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A Study of Prompt Engineering Techniques for Improving Generative AI Performance

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Abstract : *Generative Artificial Intelligence (GenAI) has transformed the way users create content, retrieve information, write code and solve problems. The quality of outputs produced by Generative AI systems depends not only on the underlying model but also on the instructions supplied by users. Prompt engineering is the process of designing, structuring and refining inputs to guide an AI model towards relevant, accurate and useful responses. The present study examines the role of prompt engineering techniques in improving the performance of Generative AI systems, with particular attention to Zero-Shot Prompting, One-Shot and Few-Shot Prompting, Role-Based Prompting, Contextual Prompting and Chain-of-Thought Prompting. The study adopts a descriptive research design and is qualitative in nature, relying on secondary data collected from academic research papers, conference proceedings and published surveys. The literature indicates that carefully structured prompts can improve task alignment, response relevance, reasoning performance and output consistency. However, prompt effectiveness varies according to the task, model, context and evaluation method. The study also identifies limitations such as hallucinations, sensitivity to wording, prompt injection risks, bias and the absence of universally effective prompt templates. It concludes that prompt engineering is an important method for obtaining more reliable results from Generative AI, but should be combined with verification, clear evaluation criteria and responsible AI practices.*

Keywords: Prompt Engineering, Generative Artificial Intelligence, Large Language Models, Zero-Shot Prompting, Few-Shot Prompting, Chain-of-Thought Prompting, AI Performance.

I. INTRODUCTION

Generative Artificial Intelligence refers to AI systems capable of producing new content such as text, images, code, audio and other forms of media in response to user instructions. Large Language Models (LLMs) are an important category of Generative AI systems that process and generate human language. They are increasingly used in education, business, software development, customer support, research and content creation.

A prompt is the instruction or input provided to a Generative AI model. It may include a question, task description, context, examples, constraints and the expected output format. Prompt engineering involves designing and refining these instructions so that the model understands the user's objective and generates an appropriate response. Unlike model fine-tuning, prompt engineering can often guide an existing model without changing its internal parameters.

A vague prompt may produce a general, incomplete or irrelevant response, whereas a clear prompt that specifies the task, context, audience and output requirements can improve usefulness. For example, asking an AI system to 'explain databases' is less specific than asking it to 'explain relational databases to first-year IT students using a simple example and five key points'. The second prompt provides context and establishes the expected level and format.

Several prompting approaches have emerged, ranging from simple Zero-Shot instructions to example-based Few-Shot prompting and reasoning-oriented Chain-of-Thought prompting. Research has demonstrated that prompting strategies can influence performance on reasoning, question-answering and language tasks. Nevertheless, results are not uniform across all tasks or models. Therefore, it is important to understand the strengths, limitations and suitable applications of

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different techniques. In this context, the present study examines how prompt engineering techniques contribute to improving Generative AI performance.

II. RESEARCH OBJECTIVES

1. To understand the concept and importance of prompt engineering in Generative Artificial Intelligence.
2. To examine major prompt engineering techniques used with Generative AI systems.
3. To analyse how different prompting techniques influence the accuracy, relevance, completeness and consistency of AI-generated responses.
4. To identify the applications of prompt engineering in education, software development, research and business.
5. To examine the limitations and challenges associated with prompt engineering, including hallucinations, bias and prompt injection.
6. To suggest best practices for designing effective, reliable and responsible prompts.

