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Date

ARTIFICIAL INTELLIGENCE

ASSIGNMENT #01:-

Ans) The following objections still carry weight in the quest for artificial intelligence:

1) Mathematical Objection:-

As a corollary of Godel's Incompleteness Theorem, a system based on formal logic has provable limitations. As a result, any deterministic artificial intelligence cannot be considered a "true" intelligence.

2) Arguments from consciousness:-

Since a machine does not experiences emotions i.e. have a consciousness, it is difficult to equate human and machine intelligence. Turing's refutation to this argument, the "Other Mind's reply" left much to be desired.

3) Lady Lovelace's objection:-

According to lady Ada Lovelace, since computers are incapable of originality, they cannot be classified as an intelligence akin to humans. This is quite possibly the heaviest and most famous objection against AI.

4) Argument from continuity in nervous system:-

Neurological research shows that neurons in human brains have analog components rather than being completely digital. This indicates that it is impossible to simulate human intelligence using digital signals. Turing refutes this argument by arguing that any analog system can be simulated to a reasonable degree given enough computing power.

5) Argument from informality of behaviour:-

According to this argument any system based on laws will be predictable and not completely intelligent. Turing states the brain is also governed by (unknown) laws that we have not been able to identify.

#2) According to Turing, a computer would have at least a 30% chance of passing Turing Test lasting 5 minutes with an unskilled investigator. Given that current GPT-4 is able to pass a sample Turing Test 49.7% of the time, compared to a human baseline of 66%, it is assumed that Turing's estimate was quite reasonable.

Date

QUESTION #02:-

1) Through a combination of robotics and reinforcement learning, the game of ping-pong has been perfected by AI. In fact, it is now impossible for a human player to beat a decent AI at ping-pong.

3) Although bridge is an imperfect information game, it has been perfected by AI, as evidenced by the French startup NukkAI's victory against eight bridge world champions at Paris in 2022.

4) Yes, it is now possible to discover and prove new theorems using AI. The researchers at DeepMind (creator of AlphaGo) have successfully accomplished this feat. Although computers have long since been used for experimental mathematics, identifying nonlinear patterns has only become possible through the power of AI.

6) Although static legal information retrieval systems i.e. Westlaw, have existed for more than 40 years, it is still a point of debate whether AI can (or should) be used to give legal advice. Currently, there is no perfect AI tool for legal advice and most international courts have strict policies on the usage of AI in legal documents. Notable examples include: Ross intelligence

Date

7) Realtime machine translation, although AI-complete, has been mostly solved through cutting-edge transformer sequence-to-sequence models. Examples include: Google Translate, Azure Language, etc

5) Due to advancements in Natural Language Understanding (NLU), it has become possible for AI to come up with intentionally funny stories, albeit with some caveats. It is also possible for an AI such as ChatGPT to dissect a joke using NLP and explain why its funny.

QUESTION #03:-

Ans) Domain: Playing a fighting game (The King of Fighters 2002: Unlimited Match)

Agent: Player 1, Player 2

Environment: Deterministic, Sequential, Dynamic, Continuous, Multi-agent

A learning agent would be the best for this domain because it can tailor its moves according to the opponent.

Date

QUESTION #04:-

1] Playing soccer:-

Performance Measure: Scoring goals, Winning
Environment: Football field
Actuators: Players
Sensors: Ball, Goalposts

2) Exploring subsurface of Arabian Sea:-

P: Discovering new algae / aquatic species, Mapping ocean floor
E: Sea floor
A: Divers, ~~cameras~~, robots
S: Cameras, SONAR

3] Playing a tennis match:-

P: Scoring, Winning, Successful serves
E: Tennis ~~Field~~ court
A: Tennis players, rackets
S: Cameras, ~~Judges~~ Referees, Balls

4) Performing a high jump:-

P: Clearing the bar, landing safely
E: Track, Pit
A: Jumper, Pole
S: Bar, Referee

Date

5) Bidding on an item at an auction:-

P: Winning the bid, Minimizing bid
E: Auction house
A: Bidders.
S: Auctioneer

QUESTION#05:-

1) True. If an agent has only partial information, there is the possibility of the existence of information that is unknown to the agent but which would lead to a better, more rational decision.

2) True. Since reflex agents only rely on current percept, they would not be rational in an sequential environment where each state depends on previous state.

3) False. Different agents will perform differently in a similar environment.

5) As long as the agent is deterministic and computationally feasible, it can be implemented by a machine program.

6) A randomized agent has the possibility of performing rationally in a deterministic environment. However, this has almost negligible probability.

Signature