

PROMPT ENGINEERING

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SR22BSIT107

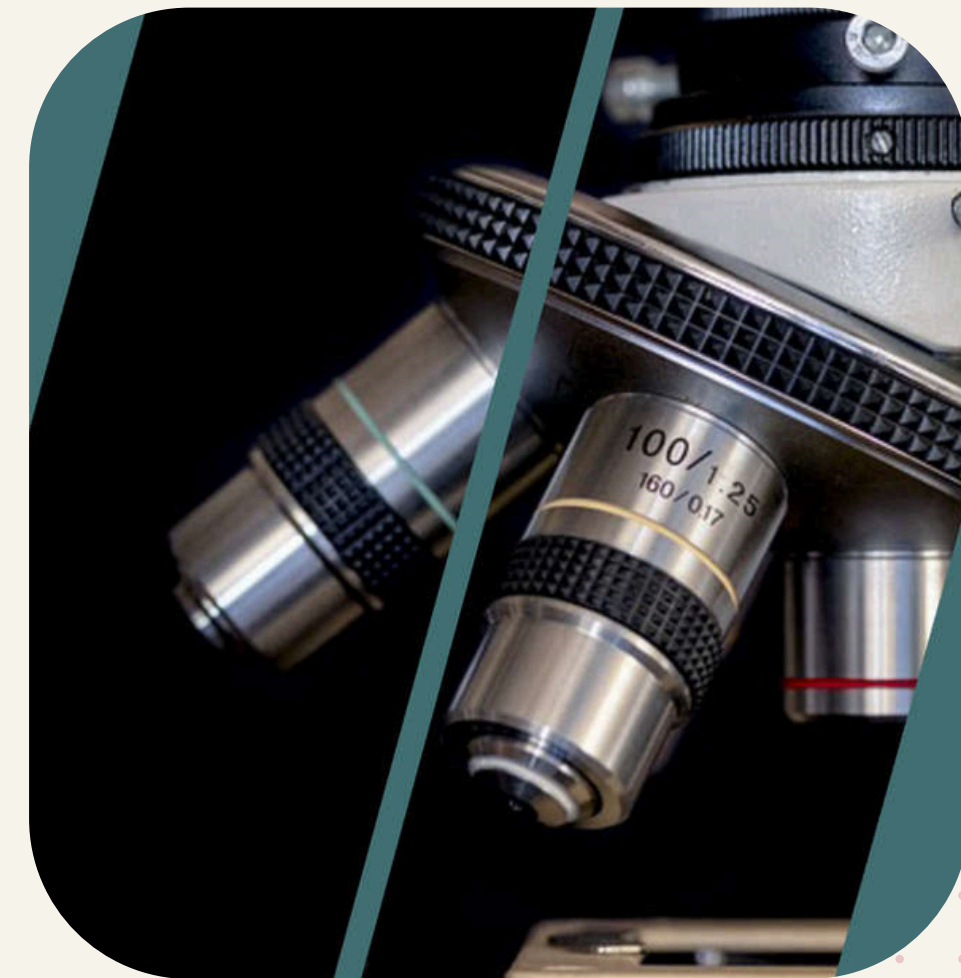
TYIT-B

Internal guide: Yesha mehta

External guide: Harsh patel

INTRODUCTION OF PROMPT ENGINEERING

- Prompt engineering is the process of writing instructions to get the best output from an AI model. It's a key part of generative AI, which is changing how people interact with technology.



HISTORY OF PROMPT ENGINEERING

- **1950s–1980s**

Early AI and NLP foundations (Turing Test, ELIZA, expert systems).

- **1990s–2010s**

Machine learning and deep learning improved NLP (Word2Vec, rule-based systems).

- **2017s–2020s**

Rise of large language models (Transformer architecture, GPT-1 to GPT-3).

- **2021s**

Present: Prompt engineering becomes a key discipline (zero-shot, few-shot, CoT prompting, ChatGPT, GPT-4).



USES OF PROMPT ENGINEERING

1. Chatbot Development

Utilizing prompt engineering to create conversational agents that understand human language effectively.

2. Content Generation


Applying prompt engineering techniques to automatically generate articles, stories, or summaries.

3. Data Analysis

Empowering data scientists to leverage prompts for extracting meaningful insights from large datasets.

