

2021

AI

Aspire ES 15

Precision

Processor



ES1-571-33UE

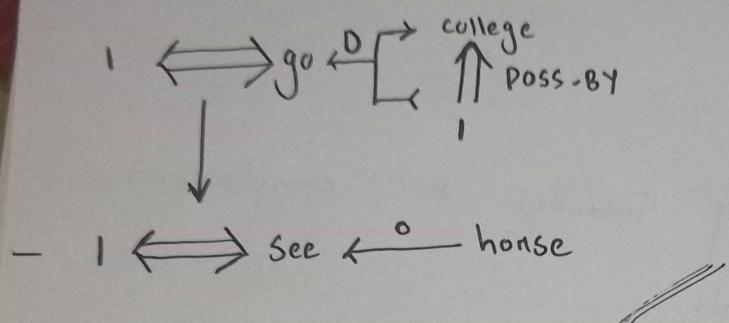


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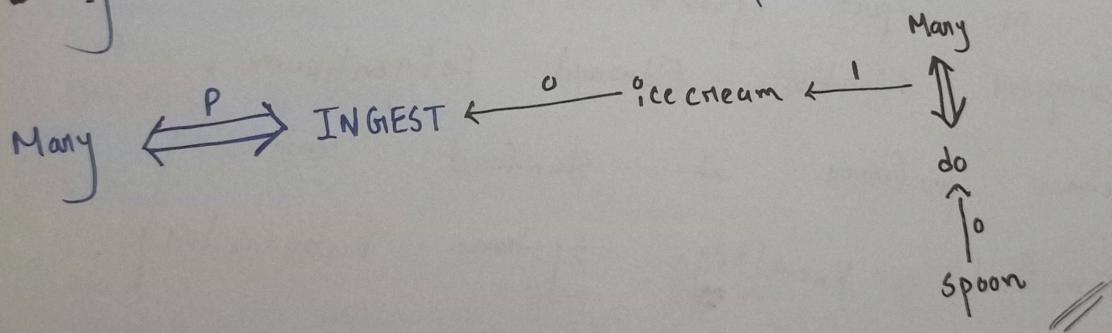
i) b) Draw a Conceptual Dependency Representation of the following -

(Artificial Intelligence)

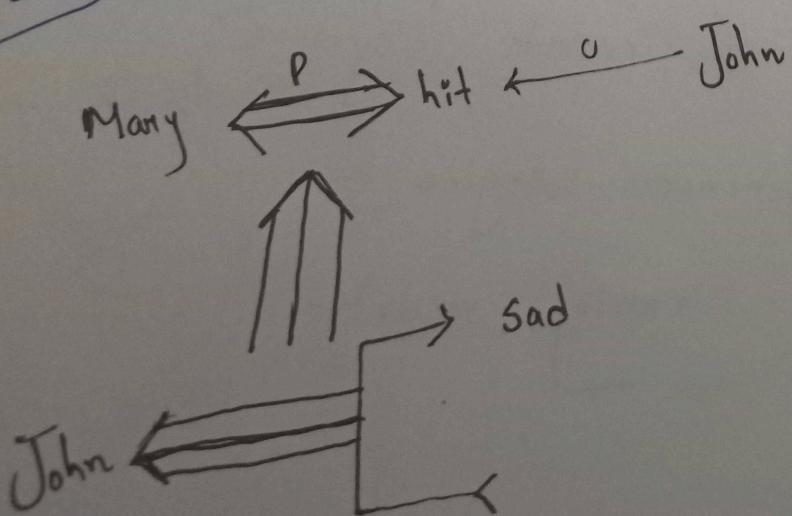
• while going college, I saw a house



• Mary ate ice cream with a spoon



Extra John was sad because Mary hit him.



2)(a)

Expert System —

An expert system is a computer program that uses artificial intelligence (AI) technologies to simulate the judgement and behaviour of a human or an organization that has expertise and experience in a particular field.

- Expert systems are usually intended to complement, not replace, human experts.
- The concept of expert systems was developed in 1970s by computer scientist Edward Feigenbaum, a computer science professor at Stanford University and founder of Stanford's Knowledge Systems Laboratory.

- Components / Architecture of Expert Systems —

There are 5 components of expert systems:

1. Knowledge Base
2. Inference Engine
3. Knowledge acquisition and learning module
4. User interface,
5. Explanation module.

Extra

Characteristics of Export Systems

- They have high-performance levels.
- They are easy to understand.
- They are completely reliable.
- They are highly responsive.

Capabilities of Export Systems

- ↪ The export systems are capable of a number of actions
 - advising.
 - Assistance in human decision making.

Many ↪

- Demonstrations and Instructions.

