COURSE TABLE OF CONTENTS

Chain-of-Thought Reasoning Concepts

OEM: Koenig Original • Duration: 2 Days (16 hrs)

COURSE MODULES & TOPICS

Module 1: Reasoning in Large Language Models

- Limitations of standard prompt engineering and traditional QA
- Emergent abilities in large-scale language models
- Introduction to Chain-of-Thought (CoT) prompting concepts
- Zero-shot CoT vs. Few-shot CoT methodologies
- Understanding reasoning pathways and intermediate steps

Module 2: Advanced Prompting Techniques

- Least-to-Most prompting and problem decomposition
- Self-Consistency sampling and majority voting
- Directional Stimulus Prompting
- Chain-of-Thought with retrieval-augmented generation (RAG)
- Handling edge cases, hallucinations, and error propagation in reasoning chains

Module 3: Algorithmic and Automated Reasoning

- Tree of Thoughts (ToT) and Graph of Thoughts (GoT) architectures
- Algorithmic verification and self-correction mechanisms
- Automated prompt optimization for reasoning tasks
- Integrating external tools, calculators, and code interpreters into CoT workflows
- Case studies on mathematical reasoning, symbolic logic, and coding benchmarks

Module 4: Evaluation and Future Directions

- Benchmarking reasoning performance (GSM8K, MATH, StrategyQA)
- Evaluating factual consistency and reasoning validity
- Efficiency trade-offs: latency, token consumption, and cost optimization
- Emerging paradigms in neuro-symbolic reasoning and test-time compute

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