III. REVIEW OF LITERATURE

- **Brown et al. (2020),** in their work on language models as few-shot learners, demonstrated that large language models can perform a range of tasks from natural language instructions and a small number of examples, without task-specific gradient updates. The study established an important foundation for in-context learning and example-based prompting.
- **Wei et al. (2022),** in 'Chain-of-Thought Prompting Elicits Reasoning in Large Language Models', examined the use of intermediate reasoning examples in prompts. Their experiments reported improvements on arithmetic, commonsense and symbolic reasoning tasks, particularly when sufficiently large models were provided with chain-of-thought demonstrations.
- **Kojima et al. (2022),** in 'Large Language Models are Zero-Shot Reasoners', investigated whether simple instructions could encourage multi-step reasoning without providing worked examples. Their findings showed that adding a step-by-step reasoning cue improved performance on several reasoning benchmarks, demonstrating the potential of Zero-Shot Chain-of-Thought prompting.
- **Sahoo et al. (2024),** in 'A Systematic Survey of Prompt Engineering in Large Language Models: Techniques and Applications', organised prompt engineering approaches by technique and application. The survey discussed how prompts can elicit desired model behaviour without modifying model parameters and identified strengths, limitations and open research challenges.
- **Schulhoff et al. (2024),** in 'The Prompt Report: A Systematic Survey of Prompting Techniques', developed a broad taxonomy of prompting terminology and techniques. The work highlighted the diversity of prompt methods and the need for consistent terminology, structured evaluation and practical guidance for users and developers.
- **Vatsal and Dubey (2024),** in their survey of prompt engineering methods for different natural language processing tasks, reviewed multiple prompting methods and their applications across NLP tasks. Their work illustrates that the choice of prompting strategy should be considered in relation to the task and evaluation setting.

IV. RESEARCH GAP

Existing studies provide evidence that prompting can improve selected language and reasoning tasks, and several surveys classify the growing range of techniques. However, prompt engineering terminology and evaluation practices remain diverse. Comparisons are often based on different models, datasets, tasks and performance measures, making direct comparison difficult. There is a need for an accessible, consolidated analysis that connects commonly used prompt techniques with practical performance dimensions such as accuracy, relevance, completeness, consistency and task suitability. The present study addresses this need through a descriptive synthesis of published literature and

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practical applications. It does not claim to conduct new benchmark experiments or generate original quantitative performance scores.

V. RESEARCH METHODOLOGY

The study adopts a descriptive research design to examine the role of prompt engineering techniques in improving Generative AI performance. The research is qualitative in nature and is based entirely on secondary data.

Sources of Data: Secondary data is collected from published academic papers, peer-reviewed conference proceedings, research surveys and relevant technical publications. Key sources include research on in-context learning, Chain-of-Thought prompting, Zero-Shot reasoning and systematic surveys of prompt engineering.

Scope of the Study: The study focuses mainly on text-based Generative AI and Large Language Models. It considers five commonly used approaches: Zero-Shot Prompting, One-Shot and Few-Shot Prompting, Role-Based Prompting, Contextual Prompting and Chain-of-Thought Prompting. The analysis considers performance in terms of task accuracy, relevance, completeness, consistency and clarity.

Method of Analysis: The selected literature is reviewed thematically. Techniques are compared according to their purpose, working approach, potential benefits, limitations and suitable applications. Findings are synthesised from published studies and conceptual analysis; no primary survey, controlled experiment or original model benchmark was conducted for this paper.

VI. MAJOR PROMPT ENGINEERING TECHNIQUES

1. Zero-Shot Prompting

Zero-Shot Prompting asks the AI model to perform a task using instructions alone, without providing examples. For instance, a user may write: 'Summarise the following passage in five bullet points.' This technique is simple, quick and useful for common tasks where the model already has relevant general capabilities. Its effectiveness depends on how clearly the task is described and whether the model has sufficient knowledge to perform it.

2. One-Shot and Few-Shot Prompting

One-Shot Prompting provides one example of the desired input-output pattern, while Few-Shot Prompting provides multiple examples. These examples help the model understand the expected format, style or classification pattern. For example, a user can provide sample student feedback and ask the model to classify additional feedback using the same categories. Brown et al. (2020) established the importance of in-context examples for enabling models to perform new tasks.

