

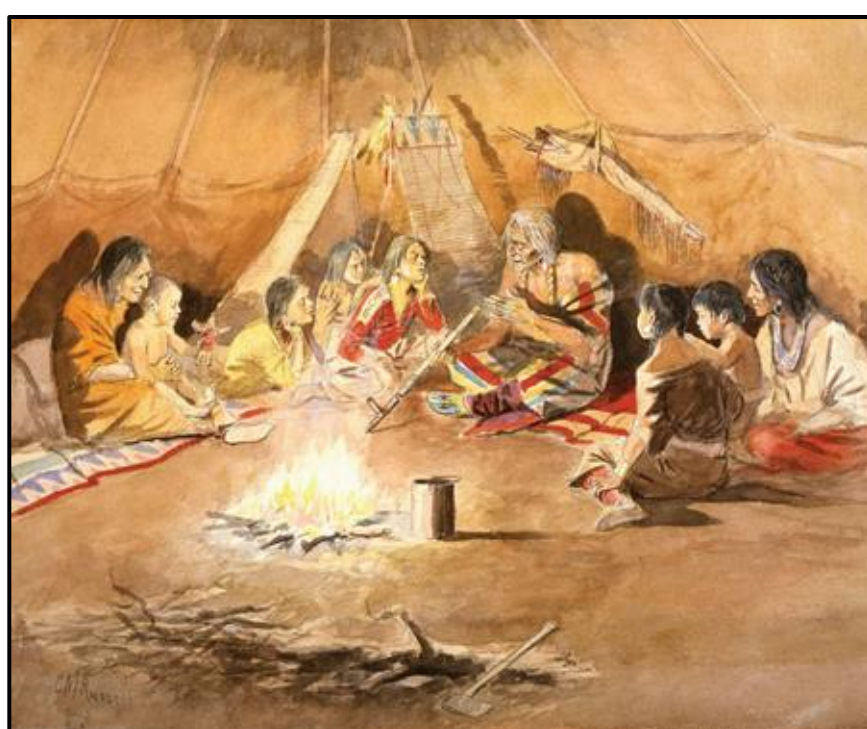
Background Information

Myths in Human History

- Human history is beautifully complex; it is shaped by migration, cultural exchange, shared ancestry, and different environments
- Myths preserve human culture by recording how societies understand nature, identity, morality, the unknown, and reality
- It serves as a unique and valuable lens in which the intangible cultural heritage of societies can be accurately observed and understood
- Therefore, exploring myths is exploring the intricate history, thought, and relationship people had with their community and surroundings

Importance of Myth Today

- Intangible Cultural Heritage:**
Preserve collection memory and identity that may otherwise disappear across generations
- Indigenous Knowledge:**
Contain knowledge that is increasingly endangered by language loss and cultural displacement
- AI and Information Homogenization:**
Algorithms amplify dominant narratives; studying myths helps preserve diverse ways of understanding the world around us



(Source: Russell, ca. 1893-1895)

Previous Research

- European folktale variations reflect both geographic proximity and ethnolinguistic population history, suggesting the stories preserve traces of cultural movements around the world
- However, anthropological field suggests the Galton's Problem, which indicates that folktales and culture is simultaneously influenced by migration, cross-cultural contact, ancestry, and the environment
- Large-scale, global analysis of myths have been successful recently with the advent of digitized cross-cultural folklore databases and computational methods
- Topic modeling have shown to be able to identify broader semantic relationships among folklore motifs, but abstract and hierarchical themes remain difficult to computationally represent

Research Question

Question 01: How does the network structure, similarity representation, and cultural understandings derived from the networks different when the global mythology is analyzed using the binary motif matrix and unsupervised topic modeling network?

Question 02: How does the representation of myths affect our ability to accurately determine whether cross-cultural similarities reflect migration, cultural exchange, shared ancestry, or common environments?

