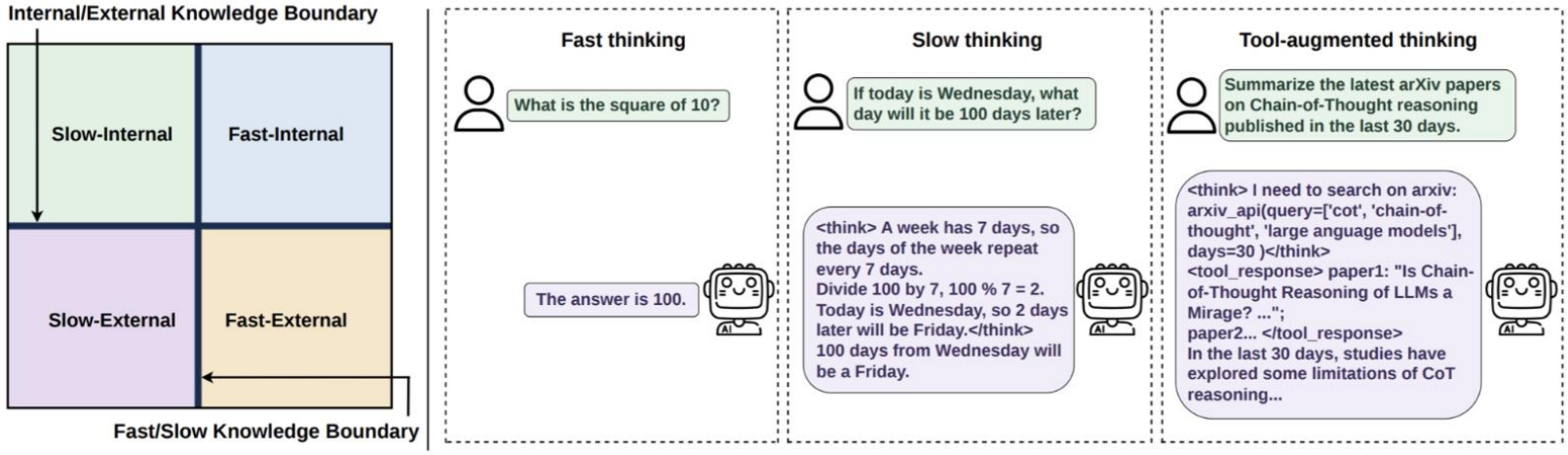
Fast, Slow, and Tool-augmented Thinking for LLMs: A Review

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Problems & Ideas

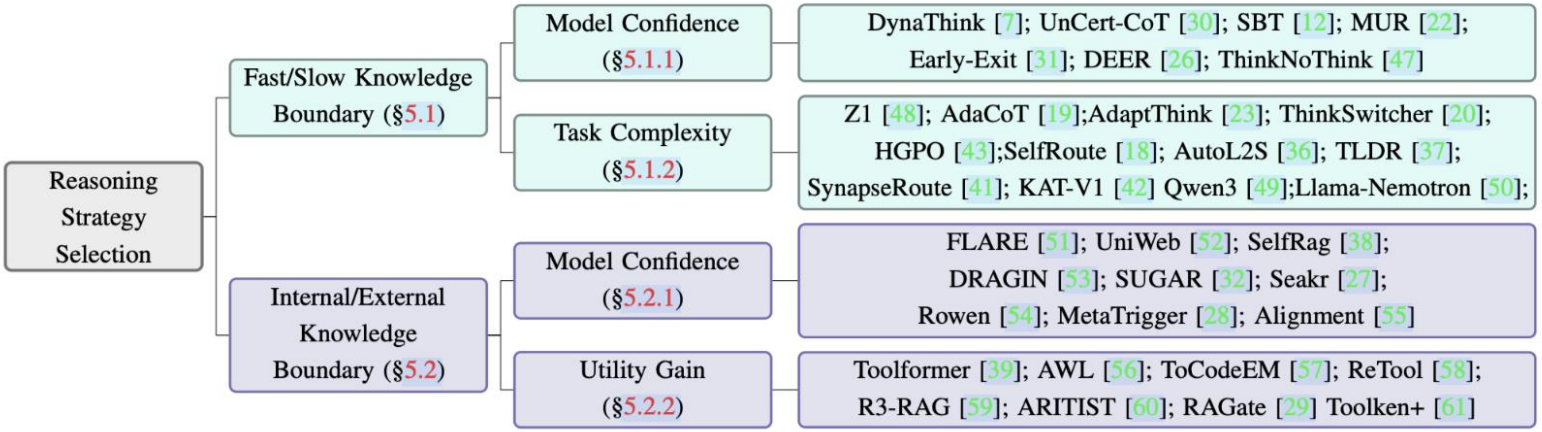
- Problems of existing LLM reasoning strategies:
  - Fast, slow, and tool-augmented thinking are often discussed as separate reasoning modes.
  - Real-world tasks require adaptive choices of computational depth and knowledge source to avoid underthinking, overthinking, hallucination, or unnecessary tool use.
- Ideas: We propose two orthogonal dimensions—computational depth and knowledge source—for organizing LLM reasoning strategies, showing that tool-augmented thinking can intersect with both fast and slow thinking.



Two knowledge boundaries define the 2 × 2 structure of LLM reasoning strategies.

Main Conclusions

- Conclusions:
  - We propose a unified formulation that abstracts adaptive reasoning as decision factor extraction followed by strategy selection.
  - We provide a comprehensive taxonomy for adaptive reasoning strategy selection, covering implicit and explicit selection paradigms across two knowledge boundaries, and identifying model confidence, task complexity, and utility gain as key decision factors.



Decision factors for adaptive reasoning strategy selection.