Structural Intelligence and the Digital Brain Model (DBM-SI)

Full Lecture Script (ResearchGate Supporting Document)

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Repository: https://github.com/sizhet/Digital-Brain-Model-Chain-of-Thoughts

Opening

Modern AI has achieved extraordinary progress in prediction and generation. However, prediction alone does not constitute intelligence. This lecture explores structural intelligence and the Digital Brain Model (DBM-SI) as a runtime system for structural reasoning and evolution.

Why Structural Intelligence

Scaling improves prediction quality but does not automatically produce structural reasoning. Structural intelligence accumulates recurring patterns, stable rules, structural memory, and decision evolution.

DBM-SI Architecture Overview

DBM-SI consists of eight structural components: Structural IR, Metric Space, Differential Tree, Two-Phase Search, CCC, Evidence Chain, Rule Engine, and Evolution Layer. These form a runtime intelligence loop driven by the APTGOE paradigm.

Structural IR

Representation defines reasoning space. DBM-SI uses structural IR forms such as Sequence IR, Graph IR, Motion IR, and Observer-centric IR to enable structural comparability.

Metric Space

Structural metric distance provides alignment-aware comparison across structural representations. Sequence, Graph, and Image Starmaps have been in continuous use for over a year.

Differential Tree

Differential Tree provides signature-based routing in structural search space, supporting jump-to-leaf execution and deterministic search behavior.

Two-Phase Search

Two-Phase Search supports partial-information retrieval through candidate construction followed by structural scoring using metric distance.

CCC — Common Concept Core

CCC represents recurring structural fragments that form concept-level structures. CCC behaves like structural statistics across datasets.

Evidence Chain

Evidence Chain records deterministic structural reasoning traces, ensuring reproducibility and engineering-grade explainability.

Rule Engine

Rule engines transform stable CCC patterns into fast decision mechanisms under the Minimal Evolution Threshold principle.

Evolution Layer

The evolution layer accumulates CCC archives, refines rules, and enables structural learning through the APTGOE cycle.

Integration

DBM-SI operates as a structural runtime integrating search, reasoning, decision, and evolution mechanisms.

LLM × DBM × ACLM Future

Future AI systems combine generative intelligence (LLM), structural intelligence (DBM), and execution-evolution loops (ACLM).

Closing

Intelligence emerges from Prediction, Structure, and Evolution working together.