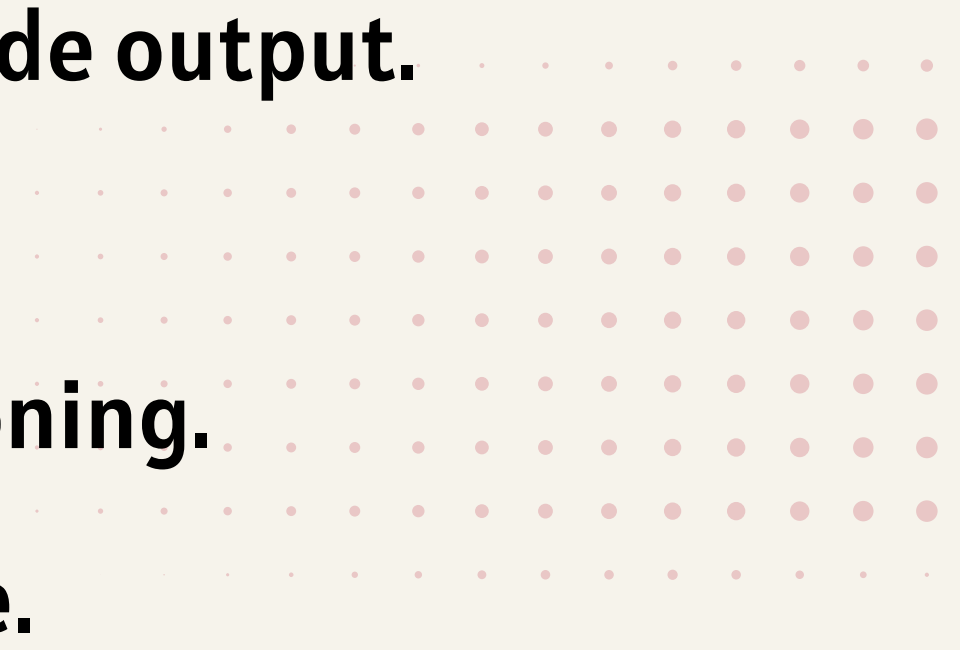
4. Personalized Recommendations

Using prompt engineering to enhance recommendation systems for tailored user experiences.





TYPES OF PROMPT


- 1. Instruction-Based Prompt – Direct command or request.**
 - 2. Open-Ended Prompt – Encourages exploration or discussion.**
 - 3. Contextual Prompt – Provides background information for a response.**
 - 4. Example-Based Prompt – Uses patterns or references to guide output.**
 - 5. Multi-Turn Prompt – Builds on previous interactions.**
 - 6. Chain-of-Thought Prompt – Encourages step-by-step reasoning.**
 - 7. Role-Based Prompt – Assigns a specific persona or expertise.**
- 


PLATFORMS SUPPORTING PROMPT EGG.

	Features	Use Cases	Access Method
OpenAI	API for LLMs	Chatbots	Web Interface
Google	BERT, T5	Search Optimization	Cloud-Based
Microsoft	Azure Integration	Code Assistance	API Access
Hugging Face	Transformers Library	Research, Development	Open Source





KEY FEATURES OF EFFECTIVE PROMPT ENGINEERING

- **Clarity :-** Ensure each prompt clearly specifies the desired outcome or response.
 - **Contextual Relevance :-** Prompts should include relevant context to guide the AI's generation.
 - **Conciseness :-** Keep prompts short while still conveying essential information.
 - **Direct Instruction :-** Use imperative language to direct the AI towards specific tasks.
 - **Balanced Specificity :-** Provide enough detail without overwhelming the AI to maintain flexibility.
 - **Iterative Testing :-** Regularly refine prompts based on AI response quality and relevance.
 - **User Input :-** Leverage user feedback to improve and adapt prompt strategies.
- 




ADVANTAGES OF USING PROMPT ENGINEERING

- 1.Improves AI Output Quality**
 - 2. Enhances Customization and Personalization**
 - 3.Enhance Clarity**
 - 4. Boost Creativity**
 - 5. Enhance AI Debugging And code Assistance**
 - 6. Support Multi-Model AI(text, image, audio, video, code)**
- 



DISADVANTAGES OF USING PROMPT ENGINEERING

- 1.Dependency**
 - 2.Bias**
 - 3.Complexity**
 - 4.Context Limitation**
 - 5.Efficiency**
 - 6.OverFitting**
 - 7.User Expertise**
- 



