

The Challenge: Navigating **Data Complexity**

- Modern data analysis faces fundamental challenges with multi-modal, highdimensional, heterogenous data.
- Data resists traditional categorization methods.
- Existing tools:
- have limited capabilities in data integration,
- lack intuitive interfaces,
- present barriers to **real-time**, collaborative exploration.

Our Solution: Mantis -Cognitive Cartography

- A comprehensive **AI-powered**, humandriven data science platform.
- Cognitive Cartography: Visualizes diverse data types in a unified vector space (latent space) of embeddings, hierarchical clusters where semantic relationships become geometric operations.
- Creates faithful, tractable k-D representations preserving essential structures with UMAP and t-SNE
- Enables intuitive, interactive navigation through complex, highdimensional information landscapes: cross-modal comparisons, multi-floor analysis, geometric operations, etc.







Mantis

Manolis Kellis, Pascal Passigan, Jophy Ye {manoli, ppxscal, jophyyjh}@mit.edu

Massachusetts **Institute of Technology**

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Select points / clusters to inspect

Uniqueness: Power, **Transparency, Human-Driven**

- **Operationalizes Representation Theory:** transforms complex data structures into vector spaces.
- **Power**: Integrates text, graphs, numerical data, and sequences into a common latent space. Leverages RAG, graph neural networks, and efficient vector indexing.
- **Glass-Box AI**: Enables operations that would be **computationally intractable** in the original data space. **Reasoning** is **traceable** and strengthened through geometry.
- Human-in-the-loop: A human at the steering wheel. Augments human reasoning with machine learning by making obscured relationships accessible.
- Reinforcement Learning: user action helps refine embeddings, integration accuracy, next action prediction, query relevance...

Impact & Applications

- Paradigm Shift of Data Science
- Empowered Users: Fosters fluid human-Al collaboration.
- Accelerated Discovery: Enables impossible operations with traditional databases, applicable across scientific research, healthcare, finance, and more.
- Partnerships: Demonstrating value in realworld collaborations (e.g., Lumeris (healthcare) - mapping millions of patients, Agadia (edtech) - mapping knowledge).