Saif (23K-0032) <Assignment 1>

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<Question 1>

Alan Turing's 1950 paper, Computing Machinery and Intelligence introduced the Turing test and discussed objections to machine intelligence. Some of these objections still matter today, while others have been addressed or replaced by new concerns. This essay explores which objections remain relevant, whether Turing's responses were valid, new objections that have emerged, and whether his prediction about AI passing the Turing Test by 2000 was reasonable.

Turing addressed several concerns, including theoretical arguments, consciousness, mathematical limit, and machine disabilities. Two still hold weight:

1. Consciousness: arguments that even if a machine mimics human behaviour, it still doesnot truly understand them.

2. Mathematical limits: this suggests that AI will always have limitations in solving problems.

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Turing dismissed the consciousness argument, saying intelligence should be judged by behaviour, not inner experience. While this is practical, many argue true understanding goes beyond behaviour. His response to mathematical limits was humans also have limitations, which remains a fair point.

AI has grown in many ways Turing could not have predicted, arising new concerns:

1. Biasness: AI shows biases in it's training data, leading to unfair decisions.

2. Controlability: AI might not always align with human values.

3. Lack of Explanation: AI models often work in ways we donot fully understand.

Turing thought that by 2000, a computer would have a 30% chance of fooling an unskilled interrogater in 5 minutes. Today, we have chatbots having passed versions of the test as they rely on mimicking language rather than real thinking. Today's AI can sound like a human but lacks deep understanding.

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Turing's ideas remain influential. Some of his objections still apply, while new ones have emerged. His prediction was close but didnot fully capture AI's progress in mimicking intelligence without true comprehension. The debate on whether machines truly think continues.

⟨Question 2⟩

1. AI robots can play but lack the reflexes of human player's.

2. Bridge requires teamwork, AI would struggle with teamwork and following a properly devised strategy.

3. AI can generate jokes but could lack the true human understanding.

4. AI helps in research but lacks the deep reasoning needed for specailized laws.

5. AI can prove theorms but cannot discover new ones as of it's limitations.

6. AI offers assistance in surgical operations but cannot operate indenpendently due to unpredictable situations.

7. AI struggles with different layouts and object handling in various homes.

8. Again, AI can provide assistance but cannot fully build structures without human help.

⟨Question 3⟩

An AI agent is designed for automated stock trading. It analyzes market trends, processes news and executes trades based on pre-defined strategies. This agent continously learns from historical data and adapts to market change to gain profits while minimizing risk.

- Accessible: Partially (market data available, future trends unknown).

- Deterministic: No, as market fluctuate on unpredictable factors like economic events.

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- Episodic: No, as past market trends influence future decisions.

- Static: No (market conditions change continously).

- Continous: Yes (real time market fluctuations).

Solution: A hybrid architecture containing reinforcement learning and rule-based system is ideal. As, it would use deep reinforcement learning on market trends and optimize trading strategies while rule based constraint will manage risks and prevent losses.

<Question 4>

1. False. AI can still act rationally ~~based~~ with probabilities and available information. Example: Poker AI makes optimal decisions without knowing opponent hands.

2. True. Reflex agents are based on current percepts only and they fail in places that require memory or planning. Example: Chess AI needs past moves to make strategic decisions.

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3. False. As different agents have different objectives. Example: In a self car driving environment, a agent who ignores traffic rules would not be befitting.

5. False. Some require Infinite computation, making it impossible to implement. Example, Perfect stock prediction.

4. False. Program implement functions differently. Example, The same function can be implemented in different ways.

6. True. If the environment itself is random then a random agent would fit. Example, a game of dice rolling to win a prize.

7. True. If the agent's strategy aligns perfectly with both environments, it can work. Example: a sorting algorithm can be applied to different datasets of same structure.