- Deriving solutions.
- Diagnosis

Ju. ↪

- Interpreting ^{inputs} and providing relevant outputs.

- Man. ↪
 - Predicting results.
 - Justification of conclusions.
 - Suggestions for alternative solutions to a problem.

Difference b/w AI and Expert System -

AI

AI is the ability of a machine on a computer program to think, work, learn and react like humans.

Expert System

Expert systems represent the most successful demonstration of the capabilities of AI.

- AI involves the use of methods based on the intelligent behavior of humans to solve complex problems.
- characteristics of AI -
 - Facial Recognition
 - Automate Simple and Repetitive Tasks.
- chatbots
- NLP
- ~~for~~ Imitation of human cognition
- Deep learning
- cloud computing

components of AI -

- 1) NLP , 2) Knowledge representation ,
- 3) Reasoning , 4) Problem solving
- 5) Machine Learning

• Expert systems are computer programs designed to solve complex decision problems .

characteristics of Expert system -

- High Accuracy and Efficiency
- Highly responsive
- Understandable
- Reliability .

Components of ES -

- 1) Knowledge Base
- 2) Inference engine
- 3) User interface
- 4) Knowledge acquisition module .

• AI systems from a wide range of applications
• AI systems from healthcare

• AI systems are used in a wide range of industries, from healthcare to finance, automotive, data security etc.

• ES provide expert advice and guidance in a wide variety of activities.

• Applications -

- E-commerce
- Education
- Lifestyle
- Navigation
- Robotics
- Human Resource
- Healthcare
- Gaming and others.

• Examples -

NLP & tools, Proactive healthcare management, Automated financial investing, Virtual travel booking agents, Self-driving cars, Manufacturing robots, Conversations, marketing bots, and others.

Applications -

- Hospitals
- Medical facilities
- Help desks management
- Loan Analysis
- Warehouse optimization
- Stock and market trading
- Airline scheduling and cargo schedules and others.

Examples -

DENDRAL, MYCIN and

others



✓ PXDES = Pneumoconiosis X-ray Diagnosis Expert System.

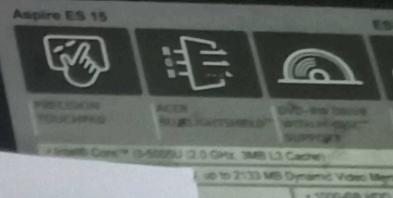
It is an expert system that is used to determine the type and level of lung cancer.

✓ Cadet : The Cadet expert system is a diagnostic support system that can detect cancer at early stages.

Extra not related to question

✓ MYCIN = It was the earliest backward chaining expert systems that was designed to find the bacteria causing infections like bacteraemia and meningitis.

✓ DENDRAL = it was an artificial intelligence project that was made as a chemical analysis expert system.



2) b) Solv: —

1) b)

case - based

- Case - based
- while solving new problems is an experience-based approach to previously successful problems.
- On, by adapting similar solutions to

reasoning (CBR)

- It uses a database of problem solutions to solve new problems. It stores the tuples on cases for problem solving or complex symbolic descriptions.

- Many at. solving or complex symbolic descriptions.
John my ←
- CBR systems can "learn" by acquiring new knowledge as cases. This along with the application of database techniques, makes it easier to maintain large volumes of information.

Four step process for CBR —

- 1) Retrieve - ~~Extracting~~
- 2) Reuse
- 3) Revise → Evaluating the use of the solution in the new context
- 4) Retain. → Storing this new problem-solving method in the memory system.

Applications of CBR -

- 1) Problem resolution for customer service help desks, where cases describe product-related diagnostic problems.
- 2) Applied in Engineering and law, where cases are either technical designs or legal rulings, respectively.
- 3) Medical educations, where patient case histories and treatments are used to help diagnose and treat new patients.

Challenges with CBR -

- 1) Finding a good similarity metric and suitable methods for combining solutions.
- 2) Selecting sufficient features for indexing training cases and the development of efficient indexing techniques.

3) a) Solv: →

• Feature Extraction ← It is a process of putting domain knowledge into the creation of feature extractions, to reduce the complexity of data and make pattern more visible to learning

• In deep learning, the feature extraction process is fully automated. As a result, the feature extraction in deep learning is more accurate and result driven.

• In Machine learning, techniques need the problem statement to break a problem down into different parts to be solved subsequently and then combine the results at the final stage.

Again, deep learning techniques tend to solve the problem end-to-end, making the learning process faster & more faster.

* Data dependency -

The most important difference b/w deep learning and machine learning is in its performance, on the scale of data increases.

- Although machine learning depends on the huge amount of data, it can work with a smaller amount of data too.

But,

Deep learning algorithms highly depend on a large amount of data, so we need to feed a large amount of data for good performance.

