Byte: The 6D Manifold and Logic Structure

Byte uses a bounded 6D representational manifold to recover stable regimes, transition corridors, and traceable exemplars from difficult data. The 6D space is a working phase-space representation - not a claim that raw datasets literally live in hidden physics. Operationally, Byte follows a bounded logic stack: observation weighting -> 6D projection -> multi-scale structure recovery -> bridge tracing -> row-level joinback.

1. What the 6D manifold is

Each row or fragment is mapped into sig6, a bounded six-dimensional vector designed to preserve structural relationships without first forcing a label.

In working terms, the first three coordinates act as a position-like structure, with a row sitting in the local geometry. The next three act like a momentum-like structure: how constrained, unstable, or directionally different that row is relative to nearby rows.

Why six dimensions

- enough degrees of freedom to capture state and change together
- compact enough to keep neighborhoods, ridges, and bridges stable
- bounded enough to compare heterogeneous data in one structural language

A practical reading rule

In Byte, labels are overlays, not the primary geometry. Structure is derived first; explanation comes second.

2. Byte's logic structure

Preserve lineage: Keep row_index, fragment_id, and join keys intact to ensure findings remain auditable.

Build the manifold: Convert rows into bounded sig6 vectors that can be compared as geometry.

Sweep across scale: Vary epsilon to see where neighborhoods and topology actually stabilize.

Recover structure: Identify regimes, then extract bridges and corridor exemplars at the boundaries.

Test persistence: Use ridge bands and edge persistence to separate repeatable structure from one-shot artifacts.

Join back to evidence: Return every regime and bridge to original rows so domain review can start from proof, not prose.

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3. The system in four layers

Layer	Role in the logic stack
sig6 manifold	bounded 6D representation that preserves neighborhood structure
ridge sweep	finds the scale where topology becomes stable enough to read
bridges	captures transition corridors instead of only cluster centers
joinback	keeps every claim attached to concrete source rows

Claim boundary: Byte is best understood as a structure-discovery layer. It produces regimes, transition windows, and prioritized rows for deeper investigation. It does not by itself establish a mechanism, causality, or experimental truth.

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