23K-0006 BSAI-4A

ARTIFICIAL INTELLIGENCE
ASSIGNMENT 01:-

ANSWER 1:-

Alan Turing paper laid the fundation for the field of AI, by proposing the famous criterion test proposed for machine learning.

Which Objections still carry some weight?

He recongnized and responed to nine primary objections ranging from theological arguements to mathematical limitation. Some still resonate today.

- The "Heads In the Sand" objection:-

It is possessed by the idea that machine thinking is too disturbing to accept. this idea is more emotional than logical but people fear the idea of AI being equally or more intelligent than human being. they fear the loss of human uniquenes.

- The Mathematical Objection:-

He addresses Godel's incompleted theroms that suggests machines has theoretical limits. Even in Modern AI they work on statistical logics inplace of formal ones. Hence the idea still persists. But the real question is wether machine can achieve true understanding or conciousnes.

- The Consicousnes Objection:-

Due to lack of subjective experience & conciousnes critics argue machine cannot truly think. But the philosophical object remains unresolved.

- The Informality Of Behaviour Objection:-

Turing believes human behavior to be too complex to capture. While models like LLMs can mimic human behaviour they still struggle. This highlights the gap between simulating Intelligence and possessing it.

Q2) Are his Refutations Valid?

~~ANSWER 2:-~~

His limits are insightful but not without limitations.

▷ HEADS IN THE SAND:-

He dismisses it as emotional concern rather than logical auguements. His refutations are valid in scientific content but not in ethical content. Today these concerns are more than ever, since AI effects human life a great deal.

▷ MATHEMATICAL OBJECTION:-

Turing says that Gödelian limits also are applied to human beings. Human Intelligence comes from intuition & clarity which are not yet fully understood or replicable in machines.

▷ CONCIOUSNESS OBJECTION:-

He sides this issue declaring that consiousness is irrelevant to Turing tests. It doesnot resolve the deeper & philosophical part about the nature of thought.

▷ INFORMALITY OF BEHAVIOUR OBJECTION:-

He says machine can learn complex behaviour through learning & adaption. Modern AI's can validate this refutation since they create human like responses but still they are few ahead.

~~ANSWER 3:-~~

New Objections Arising from Developments:-

- Ethical & Societal Concerns:- The areas where AI has been integrated such as warfare, surveillance may have said to be causing harm. These were not prominent in turings era but are now the centre.
- Explainability & Transparency:- Deep learning models are black boxes often making it hard to think how they arrive at decisions.
- Environmental Impact:- The computation resources to train large AI models have raised concerns about environmental footprint.
- Economic Disruption:- The automation has led to the rumors of everyone getting jobless & having economical inequality. While Turing predicted this but the rapid speed it is growing on is unpredictable.

~~ANSWER 4:-~~

TURING'S PREDICTION:-

His peridiction carried some weight since by the early 21st century AI systems, like chatbots demonstrated conversational abilities that could plausibly fool human briefly. However, he underestimated the human intelligence quite a bit. Since AI lacks genuine & long term consistency.

Additionally the test has been criticized for surface behaviour rather than deeper cognitive abilities. AI has not yet reached the understanding he visioned.

ANSWER 2:-

① playing a decent game of table tennis:-

- yes, with limitations.
- robots like those developed by Omron & academic institutions can play a decent level game. they use advance computer vision, motion planning ... etc.
- they struggle with unpredictable human playstyles. generalizing across diverse conditions may seem like a challenge.

② Decent Game of Bridge:-

- partially
- AI systems like WBridge5 have achieved success but not at the level of top human players.
- the game's reliance on human intuition & imperfect information makes it hard for AI to understand.

③ Intentionally Funny Story:-

- partially
- GPT-4o's can create humourous story but they are a hit or miss.
- creating funny story requires creativity & emotions which AI lacks.

④ Competent legal Advice:-

- partially
- Ross Intelligence and CaseText can assist with legal reseach documents & basic legal advice.
- reasoning, empathy & creativity is required which are beyond AI capabilities.

⑤ MATHEMATICAL THEOREM:-

- partially true
- deepmind's Alpha Tensor & lean have shown ability to discover them & prove them.
- while AI can assists in exploring large spaces, it lacks ability to conceptualize.

⑥ Performing Surgery:-

- partially
- Davinci is a robotic system used in operating rooms, but controlled by human surgeons.
- Current AI lacks judgement & situational awareness.

⑦ Unloading Dishwasher:-

- No
- Robots struggle with delicate handling & spatial reasoning in unstructed environments.
- Robots can perform controlled environment tasks but unloading Dishwasher is beyond current capabilities.

⑧ Constructing A Building:-

- partially
- they are used in Brick laying, 3D printing & site surveying.
- Current AI lacks the full scope to manage construction, including design changes.

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ANSWER 3:-

DOMAIN: FIGHTER JET OPERATIONS:-

DESCRIPTION:-

An autonomous fighter jet system designed to perform missions such as air to air combat, renoinsance & ground support. It is equipped with advance sensors (radar, infra-red, cameras) communication systems & weapons. It can make decisions about navigation, target acquisition, threat avoidance & mission execution in real time.

Primary goals:-

1) Survival:- avoid enemy threats & return safely.
2) Mission Success:- neutralize targets
3) Efficency:- optimize fuel usage, weapon deployment & time.

CHARACTERIZATION OF THE ENVIRONMENT:-

- Partially Accessible:- it will have limited information e.g: enemies intention.
- Stochastic: Unpredictable enemy environments, weather & system failures.
- Sequential: Actions have long term consequences.
- Dynamic: Continous changes in threats or conditions.
- Continous: Operates in real time 3D air space.

AGENT ARCHITECTURE:- A hybrid architecture combining:- (generative AI struc combined with reinforcement learning)

① Reactive Layer:- rule based systems & reinforcement learning for real time ~~systems~~ threats (e.g missilies..)

② Deliberative Layer:- Planning Algorithms; e.g (A*) for mission strategy.

③ Learning Component:- Reinforcement learning to adapt to new threats.

④ Communication Module:- Coordinates with allies for shared objectives

QUESTION 4:-

1) False

•) ~~event~~ agent can still be perfectly rational even with little information.

•) example:- A poker playing agent that cannot see it's opponent playing and can still act rationally using probability.

2) True

•) example: In chess the agent will make moves on the basis of current board state not considering the future consequences.

3) True

•) example:- In an environment where the only task is to press a button that results in success.

4) False

•) example:- an agent program for a self driving car might take the current cameras images as input but the agent functions takes the entire history of images area to determine the next move.

5) False

•) some agent functions are not compatible due to theory limitations.

•) examples:- an agent function that requires solving a halting problem is not implementable since the problem is undecidable.

6) True

- Example:- an agent is supposed to choose between two doors & both doors lead to the same reward, random selection is rational.

7) True

- Example:- A* search agent in grid world & puzzle task.

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