3(b) -

RNN - Recurrent

- RNNs are Neutral Networks.
- RNNs process both unique and past data on account of their ability to store and input data - and memory.
- RNNs are developed to overcome the weakness of the feed-forward network.
- It has an internal memory, it can precise predictions.

- RNN Applications include —

- Prediction problems
- Machine translation
- Speech recognition
- Sentiment Analysis
- Stock price forecasting
- Generating text and language modeling.

- It's the only Network with memory and double data processing.
- It can map out several inputs & outputs.

LSTM -

Q. Ques.
Ans.
following

LSTM - Short
long & term memory.

- it is " type of RNN .
- It is named so because it uses short - term memory

Procedure for creating long - term memory .

- # makes creating the long range dependency in RNN - is resolved by increasing the number of repeating layers in LSTM

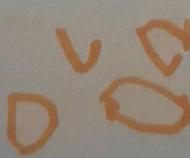
- LSTM deal with vanishing and exploding gradient problem by introducing new gates such as - input and forget gates .

Application -

mainly used in deep learning , e.g - for making predictions in speech recognition .

2019

2) Difference b/w connectionist AI and symbolic AI

Prop- entry	Symbolic AI	connectionist AI
Processing mode	The processing is sequential. Answer and construction times are long.	Networks are composed of a set of units. Information processing can be parallel, with a fast answer time.
New knowledge insertion	insertion of Knowledge (rules) can be made very quickly once experts have already processed them.	The training process can be long since weights are adapted gradually.
Incomplete information processing	The theoretical knowledge must be at a time correct & complete. This approach is not adapted to the approximate or incomplete information processing.	Networks are adapted to the approximate and incomplete information processing.
Development	Long development time. 	Architecture & parameters determination can be a long or difficult task.
Managing and maintaining	Managing and maintaining large rule bases are difficult	Easy to manage & maintain

3

Explain how reasoning is carried out using CBR -

Case-based Reasoning Concept
Case-based reasoning deals with very specific data from the previous situation, and uses and experience to fit a new problem situation.

The CBR process can be described as a cyclic procedure.

- The description of a new problem to be solved is introduced in the problem space.
- During the first step, retrieval, a new problem is matched against problems of the previous cases by computing similarity function, and the most similar problems and its stored solution are found.
- If the proposed solution does not meet the necessary requirements of a new problem situation, the next step, Adaptation, occurs and a new solution is created.
- A received solution to a new problem together form a new case that is incorporated in the case base.

during the learning step.

In this way, CBR system evolves into a better scenario as the capability of the system is improved by extending of stored experience.

→ O →

Hopfield Network —

Hopfield network is a special kind of neural network whose response is different from other neural networks — it is a fully interconnected neural network where each unit is connected to every other unit

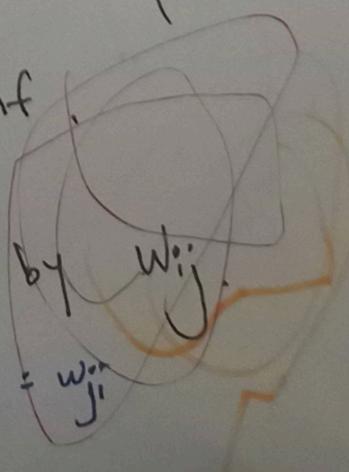
- Features of a Hopfield Network —

- This model consists of neurons with one inverting and one non-inverting output.

- The output of each neuron should be input of other neurons, but not the input of self.

- Weight / connection strength is represented

- weight should be symmetrical, i.e. $w_{ij} = w_{ji}$



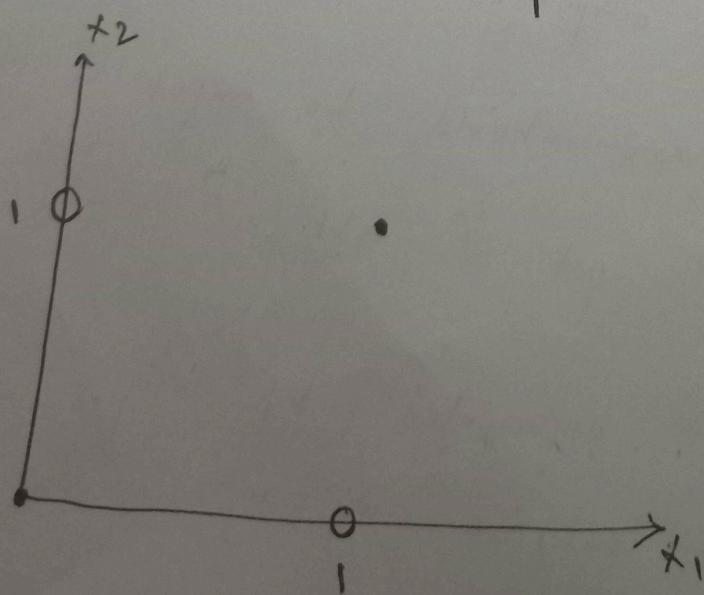
- It behaves if gives finite distinct types:
- in a discrete output manner i.e., generally of two types:
 - Binary (011)
 - Bipolar (-111)

