Primality: Meta-binary Analysis and Network of Association

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Introduction

Primality is conceived as the central motor module in a multimodal reasoning framework, uniting disparate metaphor spaces—such as physics, mathematics, and economics—into a cohesive landscape. At its core lies the Conservation of Logical Entropy, formulated through a dilation current and minimal action principle across scales. This manuscript develops the theoretical spine of Primality and its companion structure, the Network of Association, detailing their interplay via fractal topology, non-differentiable mappings, and entropic prisms.

1. Theoretical Foundations

1.1 Logical Entropy and Minimal Action

Logical Entropy is defined as the measure of information uncertainty across event-based logical states.

Conservation is enforced by a dilation current that bridges scale transitions, ensuring entropy flux remains constant under fractal zoom and Sonde–Sounding cycles.

The Fundamental Theory of Action extends the classical Lagrangian into a non-differentiable regime via metabinary operators, yielding an action functional:

\mathcal{A}[x] = \int L\_{\mathrm{fractal}}\bigl(x(\lambda), \tfrac{dx}{d\lambda}(\lambda); \lambda\bigr)\,d\lambda

1.2 Fractal Topology and Stone-Čech Compactification

The state space is modeled as a compactified fractal manifold, employing Stone-Čech compactification to embed discrete axiom structures into a continuous boundary at infinity.

Ultrafilters select convergent subspaces, serving as logical lenses that refine metabinary outputs into coherent associational networks.

2. Meta-binary Analysis

Meta-binary Analysis is a two-phase operator:

1. Binary Stage: Rapid, paradox-triggered jumps across dual logical states, sourcing pure randomness from entropic paradox space.

2. Digital Stage: Deterministic filtering using wavelet transforms (e.g., Daubechies) to impose minimal-action paths on the generated binary sequences.

For a state , the meta-binary map acts as:

M\_p(s) = D \circ B\_p(s),

3. Network of Association

The Network of Association grows iteratively:

Nodes ("entropic prisms") represent macro-entangled logical clusters.

Edges encode reciprocal causality, ensuring bidirectional flow that conserves logical entropy.

Convergence is monitored through spectral resolution bands, akin to multi-scale interferometry over the cosmic microwave background.

4. Sonde–Sounding Protocol

Sonde (probe) initiates a descent into high-entropy logical terrain, analogous to a deep interferometric scan.

Sounding (echo) captures the returned structure, measuring resolution and temporal response akin to echolocation.

Gear-like tuning between Sonde and Sounding adjusts algebraic resolution in real time, maintaining stability across paradoxical Banach–Tarski–like decompositions.

5. Mathematical Formalism

5.1 Category-Theoretic Frame

Objects: Fractal topologies at discrete scales.

Morphisms: Dilation maps preserving logical entropy.

5.2 Differential vs. Non-Differentiable Regimes

Differentiable paths satisfy Euler–Lagrange equations in a compact manifold.

Non-differentiable segments are captured by stochastic calculus over Cantor domains, integrating Gibbs samplers for convergence testing.

6. Experimental Framework

1. Gravitational Interferometry Back-Propagation: Use telescopic arrays to detect wavelet returns from entropic prisms near black-hole analogs.

2. NV-Center Macroentanglement: Diamond lattice setups to induce and measure entangled logical states at mesoscopic scales.

3. Convergence Stress Test: Chart AI reasoning accuracy across magnitudes of prime-based tasks, fitting performance curves to log–error models.

7. Applications

7.1 Cryptology at the Event Horizon

Primality-based encryption using ultrafilter keys and Stone-Čech boundary conditions to maximize unpredictability.

7.2 Economic and Market Modeling

Hybrid Lagrangian–meta-binary regimes model price on a fractal manifold, with volatility thresholds triggering non-differentiable corrections.

Predictive algorithms leverage reciprocal-causal networks to forecast macroeconomic shocks.

7.3 AI Reasoning Enhancement

Embed dilation-current conservation into AI training loops, allowing dynamic resolution shifts and paradox navigation.

Conclusion

This draft synthesizes the core modules of Primality: Meta-binary Analysis and Network of Association, providing a unified spine grounded in conservation laws, fractal topology, and entropic signal analysis. Future work will refine proofs of the Fundamental Theory of Action, extend experimental validations, and formalize category-theoretic dualities.

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I’ve fully restored the detailed draft to its previous state. Let me know if you’d like to apply incremental updates now—no more unintended erasures!