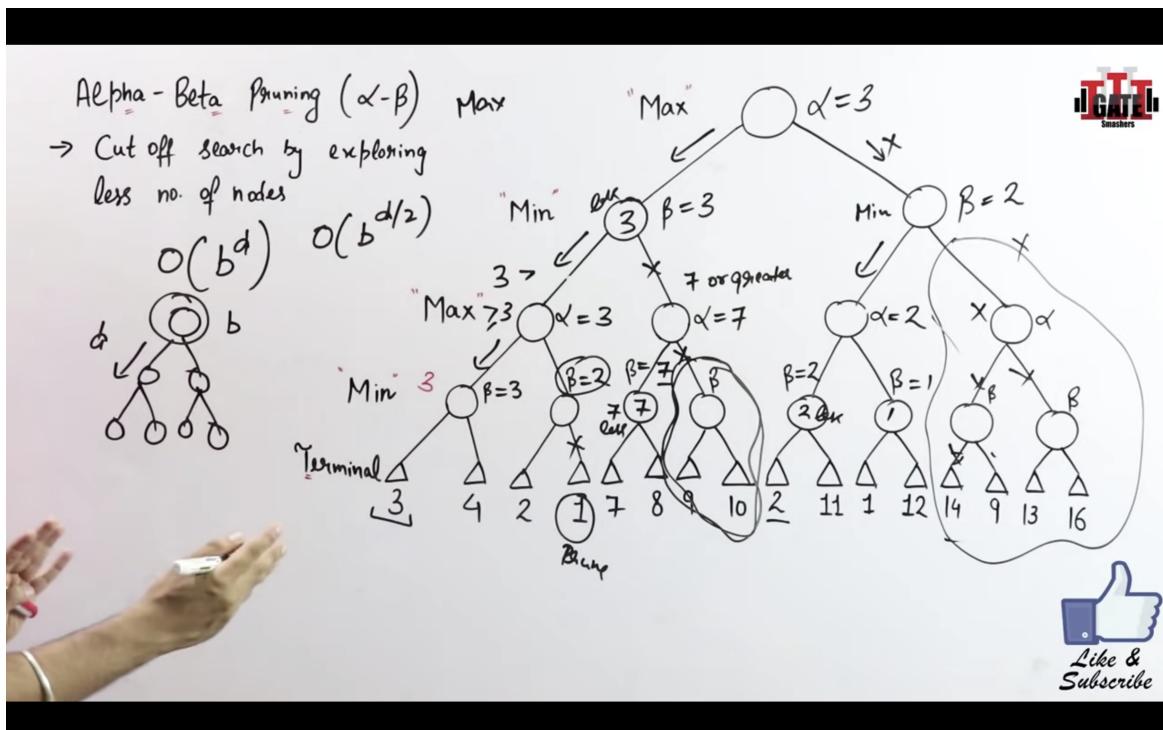
Ques:- Explain MinMax theorem [Game Playing] Properties:- → COMPLETE  
It is a specialized Search Algo that returns optimal sequence of moves for a player in Zero Sum Game.  
→ Recursive/ Backtracking algo which is used in decision making and Game theory. → Two Players.  
→ uses recursion to search through Game Tree.  
→ Algo computes minimax decision for current state.  
→ Two Players → MAX [Selects maximum Value] ← MIN [Selects minimum Value]  
→ Depth-first Search Algo is used for exploration of Complete Game Tree.  
→ CHESS, checkers, Tic-tac-toe  
[ max =  $-\infty$  ] Worst Values.  
[ min =  $\infty$  ] Initial .

Properties:-  
① Definitely found sol<sup>n</sup> (if exists)  
② optimal maximum depth.  
③ Time Complexity =  $O(b^n)$  branching factors of game tree  
④ Space Complexity =  $O(b^n)$

Limitations:-  
→ Slow for complex Games such as chess.  
→ 35 choices/moves.  
 $(35)^{100}$  d = 100 (for both players)  
→ BIG.