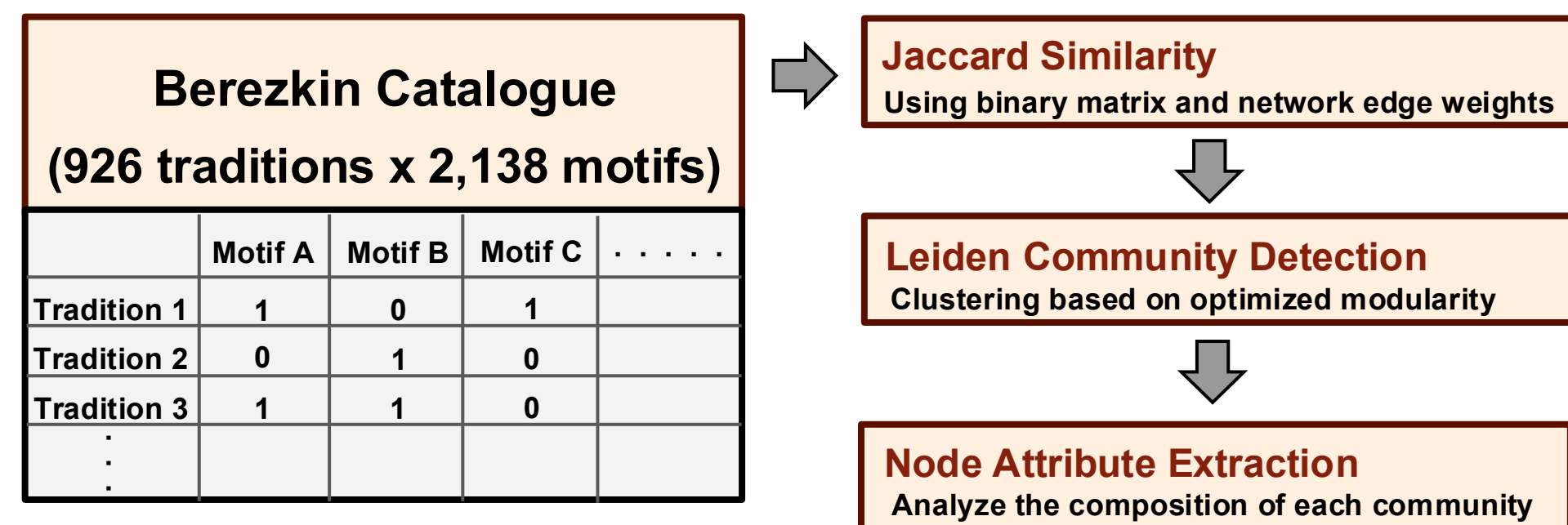
Objective

To better understand how the stories of human history are represented, remembered, and transmitted today, this research specifically focuses on these three objectives for this research:

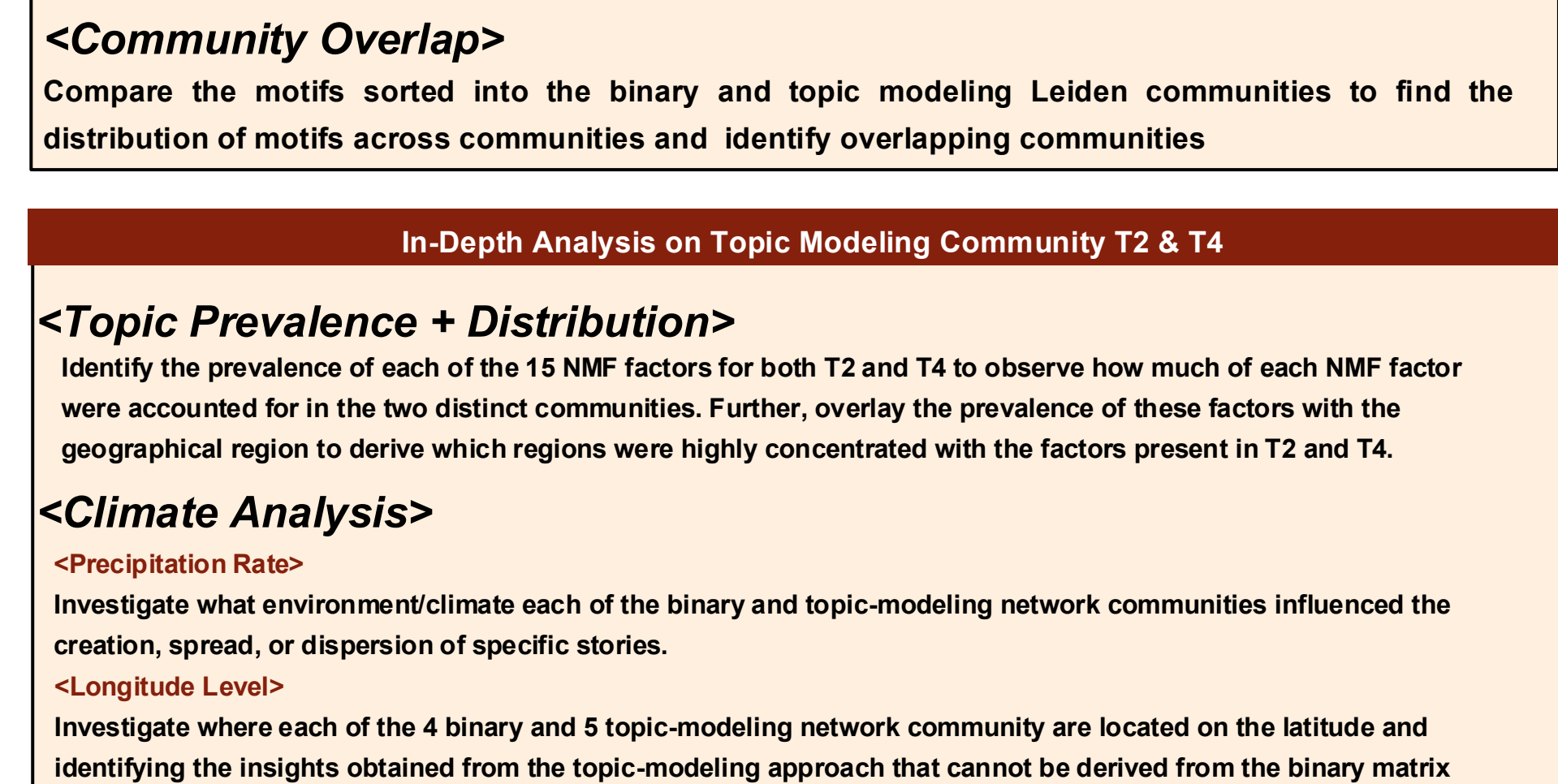
- Binary Motif Network:**
Identify motif similarities between traditions and communities of myths
- Topic-Modeling Motif Network:**
Identify broader thematic relationships beyond the catalogue using topic modeling
- Comparison Analysis:**
Where and why the networks coverage and diverge and what insights can be derived?

