

Author Information

Primary Author and Corresponding Author

Name: Haobo Ma

Institution: AELF PTE LTD.

Email: auric@aelf.io

ORCID: 0009-0008-4944-977X

Role: Lead Investigator, Theoretical Formulation, Manuscript Writing

Address for Correspondence:

#14-02, Marina Bay Financial Centre Tower 1

8 Marina Blvd, Singapore 018981

Region: Singapore

Co-Authors

Name: Wen Niu

Institution: AELF PTE LTD.

Email: ada@aelf.io

ORCID: 0009-0006-3349-0298

Role: Theoretical Analysis, Manuscript Review

Address:

#14-02, Marina Bay Financial Centre Tower 1

8 Marina Blvd, Singapore 018981

Region: Singapore

Author Contributions

Haobo Ma conceived the original concept of information ontology, developed the mathematical formalism, derived the theoretical predictions, designed the verification experiments, analyzed the results, and wrote the manuscript.

Wen Niu contributed to the theoretical analysis, verification of mathematical formalism, and critical review of the manuscript.

Author Order Rationale

The author order reflects the level of contribution to the theoretical development and manuscript preparation.

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Verification Statement

We, Haobo Ma and Wen Niu, hereby confirm that we have seen and approved the final version of this manuscript and take full responsibility for the integrity and accuracy of all aspects of the work presented.