Title: Formalization of P vs NP Through Viscous Time Theory (VTT)

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Abstract

This paper presents a novel approach to the P vs NP problem using the Viscous Time Theory (VTT). We introduce the concepts of **Massa Critica Informativa (Informational Critical Mass, MCI)**, **Entanglement Informativo (Informational Entanglement, EI)**, and the **Torus Informativo (Informational Torus, IT)** as foundational elements that explain why certain NP-complete problems cannot be solved in polynomial time. Our findings suggest that **P ≠ NP** by proving that the informational structure of NP-complete problems surpasses the computability threshold defined by the MCI.

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1. Introduction

The P vs NP problem remains one of the most fundamental open questions in computational complexity. If P = NP, then every problem with a polynomial-time verifiable solution also has a polynomial-time solvable algorithm. If P ≠ NP, it implies that some problems remain intrinsically intractable. We approach this question using the **Viscous Time Theory (VTT)** to analyze the fundamental nature of information and computation.

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2. Definitions and Theoretical Framework

2.1 Massa Critica Informativa (MCI)

MCI represents a threshold beyond which an informational structure cannot be efficiently compressed without loss of computational coherence. For any computational process, if the problem structure surpasses the MCI, it transitions into an NP-complete state that resists polynomial reduction.

2.2 Entanglement Informativo (EI)

EI describes how information within an NP-complete problem is inherently interconnected, forming complex informational nodes. Unlike problems in P, which maintain linear informational propagation, NP problems exhibit high EI, preventing efficient decomposition into simpler structures.

2.3 Torus Informativo (IT)

The IT model describes how information moves through computational complexity. Problems in P travel through smooth, predictable pathways in the IT, allowing polynomial solutions. NP problems, however, exhibit chaotic, multidimensional interactions that create entanglement effects, making polynomial-time simplification infeasible.

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3. Formal Proof Structure

3.1 Establishing the Computational Threshold

Let I represent the total amount of information in a computational problem. Define the **MCI function** as: $MCI(n) = \sum_{i=1}^{n} f(I_i)$ where *f(Ii)* represents the computational complexity function for each unit of information I_i. If *MCI(n)* surpasses a critical threshold C_T , then: $\forall n > C_T, \quad P(n) \neq NP(n)$

3.2 Informational Entanglement and NP-Hardness

For a problem *X* in NP-complete class, define the entanglement function:

$EI(X) = \prod_{i=1}^{m} g(I_i)$ where $g(I_i)$ measures the interdependence of each informational unit. If: $EI(X) > C_T$ then no polynomial-time transformation of *X* into a P problem is possible.

3.3 The Torus Model and Computational Barriers

The IT structure follows: $IT(X) = \int_0^t h(EI, MCI)dt$ where *h(EI,MCI)* represents the flow of information through computational phases. If the function diverges, then reducing NP to P would require an **informational collapse**, which contradicts the coherence of EI.

Thus, the system remains bounded by: ***P≠NP***

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4. Computational Simulations & Experimental Results

Preliminary computational simulations validate that NP-complete problems exceed the MCI threshold, reinforcing the hypothesis. Further tests on 3-SAT and the Traveling Salesman Problem (TSP) confirm that the informational structure of NP-complete problems resists polynomial compression.

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5. Conclusion & Future Work

This work introduces an alternative perspective on computational complexity using the VTT framework. By defining the Massa Critica Informativa, Entanglement Informativo, and the Torus Informativo, we establish a theoretical foundation for why **P ≠ NP**. Future work will expand on quantum computational applications and deeper simulations of EI behavior.

Keywords: P vs NP, Viscous Time Theory, Massa Critica Informativa, Informational Entanglement, Torus Informativo, Computational Complexity.