Data and Methodology

1) Binary Motif Network Construction



3) Comparison Analysis



2) Topic Modeling Motif Network Construction

<Text Processing of Berezkin Catalogue>

Motif Title	Motif Description
The old sun	Another sun, usually less benevolent and/or powerful, existed before the present one

- Text Normalization: Convert "Motif Title; Motif Description" into combined text
- Tokenization: Filter the text with English stopwords list and include terms relevant to mythology
- Unigram & Bigram Construction: Create title_local and description_local Bigrams for analysis

Finalized Unigram/Bigram for Topic Modeling

old_sun old_sun_sun usually benevolent powerful existed before present one_sun usually usually_benevolent benevolent_powerful powerful_powerful existed existed_before before_present present_one

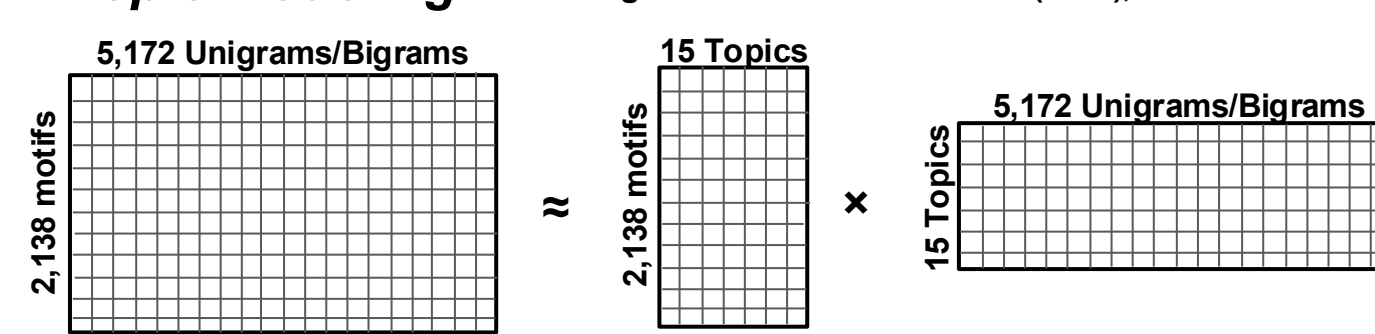
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Filter the text with English stopwords list and include terms relevant to mythology (df_min = 2.00, df_max = 0.80)

