SESSION 3

Prompt Engineering Fundamentals

COMPREHENSIVE STUDY NOTES

Course: Autonomous AI Systems & Agent-Based Computing
Duration: Approximately 60 minutes

These comprehensive study notes extract all key concepts, detailed explanations, and examples from the Session 3 speaker script. Read before or after attending the session to deeply understand the material.

TABLE OF CONTENTS

1. The Art of Effective Prompting
2. Role-Based Prompting
3. Few-Shot Learning
4. Chain-of-Thought Prompting

1. The Art of Effective Prompting

Why Prompts Matter

A well-designed prompt dramatically improves output quality. A poor prompt produces mediocre results. The difference between a good and bad prompt often lies in specificity, context, and format specification.

Elements of Effective Prompts

Include: (1) Context—background information. (2) Task—what you want. (3) Format—output structure. (4) Tone—desired style. (5) Constraints—limitations or requirements.

2. Role-Based Prompting

Why Roles Work

Assigning a role makes the model adapt its language, depth, and perspective. 'Explain quantum computing to a 10th grader' produces simpler language than 'Explain to a physics PhD.'

Examples

Bad: 'Write code.' Better: 'You are a senior Python developer. Write production-ready code that handles edge cases and includes error checking.'

3. Few-Shot Learning

Power of Examples

Providing 2-5 examples dramatically improves performance. Few-shot typically outperforms zero-shot (no examples) and requires fewer tokens than extensive explanations.

Format Teaching

Show the desired output format. If you want JSON, show examples of JSON outputs for similar inputs.

4. Chain-of-Thought Prompting

Step-by-Step Reasoning

For complex tasks, asking the model to reason step-by-step significantly improves accuracy. The model explicitly writes intermediate reasoning steps.

When to Use

Especially effective for math, logic puzzles, and multi-step reasoning. Less necessary for simple factual questions.

KEY TAKEAWAYS

Session 3 covers advanced concepts essential for building effective AI systems. Master these topics and integrate them with knowledge from previous sessions. Apply these concepts in the lab exercise to solidify your understanding and build toward your course capstone project.