3. Role-Based Prompting

Role-Based Prompting assigns a specific role or perspective to the AI system, such as 'Act as a programming instructor' or 'You are a customer-support assistant'. The role provides guidance about tone, audience and the type of response expected. It can make outputs more focused and consistent, although assigning a role does not guarantee expertise or factual correctness.

4. Contextual Prompting

Contextual Prompting supplies background information, relevant data, user requirements or situational details along with the task. For example, a prompt may specify the students' academic level, syllabus unit and required answer length before requesting study notes. Context reduces ambiguity and helps the model produce responses suited to the intended purpose. Irrelevant or excessive context, however, may distract the model or consume available context space.

5. Chain-of-Thought Prompting

Chain-of-Thought Prompting encourages a model to approach a complex problem through intermediate reasoning steps. Wei et al. (2022) reported improvements on several reasoning benchmarks when examples containing intermediate steps were supplied. Kojima et al. (2022) also showed that a simple reasoning cue could improve performance on selected tasks. This technique can be useful for mathematical problems, logical analysis and multi-step tasks. The generated explanation should still be checked, since a plausible reasoning sequence may contain errors.

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VII. COMPARATIVE ANALYSIS OF PROMPTING TECHNIQUES

Technique	Main feature	Potential benefit	Possible limitation
Zero-Shot	Instruction without examples	Fast and easy to use	May misinterpret ambiguous tasks
One/Few-Shot	One or more demonstrations	Shows expected pattern or format	Quality depends on example selection
Role-Based	Assigns role or perspective	Guides tone and audience	Role does not ensure expertise
Contextual	Adds background and constraints	Improves task relevance	Excessive context can distract
Chain-of-Thought	Encourages intermediate reasoning	Can help with complex reasoning	May be slower and still produce errors

VII. APPLICATIONS OF PROMPT ENGINEERING

1. Education and Learning

Prompt engineering can support the preparation of study notes, explanations, quizzes, lesson plans and practice questions. By specifying the learner's level, syllabus and preferred format, educators can obtain more relevant learning material. AI-generated educational content should be reviewed by teachers for accuracy, curriculum alignment and appropriateness.

2. Software Development

Developers use prompts to generate code examples, explain programming concepts, identify possible errors, create test cases and draft documentation. A useful programming prompt should mention the language, framework, expected input and output, constraints and error-handling requirements. Generated code must be tested and reviewed before being used in production.

3. Research and Content Creation

Prompting can assist with brainstorming research questions, outlining sections, summarising provided material and improving clarity. Researchers should verify references, quotations, data and factual claims independently. AI-generated citations should never be treated as authentic without checking the original publication.

4. Business and Customer Support

Organisations can use structured prompts to draft customer responses, classify feedback, summarise reports and prepare product descriptions. Clear instructions about brand tone, customer context and response limits can improve consistency. Confidential or personal information should not be entered into systems unless permitted by applicable policies and safeguards.

IX. FINDINGS OF THE STUDY

Impact on Generative AI Performance

- Clear and specific prompts help define the task and reduce ambiguity, which can improve the relevance and usefulness of generated responses.
- Few-Shot Prompting can guide the model towards a required pattern or output format by providing relevant demonstrations.
- Chain-of-Thought approaches have shown benefits on selected multi-step reasoning benchmarks, although the degree of improvement depends on the model and task.
- Role-Based and Contextual Prompting can make responses better aligned with the intended audience, domain and purpose.
- Combining task instructions, context, constraints and an output format can improve response structure and consistency.

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X. CHALLENGES IDENTIFIED

- Different models may respond differently to the same prompt, so a prompt that works well in one system may not produce equivalent results in another.
- Small changes in wording, ordering or context can affect generated responses, making prompt design and reproducibility challenging.
- Generative AI systems may produce hallucinations, biased content or outdated information even when prompts are carefully designed.
- Long prompts and excessive contextual information may increase processing requirements and can obscure the main task.
- Prompt injection and instruction manipulation can create security risks when AI systems process untrusted external content.
- There is no single prompting technique that performs best for every task; prompt selection should be based on the intended use and evaluation criteria.