<TF-IDF Algorithm>

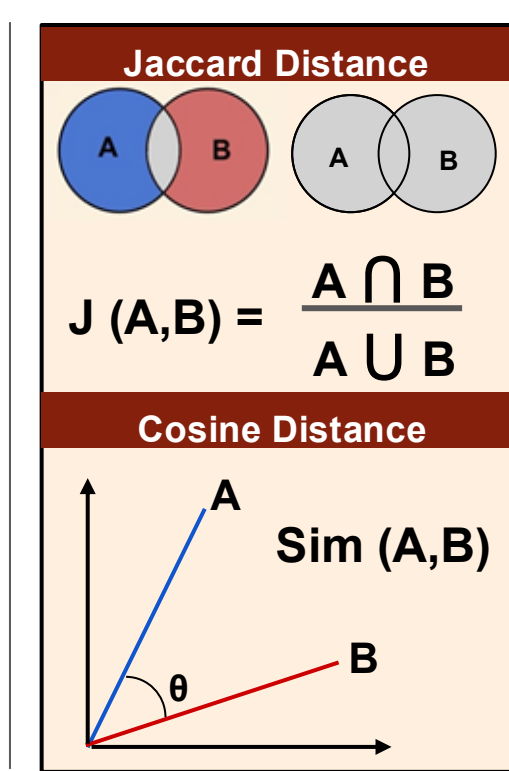
Filter the text with English stopwords list and include terms relevant to mythology