BEST PRACTICES FOR WRITTING PROMPT

- Clarity

- Specificity

- context

- Conciseness

- Instruction

- Examples

- Testing





APPLICATIONS

AI-Powered Content Generation

- Writing articles, blogs, and essays
- Generating creative stories, poems, and scripts

Chatbots & Virtual Assistants

- Enhancing customer support responses
- Automating FAQs and troubleshooting

Healthcare & Medical Applications

- Assisting in medical report summarization
- Generating patient-friendly explanations of conditions

Data Analysis & Research



- Extracting insights from large datasets
- Generating reports and summaries

SOLUTION

● Clear and Specific Prompts

Instead of: "Explain Nodejs"

Use: "Explain Nodejs Json Web Token example."

Solution: Be precise to get relevant responses.

● Step-by-Step Prompts

Instead of: "Solve this math problem: $5x + 10 = 30$."

Use: "Solve the equation $5x + 10 = 30$ step by step."

Solution: Guide AI to break down complex tasks.

● Format-Specific Prompts

Instead of: "Explain JavaScript."

Use: "Explain JavaScript closures with an example."

Solution: Specify output format (list, table, step-by-step).

● Real-Time Debugging & Improvement

Example Prompt for Debugging:

"Find and fix errors in this JavaScript function. Explain the mistake."



FUTURE TRENDS

● **Automated Prompt Optimization**

● **Multimodal Prompt Engineering**

● **AI-Powered Code Generation & Debugging**

● **Natural Language-Based Prompting**

● **Dynamic Prompt Chaining & Self-Correction**



BACKEND CODE

```
Prompt_engi_demo > backend > JS app.js > ...
1  const express = require("express");
2  const cors = require("cors");
3  const dotenv = require("dotenv");
4  const { GoogleGenerativeAI } = require("@google/generative-ai");
5  const db = require("./database");
6  const mongoose = require("mongoose");
7
8  dotenv.config();
9  const app = express();
10 const PORT = process.env.PORT || 5000;
11
12 app.use(express.json());
13 app.use(cors());
14
15 const GEMINI_API_KEY = process.env.GEMINI_API_KEY;
16 const genAI = new GoogleGenerativeAI(GEMINI_API_KEY);
17
18
19 const promptSchema = new mongoose.Schema({
20   prompt: String,
21   strategy: String,
22   response: String,
23   createdAt: { type: Date, default: Date.now }
24 });
25 const Prompt = mongoose.model("Prompt", promptSchema);
26
27
28 app.post("/api/prompt", async (req, res) => {
29   try {
30     const { prompt, strategy } = req.body;
31     if (!prompt || !strategy) {
32       return res.status(400).json({ error: "Prompt and strategy are required" });
33     }
34
35     const formattedPrompt = `
36 Please respond in Markdown format (\`#\` for headings, \`*\` for bullet points).
37 Request: "${strategy}: ${prompt}"
38 `;
39
40     const model = genAI.getGenerativeModel({ model: "gemini-1.5-pro-latest" });
41     const result = await model.generateContent(formattedPrompt);
42
43     const responseText = result.response.candidates[0].content.parts[0].text;
44
45     const newPrompt = new Prompt({ prompt, strategy, response: responseText });
46     await newPrompt.save();
47
48     res.json({ result: responseText });
49   } catch (error) {
50     console.error("Error generating AI response:", error);
51     res.status(500).json({ error: "Failed to process the request", details: error.message });
52   }
53 });
54
55 app.listen(PORT, () => console.log(`Server running on port ${PORT}`));
```

```
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52 }
53 });
54
55 app.listen(PORT, () => console.log(`Server running on port ${PORT}`));
56
57
58
```

app.js

DATABASE AND .ENV

```
const mongoose = require("mongoose");
const dotenv = require("dotenv");

dotenv.config();

mongoose.connect(process.env.MONGO_URL)
  .then(() => console.log("Connected to MongoDB"))
  .catch((err) => console.error("MongoDB Connection Error:", err));

module.exports = mongoose;
```

```
MONGO_URL=mongodb://localhost:27017/prompt
GEMINI_API_KEY=AIzaSyA2060pgs8gSXvkUTM_DnkfBaJSKVI23uk
```

