Prompt Engineering

Prompt Engineering is essentially the art and science of communicating effectively with AI models by carefully crafting input prompts to see their full potential across tasks.

Prompt Engineering Techniques

- Zero-shot prompting for direct AI responses
- Few-shot prompting utilizes limited examples
- Chain–of–Thought guides AI reasoning process
- Instruction tuning improves model adherence
- Context framing sets relevant AI understanding
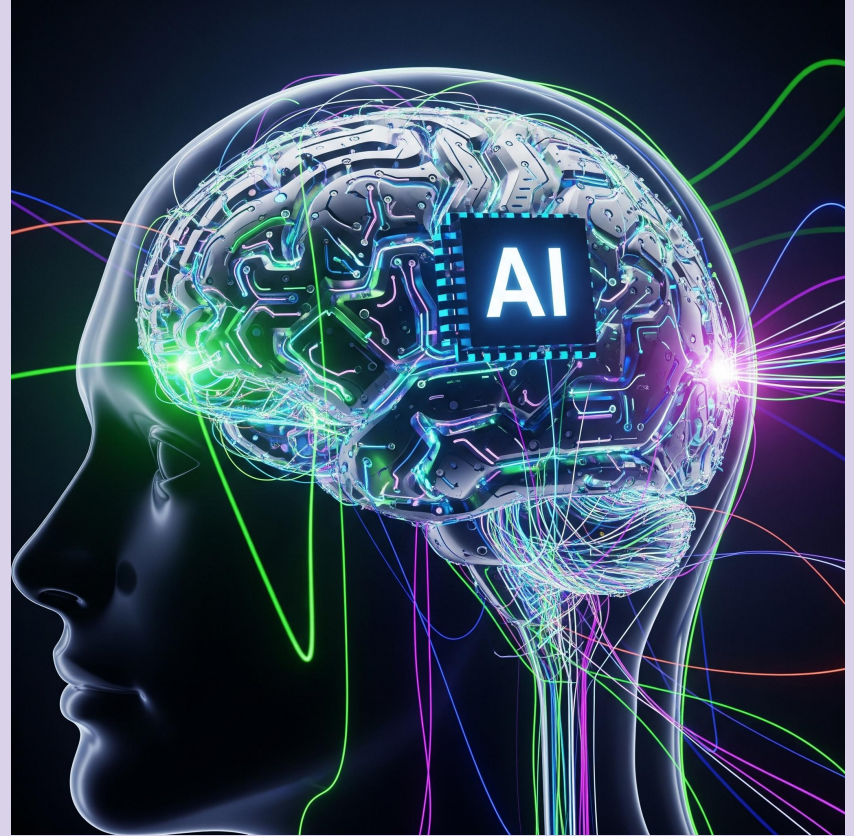- Toolformer–style helps AI use tools

Zero-shot Prompting Explained

- Directly ask AI without prior examples
- Relies on AI's inherent understanding
- AI generates relevant responses effectively

1 Zero-shot

Prompt (Instruction only):

Write a Java method that validates a JSON string to ensure it contains the fields `"id"` (int), `"name"` (string), and `"email"` (string).

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Few-shot Prompting Explained

- Provide AI models with illustrative examples
- Guide the model toward desired output
- Improve model understanding and performance
- Crucial for specific formatting or style

2 Few-shot

Prompt (Instruction + Examples):

Here are some examples of how JSON validation should work:

- "Input: {"username": "john", "password": "1234"} →
  Check username (string), password (string)"

- "Input: {"id": 101, "title": "Book", "price": 29.99} →
  Check id (int), title (string), price (double)"

Now, validate this: {"id": 1, "name": "Alice", "email": "alice@example.com"}

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Chain-of-Thought Prompting

THINKING PROCESS

- Model reasons step-by-step for complex tasks
- Explaining thought process leads to accurate conclusions
- Encourages logical problem-solving in AI models

3 Chain-of-Thought

Prompt (Step-by-step reasoning):

Let's reason through this:

1. "Parse the JSON string into an object."

2. "Ensure all required fields exist: `"id"`, `"name"`, and `"email"`."

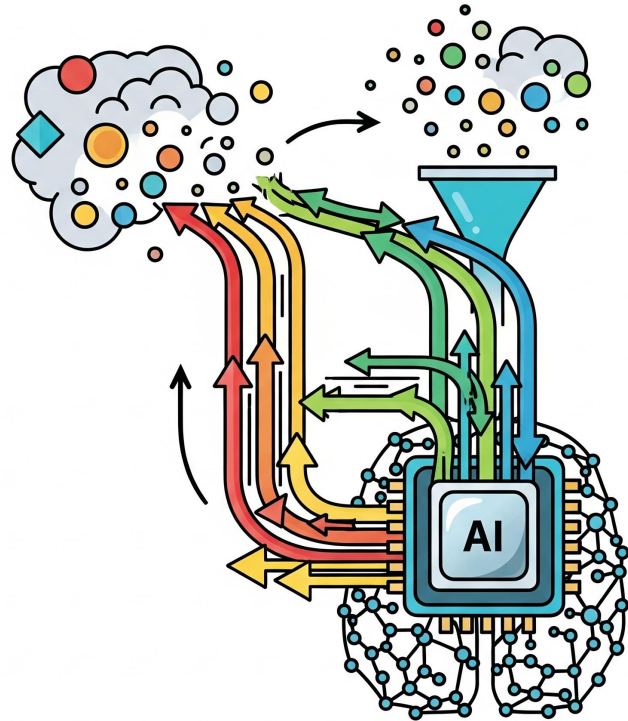3. "Confirm `"id"` is an integer, and `"name"` and `"email"` are strings.
Now, implement this as a method in Java."

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Context Framing Prompts

- Adding context or constraints to a prompt
- Narrows the scope of the AI model
- Guides the model to specific knowledge
- Reduces irrelevant or off-topic AI outputs

📄 **Context Framing Prompt**

You are a developer working on a application that exposes REST APIs at location
C:\Users\abc\AI\HR\HRInterviewManagementSystem
The client sends a JSON payload to register new users.
The JSON must include: `id` (int), `name` (String), and `email` (String).
Write a method that validates this JSON and returns `true` if it's valid; otherwise, return `false`.

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Prompt Engineering Challenges

- Models are highly sensitive to wording
- Minor changes alter outputs significantly
- AI can hallucinate or produce biased content
- Optimal prompts need much trial-and-error

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