<Topic Modeling>



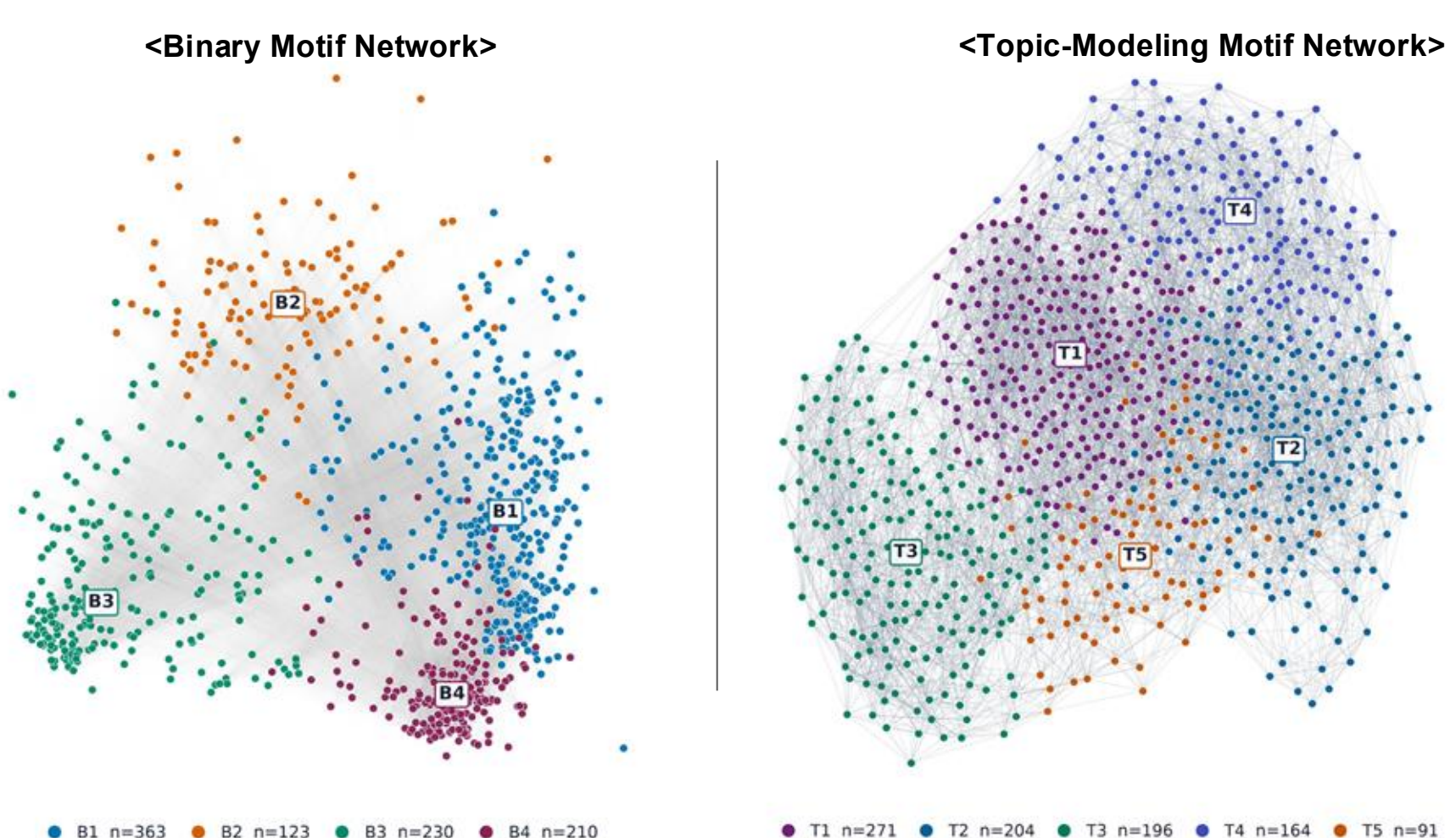
<Network Construction>

- Cosine Similarity computed for each tradition pair
- Union kNN similarity network using k = 12
- Leiden Community Detection, resolution gamma = 0.75