\rightarrow \leftarrow

~~Nonlinear classification~~

X-NOR problem is linearly inseparable

x_1	x_2	y (result) $(x_1 \oplus x_2)'$
0	0	1
0	1	0
1	0	0
1	1	1



$$0 : 0 \\ 0 : 1$$

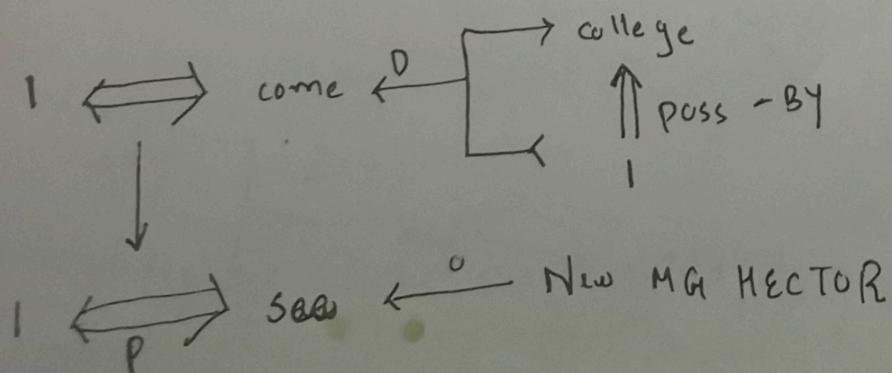
If it is impossible to separate points using a linear line.

No, NOR is not a linearly separable function as no line can be drawn that divides the problem space into 2 separate and exclusive areas.

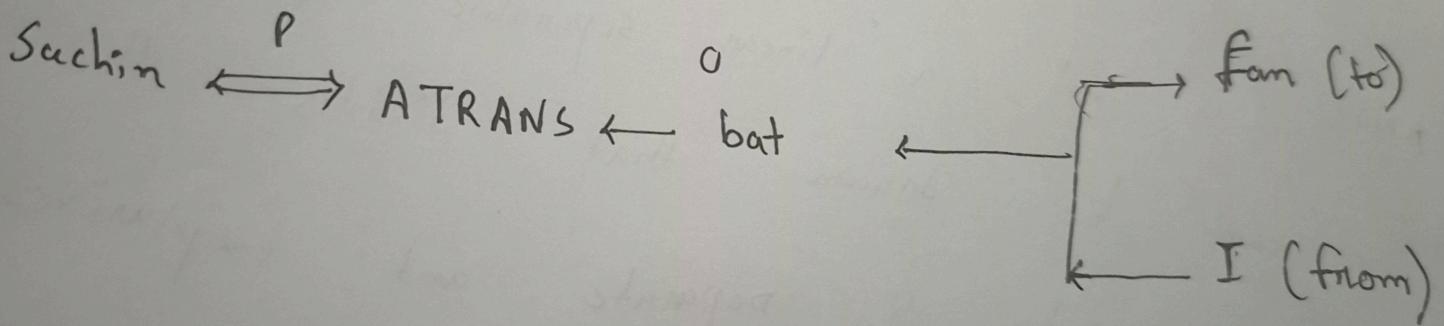
— 0 —

2) I heard a snake in the woods

• while coming from college I saw a new MG M ECTOR



Sachin gave his signed bat to his fan



- O -

Difference b/w

Machine learning

Machine learning & Deep learning -

Deep learning

Parameter	Machine learning	Machine learning & Deep learning - Deep learning
Data dependency	Although ML depends on the huge amount of data, it can work with a smaller amount of data.	DL Algorithms highly depend on a large amount of data, so we need to feed a large amount of data for good performance.
Execution time	Takes less time than BL to train the model. But it takes a long time duration to test the model.	DL takes long time for execution to train the model, but less time to test the model.
Hardware dependency	Work on low-end machines	Works on high-end machine. They need GPU.
Type of data	ML models mostly acquire data in a structured form.	DL model can work with structured and unstructured data both as they rely on the layers of the Artificial neural network.
Suitable for	ML models are suitable for solving simple or bit complex problems.	DL models are suitable for solving complex problems
Problem Solving Approach	ML breaks the problems into sub-parts, after solving each part, produces the final result	it takes input for a given problem, & produces the end result. It follows end to end approach.