XI.RECOMMENDATIONS

- Users should write clear, specific and unambiguous prompts that state the task, context, audience and expected output.
- Where format or style is important, users should provide one or more relevant examples through One-Shot or Few-Shot Prompting.
- Complex tasks should be divided into smaller steps, and reasoning-oriented prompting should be used only where it is suitable.
- Prompt outputs should be evaluated using task-specific criteria such as factual accuracy, relevance, completeness, clarity and consistency.
- Important facts, calculations, code and references generated by AI should be independently verified before use.
- Organisations should establish guidelines for privacy, confidentiality, bias checking, human review and responsible use of Generative AI.
- Developers should apply security controls against prompt injection, especially when models use external documents, websites or tools.
- Researchers should document the model, prompt wording, examples, settings and evaluation procedure to support transparency and reproducibility.

XII. LIMITATIONS OF STUDY

1. The study is based entirely on secondary data and does not include primary responses from users or developers.
2. No controlled experiment was conducted to measure the performance of different prompts on a common dataset.
3. The study focuses mainly on text-based Generative AI and does not provide an exhaustive analysis of image, audio or video prompting.
4. Generative AI models are updated frequently; therefore, the effectiveness of particular prompts may change across model versions.
5. The reviewed literature uses different datasets, tasks and evaluation measures, which limits direct comparison of reported results.

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XIII. CONCLUSION

Prompt engineering has become an important skill for interacting effectively with Generative Artificial Intelligence systems. The study indicates that the way a task is expressed can influence the accuracy, relevance, clarity and usefulness of AI-generated responses. Zero-Shot Prompting is suitable for straightforward instructions, while One-Shot and Few-Shot Prompting can demonstrate the expected response pattern. Role-Based and Contextual Prompting help align outputs with a particular audience or situation, and Chain-of-Thought Prompting has shown value for selected complex reasoning tasks.

At the same time, prompt engineering cannot eliminate the limitations of Generative AI. Models may still generate incorrect information, reflect bias or respond inconsistently. Effective use therefore requires prompt refinement, output verification, task-specific evaluation and responsible data practices. The study concludes that prompt engineering can improve the practical performance of Generative AI when applied thoughtfully, but it should be treated as one component of a broader process that includes human judgement, model evaluation and AI governance.

REFERENCES

1. Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., et al. (2020). Language models are few-shot learners. Advances in Neural Information Processing Systems, 33, 1877–1901. https://arxiv.org/abs/2005.14165
2. Wei, J., Wang, X., Schuurmans, D., Bosma, M., Ichter, B., Xia, F., et al. (2022). Chain-of-thought prompting elicits reasoning in large language models. Advances in Neural Information Processing Systems, 35, 24824–24837. https://arxiv.org/abs/2201.11903
3. Kojima, T., Gu, S. S., Reid, M., Matsuo, Y., & Iwasawa, Y. (2022). Large language models are zero-shot reasoners. Advances in Neural Information Processing Systems, 35. https://arxiv.org/abs/2205.11916
4. Sahoo, P., Singh, A. K., Saha, S., Jain, V., Mondal, S., & Chadha, A. (2024). A systematic survey of prompt engineering in large language models: Techniques and applications. arXiv preprint arXiv:2402.07927. https://arxiv.org/abs/2402.07927
5. Schulhoff, S., Ilie, M., Balepur, N., Kahadze, K., Liu, A., Si, C., et al. (2024). The prompt report: A systematic survey of prompting techniques. arXiv preprint arXiv:2406.06608. https://arxiv.org/abs/2406.06608
6. Vatsal, S., & Dubey, H. (2024). A survey of prompt engineering methods in large language models for different NLP tasks. arXiv preprint arXiv:2407.12994. https://arxiv.org/abs/2407.12994