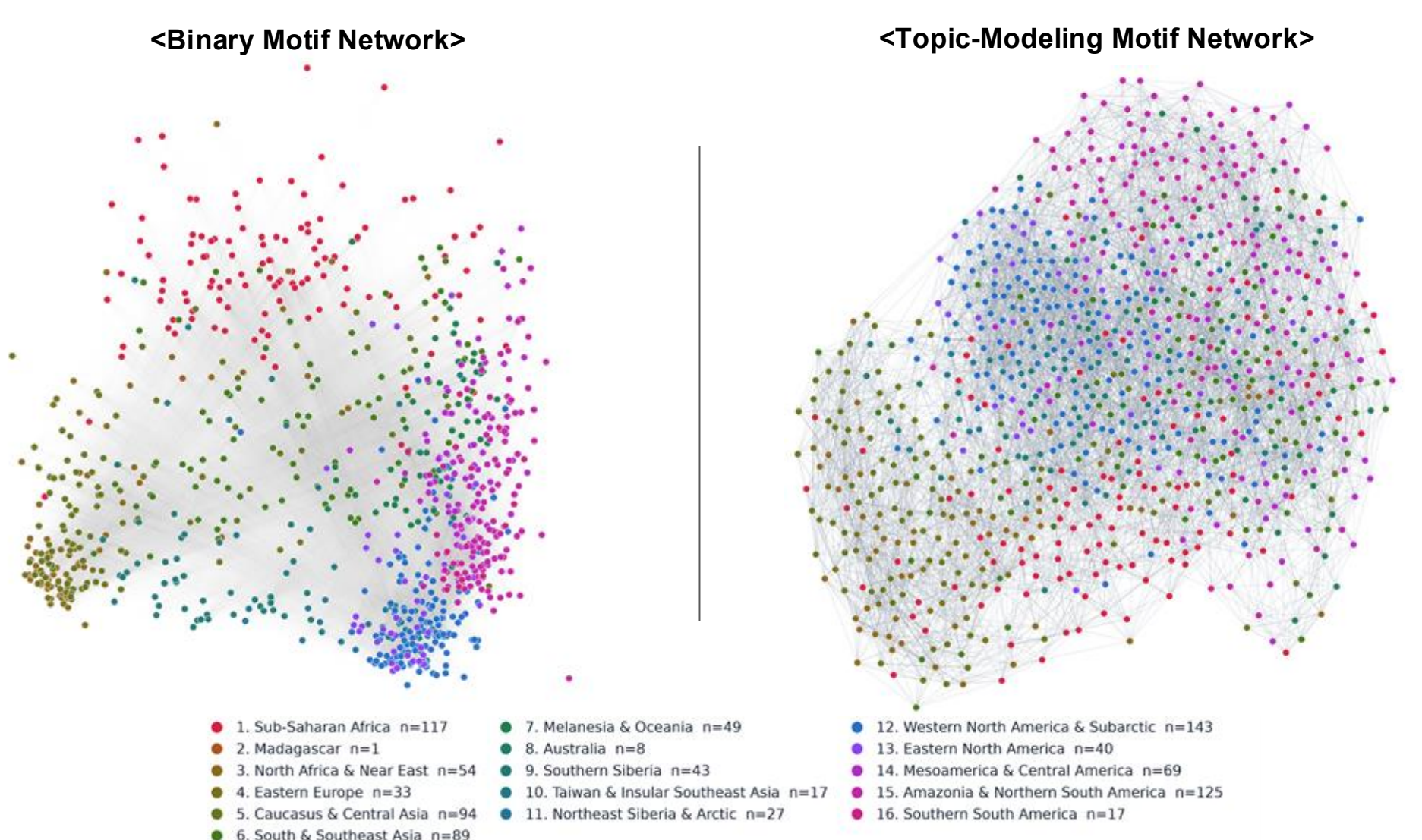


Results

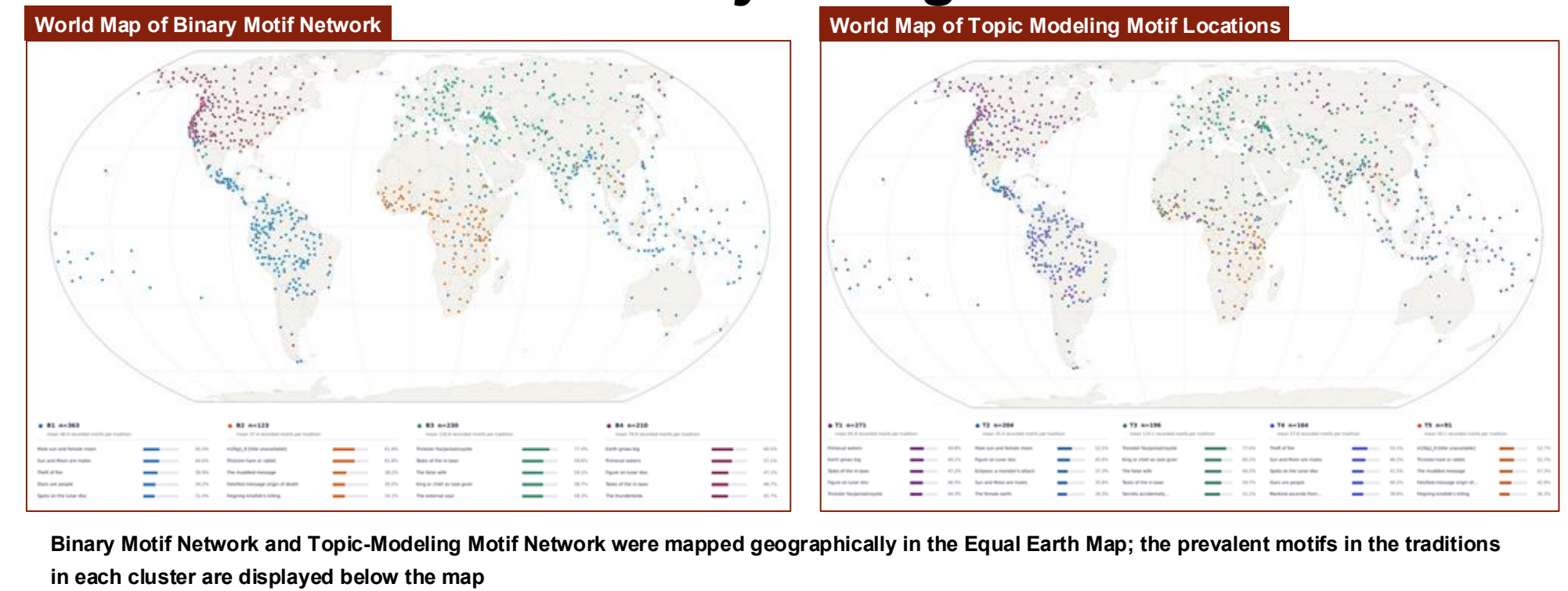