## Alpha beta pruning -

[https://www.youtube.com/watch?v=dEs\\_kbvu\\_0s&ab\\_channel=GateSmashers](https://www.youtube.com/watch?v=dEs_kbvu_0s&ab_channel=GateSmashers)



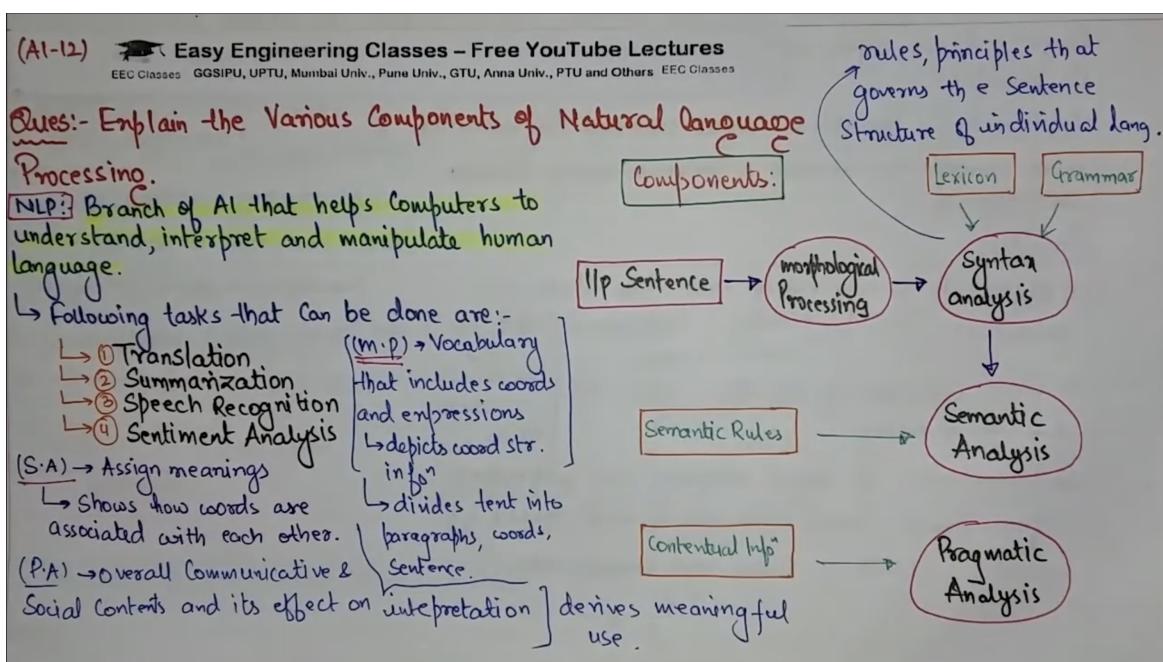
intro to nlp -

[https://www.youtube.com/watch?v=xBoCwQdUBiM&ab\\_channel=ChetnaDang](https://www.youtube.com/watch?v=xBoCwQdUBiM&ab_channel=ChetnaDang)

[https://www.youtube.com/watch?v=C-34SFYMNNA&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=77&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=C-34SFYMNNA&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=77&ab_channel=EasyEngineeringClasses)

[https://www.youtube.com/watch?v=fbdB7SZLWPc&ab\\_channel=MukeshBarapatre](https://www.youtube.com/watch?v=fbdB7SZLWPc&ab_channel=MukeshBarapatre)

[https://www.youtube.com/watch?v=8FGHDBwoPVo&list=PLPN-43XehstNQttedytmmLPwzMCXahBRg&index=35&ab\\_channel=RANJIRAJ](https://www.youtube.com/watch?v=8FGHDBwoPVo&list=PLPN-43XehstNQttedytmmLPwzMCXahBRg&index=35&ab_channel=RANJIRAJ)



Expert system -

[https://www.youtube.com/watch?v=NmF-VJ2NrT0&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=78&ab\\_channel=EasyEngineeringClasses](https://www.youtube.com/watch?v=NmF-VJ2NrT0&list=PLV8vIYTIdSnYsd0Dh9KkD9WFEi7nVgbe&index=78&ab_channel=EasyEngineeringClasses)

Answersssss -

for 2021 and 2019 sessional 2 answers refer mehedi notes best -

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/4b6aae3b-dd6c-4c23-af0-ab860e3755e1/Untitled.pdf>