FRONTEND

```
Prompt_engi_demo > frontend > src > components > JS Chatbot.jsx > Chatbot > handleSend
1  import React, { useState } from "react";
2  import axios from "axios";
3  import ReactMarkdown from "react-markdown"; // For rendering Markdown
4
5  const Chatbot = () => {
6    const [prompt, setPrompt] = useState("");
7    const [strategy, setStrategy] = useState("Detailed Explanation");
8    const [messages, setMessages] = useState([]);
9    const [loading, setLoading] = useState(false);
10
11    const handleSend = async () => {
12      if (!prompt.trim()) return;
13
14      const userMessage = { sender: "User", text: prompt };
15      setMessages([...messages, userMessage]);
16      setPrompt("");
17      setLoading(true);
18
19      try {
20        const response = await axios.post("http://localhost:5000/api/prompt", {
21          prompt,
22          strategy,
23        });
24
25        const botMessage = { sender: "Bot", text: response.data.result };
26        setMessages((prev) => [...prev, botMessage]);
27      } catch (error) {
28        console.error("Error:", error);
29        setMessages((prev) => [...prev, { sender: "Bot", text: "Error processing request." }]);
30      }
31
32      setLoading(false);
33    };
34
35    return (
36      <div className="chat-container">
37        <div className="chat-box">
```

```

38          {messages.map((msg, index) => (
39            <div key={index} className={`message ${msg.sender === "User" ? "user" : "bot"}`}>
40              <b>{msg.sender}</b>
41              <ReactMarkdown>{msg.text}</ReactMarkdown> {/* Renders Markdown */}
42            </div>
43          ))}
44          {loading && <div className="bot loading">Bot is typing...</div>}
45        </div>
46
47        <div className="input-container">
48          <input
49            type="text"
50            value={prompt}
51            onChange={(e) => setPrompt(e.target.value)}
52            placeholder="Enter your prompt..."
53            className="chat-input"
54          />
55
56          <select className="chat-select" value={strategy} onChange={(e) => setStrategy(e.target.value)}>
57            <option value="Detailed Explanation">Detailed Explanation</option>
58            <option value="Short Summary">Short Summary</option>
59            <option value="Key Points">Key Points</option>
60          </select>
61
62          <button className="chat-send" onClick={handleSend} disabled={loading}>Send</button>
63        </div>
64      </div>
65    );
66  };
67
68  export default Chatbot;
```

App.jsx

OUTPUT

Prompt Engineering

Prompt Engineering: A Detailed Explanation

Prompt engineering is the art and science of crafting effective input prompts for large language models (LLMs) like GPT-3, Bard, and others to elicit desired responses. It involves carefully selecting words, phrasing, formatting, and context to guide the model towards generating accurate, relevant, and creative outputs. Think of it as programming with natural language, where the prompt is your code, and the LLM's output is the program's execution.

Why is prompt engineering important?

- Improved Output Quality:** A well-crafted prompt can significantly improve the quality of the generated text, making it more coherent, factual, and relevant to the user's needs.
- Controlled Generation:** Prompts allow you to control the format, style, and content of the output. You can specify the desired length, tone, and even the target audience.
- Unlocking Advanced Capabilities:** By using advanced prompting techniques, you can unlock the full potential of LLMs, including tasks like translation, summarization, question answering, code generation, and creative writing.
- Efficiency and Productivity:** Effective prompts reduce the need for post-processing and editing, saving time and resources.

Key Components of Prompt Engineering:

- Clear Instructions:** The prompt should clearly state the task you want the LLM to perform. Avoid ambiguity and provide specific instructions.
- Context and Background:** Providing relevant context and background information helps the model understand the task better and generate more accurate responses.
- Examples (Few-Shot Learning):** Including a few examples of the desired input and output format can guide the model to learn the pattern and generate similar outputs.
- Constraints and Keywords:** Using specific keywords and constraints (e.g., length limits, target audience) helps shape the output according to your

Send a message...

Detailed Explanation

Send

Detailed Explanation

OUTPUT

prompt engineering

Prompt engineering is the process of crafting effective inputs (prompts) for AI models, especially large language models (LLMs), to generate desired outputs. It involves understanding how these models interpret language and using specific techniques like clear instructions, context, examples, constraints, and iterative refinement to guide the model towards producing accurate, relevant, and creative content. Good prompt engineering improves the quality and reliability of AI-generated text, code, images, and other data.

Send a message...

Short Summary

Send

short summary

OUTPUT

Prompt Engineering

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key points

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THANK YOU