Leiden Community Detection



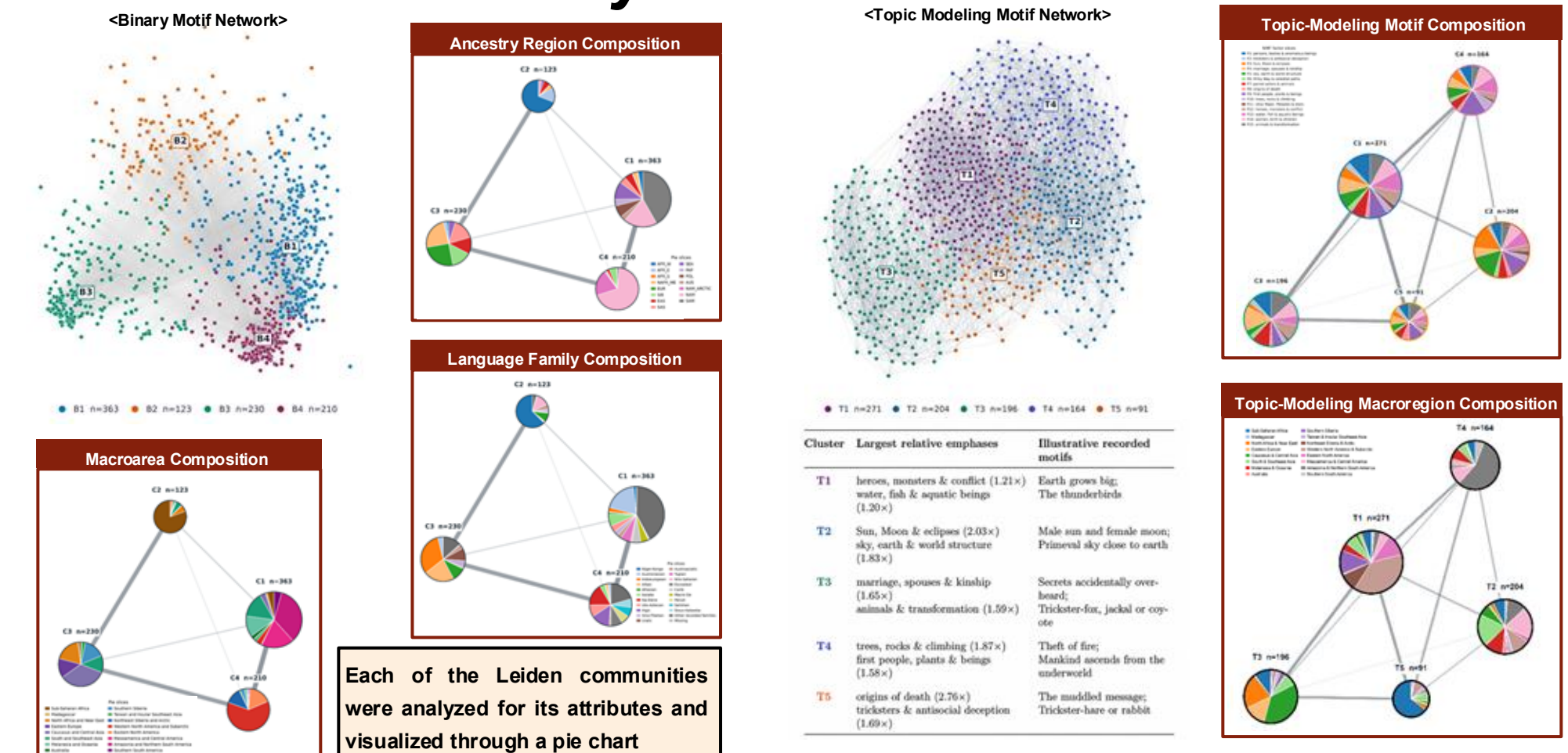
Leiden Community and Geographical Location



