2. Literature Survey

**Advancing Requirements Engineering through Generative AI: Assessing the Role of LLMs [**[**3**](#_bookmark24)**]:**

The research paper discusses the significance of Requirements Engineering (RE) in software development, where tasks like elicitation, analysis, specification, and validation of software requirements are crucial. Despite its importance, RE is challenging due to communication complexities, early-stage uncertainty, and limited automation support. In recent years, Large Language Models (LLMs) have demonstrated promise in various domains, including natural language processing, code generation, and program understanding [[3](#_bookmark24)]. The chapter explores how LLMs can enhance RE processes to improve the efficiency and accuracy of requirements-related tasks. It proposes key directions and a SWOT analysis for research and development in using LLMs for RE, with a focus on requirements elicitation, analysis, specification, and validation. The abstract also mentions a preliminary evaluation of LLMs in this context.

**A Survey of Safety and Trustworthiness of Large Language Models through the Lens of Verification and Validation [**[**4**](#_bookmark25)**]:**

The abstract of the research paper discusses the rapid adoption of Large Language Models (LLMs) in various applications, highlighting their ability to engage in human-level conversations and provide detailed and articulate answers across knowledge domains. However, the abstract also recognizes the need to address safety and trustworthiness concerns associated with LLMs. The paper reviews vulnerabilities and limitations of LLMs, categorizing them into inherent issues, potential attacks, and unintended bugs [[4](#_bookmark25)]. It then explores the integration of Verification and Validation (V&V) techniques throughout the lifecycle of LLMs to enhance their safety and trustworthiness, considering four key techniques: falsification and evaluation, verification, runtime monitoring, and ethical use regulations. The paper references over 370 sources to provide a comprehensive

understanding of these issues.

**OntoChatGPT Information System: Ontology-Driven Structured Prompts for ChatGPT Meta-Learning [**[**5**](#_bookmark26)**]:**

The abstract of the research paper introduces a methodology that combines ontology-driven structured prompts [[6](#_bookmark27)] with ChatGPT, a widely used large language model (LLM), to enhance the performance of chatbot systems. The study develops formal models and foundations for integrating ontology-driven prompts with ChatGPT’s meta-learning capabilities. This integration results in the OntoChatGPT system, demonstrated in the context of rehabilitation using the Ukrainian language. The OntoChatGPT system effectively extracts entities, classifies them, and generates relevant responses. The methodology is highlighted for its versatility and applicability to other LLM-based chatbot systems, such as Google’s Bard with the PaLM 2 LLM [[5](#_bookmark26)]. The principles of meta-learning, structured prompts, and ontology-driven information retrieval are at the core of this approach, making it adaptable for various LLM-based systems and offering new possibilities for enhancing chatbot performance and functionality across different domains and languages [[1](#_bookmark22)] [[7](#_bookmark28)].

**Ask more, know better: reinforce-learned prompt questions for decision making with large language models [**[**8**](#_bookmark29)**]:**

The abstract of the research paper discusses the use of Large Language Models (LLMs) for addressing practical challenges by combining action-based policies with chain of thought (CoT) reasoning [[6](#_bookmark27)]. It acknowledges the importance of having high-quality prompts for the effectiveness of this framework. Currently, prompts are manually crafted, requiring substantial human effort, and often leading to limitations in generalization. The paper introduces an integrated framework for task-resolution in real-world scenarios that involves complicated reasoning. This framework includes a leader-follower bilevel structure capable of learning to ask relevant questions (prompts) and guiding the learning of actions. The prompts are designed to adapt to historical findings, leading the CoT towards anticipated goals, while the action policy learns how to use the CoT outputs for specific actions. The empirical data presented in the paper demonstrates that the proposed system outperforms leading methods in agent learning benchmarks [[8](#_bookmark29)].