**LITERATURE REVIEW** –

**Do LLM (Large Language Model) understand human logic? If so, at what level? Can LLM understanding of human logic be improved?**

Over the past few years LLM burst into our life in the past years impacting every human life . This literature review aims to help us understand the current state of LLM logic understanding and recent development related to this topic . Despite the huge lap LLM made in recent years we believe there is still room to improve especially in understanding human logic.

1. **What is human logic?**

(Yan et al.,2024) defines human logic as a core component of human cognition that is essential for comprehending , interacting with , and influencing our environment similar to (Parmar et. al 2024) who says that its a fundamental aspect of intelligence in addition to (Wan et al.2024) who define it as the cognitive process of using logic to draw conclusions from given facts. Essentially all of the studies claims that logic and reasoning are crucial part of intelligence

1. **How does LLM try to solve logic questions?**

models merely relying on shortcuts such as pattern recognition without truly engaging in logical reasoning (Wan et al.2024) . models using exemples they already saw to answer a new logical question. (Xu et al.,2024) who claims that because the data those LLM train on is so large they frequently face a question similar/ same to one they have learned on .

1. **How to evaluate LLM?**

(Gupta et al., 2023) evaluated the BCQ model using exact match accuracy and pairwise accuracy to assess its ability to correctly identify true or false answers and understand feasibility. For the MCQ model, they measured exact match accuracy and recall to assess its ability to select all correct answer options and identify a portion of the correct options. Similarly, (Mihir Parmar et al., 2024) introduced LogicBench, a benchmark designed to evaluate the logical reasoning capabilities of LLMs, constructing BQA and MCQA tasks to assess LLMs' ability to determine logical entailment and select the most appropriate conclusion from multiple options.

1. **What can be done to improve LLM understanding of logic?**

(Yan et al.2024) conclude that LLM may improve their logical reasoning performance through in context learning ( he also state that this method will only enhance the performance and not actually boost the model understanding of the concepts) while ( Parmar et al.2024) suggest a new data set to train LLM on to enhance the performance . (Xu et al.2024) says that its crucial to develop pre-training or fine-tuning strategies to enhance the model reasoning abilities .All of the studies suggest that the only improvement that can be done is supposed to be implanted in the pre-training and training phase of the model.

**Conclusion**This literature review examines the ability of Large Language Models (LLMs) to understand human logic. It finds that despite significant advancements in the field, these models still struggle to fully grasp the principles of human logic. The research suggests that LLMs primarily rely on pattern recognition and memorization rather than true logical reasoning. The review proposes several directions for future research, such as developing more sophisticated models that can handle symbolic and probabilistic logic, as well as using specialized datasets that focus on training models for logical thinking. Overall, the review highlights the need for further research to better understand the capabilities and limitations of LLMs in the domain of human logic**.**

**Bibliography**

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