Distribution of Global Mythological Motifs



Node Attribute Analysis



Comparison Analysis



Discussion

Analysis

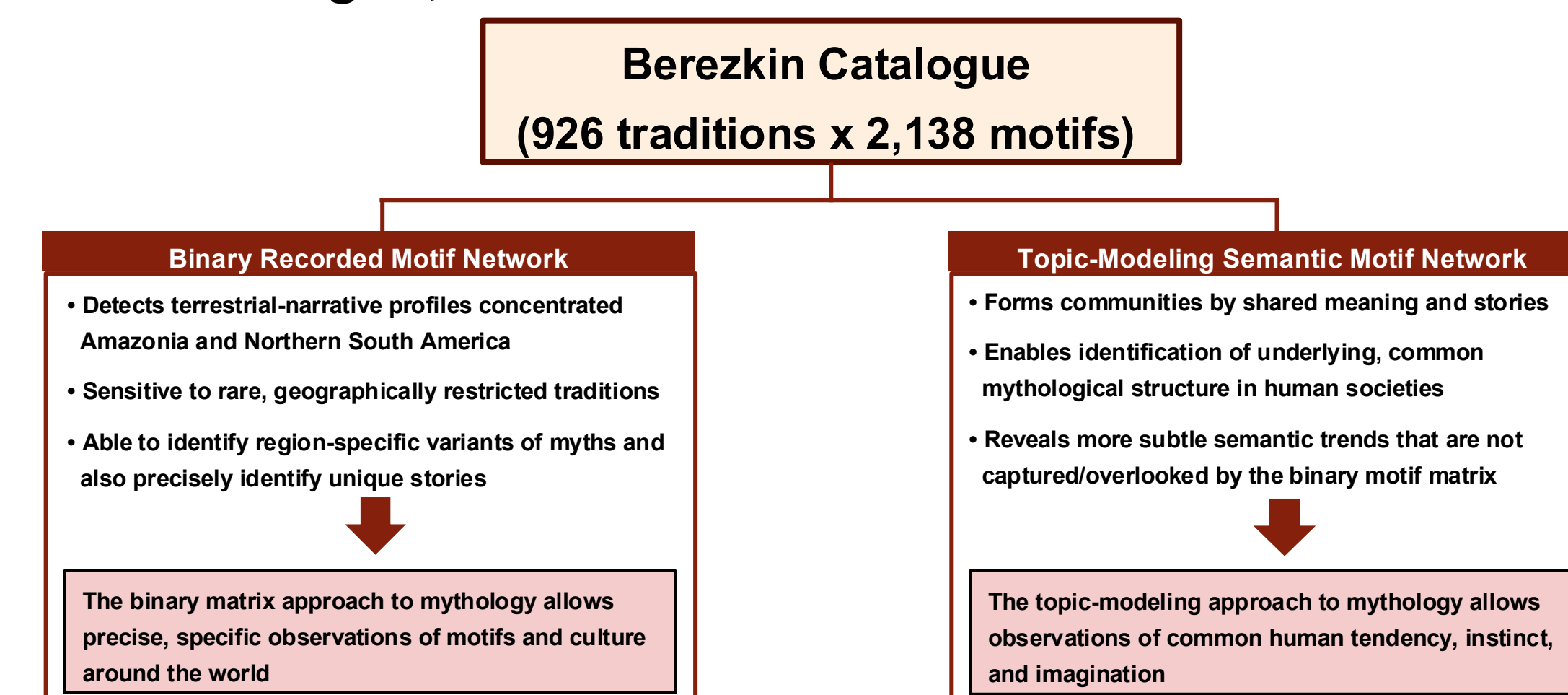
<Leiden Community Detection Comparison>

- The Binary Motif Leiden community detection created 4 communities while Topic-Modeling Leiden community detection created 5 distinct communities. When mapped onto global map, most of points corresponded with each other, but variations existed in the Topic-Modeling network
- Supporting the geographic distribution, most traditions corresponded (B4 → T1, B3 → T3, B2 → T5), except B1 community mapping to 2 distinct topic communities, T2 and T4

	T2 Community	T4 Community
Theme	Celestial, Cosmology	Terrestrial
Geography	Global	Northern South America
Ancestry	Across unrelated languages	Amazonian language family
Climate	No significant correlation	Warm, humid climate

The comparison analysis of the two different network algorithm revealed drastic differences in the communities it captured. With in the same B1 community, the T2 community highlight global, celestial themes and the T4 community highlights the region-specific, terrestrial themes.

One Catalogue, Two Stories



In order for more accurate and complete understanding of human history, a combination of binary motif matrix and the topic-modeling approach should both use in tandem. The binary motif matrix highlights the specific overlapping motifs in traditions; the topic-modeling provides insight into the universal human thought and imagination, especially in phenomena that was observed all around the world. Hence, this shows that viewing the world and understanding myths in the context of human history requires a nuanced combination of both approaches.

Limitations and Future Directions

<Limitations>

Catalogue Bias:
Uneven documentation, translation, and author perspective may influence recorded traditions and myths

Reduction of Complex Narratives:
Binary matrix and topic-modeling cannot capture the narratives and complete nuances of myths various cultures

Lack of causal inference:
Analysis of mythological similarities does not indicate a casual relationship

<Future Directions>

Additional Representations:
Since binary motif and topic-modeling yielded different results, testing different networks can reveal insights

Integrating Historical Evidence:
Combine networks with ancient trade roots, phylogenies, and languages to identify similarities and differences in networks

Expert Validation
Work with historians and archaeologists to receive advice and explore mythologies and human history more accurately

Conclusion

This research shows that representations of myth produce distinct yet complementary networks of human culture. Exact motifs pre-designated by the Berezkin Catalogue reveals specific, geographically localized stories, while topic modeling identifies broader thematic connections across regions. Together, they demonstrate that global mythological similarity reflects both cultural specificity and shared patterns of human instinct and imagination.

Throughout human history, myth has always been present to pass on the knowledge, advice, observations, warning, and messages through space and time. Yet, as modern technology advances and the primarily Western narrative dominates the world of "information", this computational geo-social network analysis to global mythology aims to highlight the value of mythology in understanding human imagination, thought, and sense of self in this world. Ultimately, this research provides a framework for analyzing mythology and preserving the intangible cultural heritage at a global scale.

Acknowledgements

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Citations

