

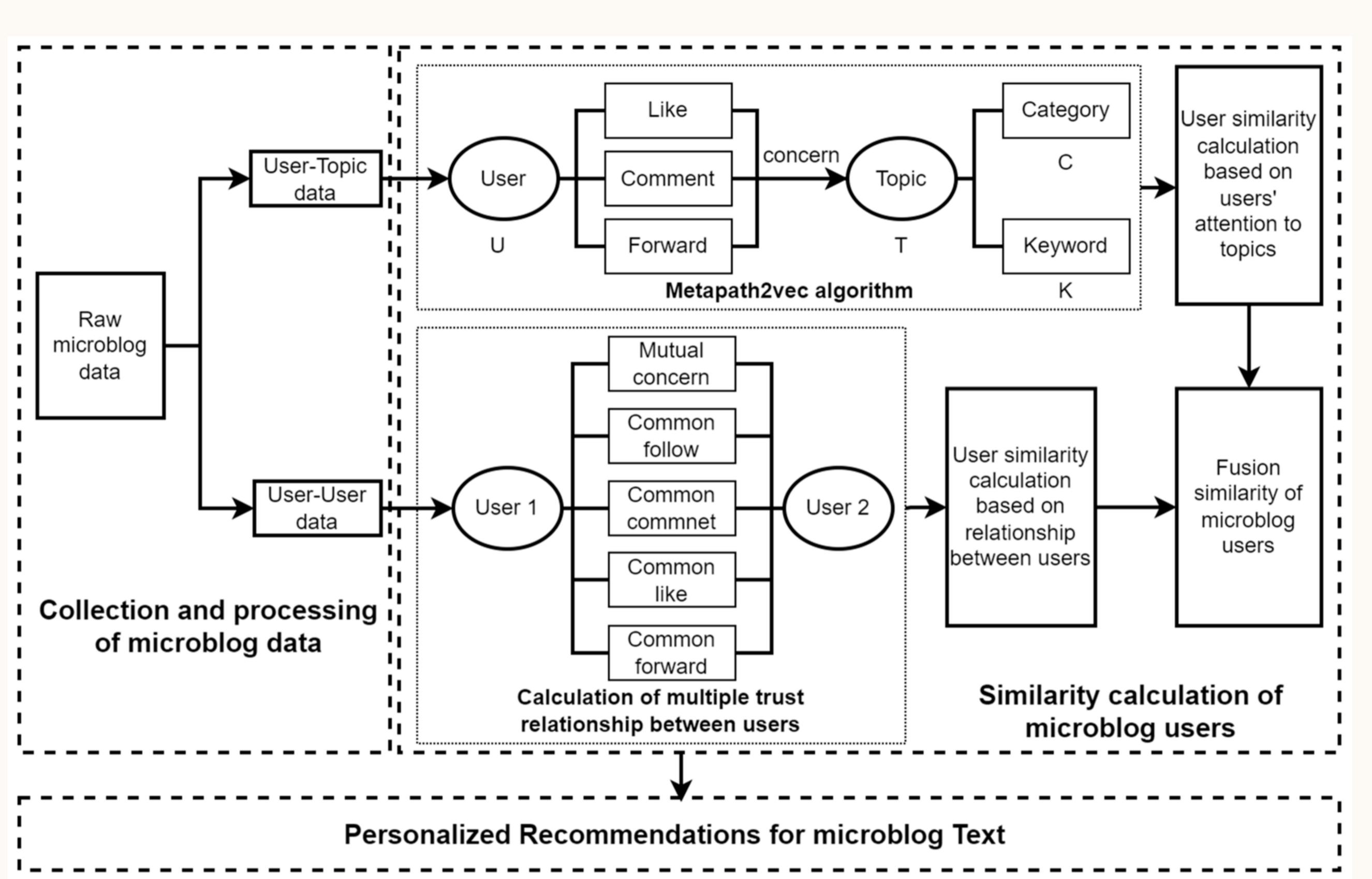
ENHANCING SEQUENTIAL RECOMMENDATION SYSTEM FOR MOOCs BASED ON HETEROGENEOUS INFORMATION NETWORKS



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OVERVIEW



WHAT

We introduce a framework to enhance sequential recommendation systems for MOOCs, in which we have:

- Proposed a robust method to integrate and model heterogeneous information networks (HIN) for MOOCs data.
- Built a comprehensive dataset combining user interactions, course metadata, and contextual information from multiple sources.
- Evaluated several advanced sequential recommendation algorithms to ensure personalized and accurate course suggestions.

WHY

- The rapid growth of MOOCs has created an urgent need for personalized recommendation systems to enhance user engagement and completion rates. However, traditional systems primarily rely on homogeneous data, which limits their ability to capture the complex relationships between various entities in the MOOCs ecosystem.
- Most existing studies focus on sequential recommendations based on user interaction history, overlooking the potential of heterogeneous information networks (HIN) to integrate diverse data sources such as course content, user preferences, and peer reviews. This gap highlights the necessity for a more advanced framework that leverages HIN to improve recommendation accuracy and relevance.

DESCRIPTION

1. Data Collection and preprocessing

- Data Collection:
 - User Interaction Data
 - Course Metadata
 - User Profiles
 - Heterogeneous Data Sources
- Data Integration
 - Mapping to HIN Schema
 - Data Alignment
- Data Cleaning:
 - Error Detection
 - Normalization
 - Outlier Handling
- Feature Engineering:
 - Temporal Features
 - User Behavioral Features
 - Course Features
- Data Transformation
 - Sequence Generation
 - Graph Embedding Preparation
- Preprocessing for Model Input
 - Embedding Initialization
 - Sequence Batching
 - Feature Scaling

2. HIN Construction

- Identifying Key Entities
 - Users
 - Courses
 - Topics
 - Other Entities
- Defining Relationships
 - User-Course Interaction
 - Course-Topic Association
 - User-User Connections
 - Temporal Sequences
- Graph Construction
 - Node Creation
 - Edge Formation
 - Heterogeneity
- Incorporating Meta-Path
 - Meta-Path Design
 - Meta-Path Selection
- Embedding Generation
 - Graph Embedding Algorithms
 - Sequence Modeling Preparation
- Integration with Sequential Models
 - Temporal Dependency Modeling
 - Feature Augmentation
- Scalability and Optimization
 - Dynamic Updates
 - Efficiency Optimization

3. Sequential Recommendation Model Development

- Sequential Modeling
- HIN Framework
- Personalized Recommendations
- Scalability and Adaptability

4. Model Evaluation and Optimization

- Performance Metrics
- Optimization Techniques
- Ablation Studies
- Real-World Testing
- Iterative Refinement

Conclusion:

- Although research on a sequential suggestion system for heterogeneous information network (HIN)-based MOOCs has not yet been completed, I believe that the initial results have formed an important foundation for the development of an effective suggestion system.
- I hope that in the coming time, I can continue to optimize the model, test in practice and expand the project by integrating new technologies. It is hoped that, when completed, the project will not only improve the learning experience on MOOCs but also contribute to the development of suggestion systems in many other areas.

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