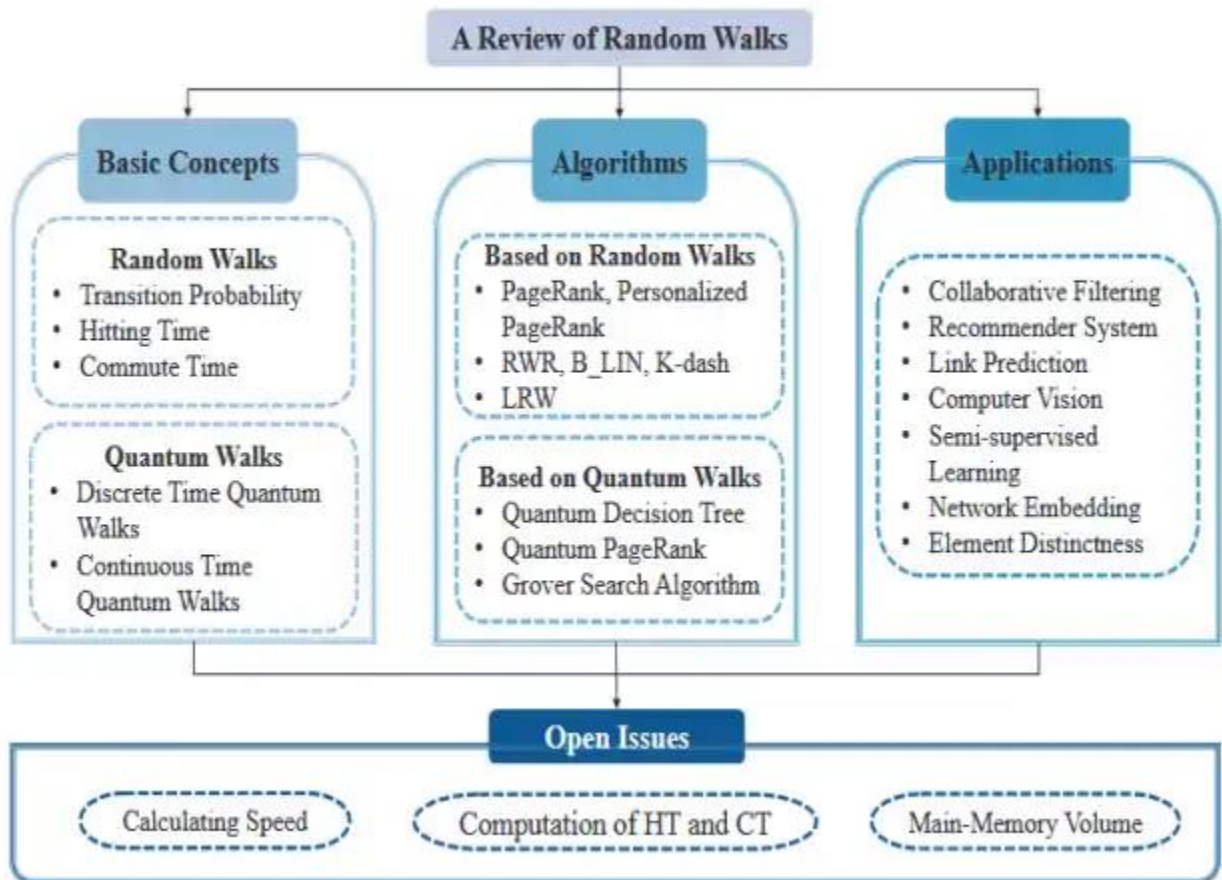


Random walks in social networks and their applications a survey

Random walks in social networks are a mathematical and computational concept that involves modeling how users or entities move through a network in a stochastic (random) manner. This concept has significant applications in various aspects of social computing, such as information retrieval, recommendation systems, and network analysis. Below is a survey of random walks in social networks and their applications in social computing:

Definition of Random Walks:

Random Walk: In the context of social networks, a random walk is a sequence of steps taken by a user or entity in a network, where each step is determined randomly based on certain probabilities.



Applications:

Information Retrieval: Random walks can be used for exploring and retrieving information from large networks. Algorithms like PageRank (used by Google) are based on random walks and help rank web pages by their importance.

Recommendation Systems: Random walks are used in recommendation algorithms to discover and recommend items, such as movies or products, to users based on their preferences and the preferences of similar users.

Community Detection: Random walks can help identify communities or clusters of users within a social network by observing how users traverse the network.

Link Prediction: By simulating random walks on a network, it's possible to predict missing links or connections between users or entities.

Anomaly Detection: Random walks can be used to identify unusual or anomalous patterns of behavior in a network, which can be indicative of security threats or fraud.

Network Analysis: Random walks are a fundamental tool for studying network properties like centrality, connectivity, and reachability.

Search Engines: Random walks have applications in improving search engine algorithms, making search results more relevant and personalized.

Mathematical Models:

Markov Chains: Random walks are often modeled as Markov chains, where the probability of moving from one node (or user) to another is determined solely by the current node and not by previous steps.

Transition Probabilities: Transition probabilities represent the likelihood of moving from one node to another. In social networks, these probabilities can be based on factors like user interests, connections, or preferences.

Random Walk Variations:

Personalized Random Walks: In recommendation systems, personalized random walks take into account a user's historical behavior to make recommendations more tailored to individual preferences.

Weighted Random Walks: In weighted random walks, the edges or connections between nodes have different weights, indicating their importance or relevance.

Challenges and Considerations:

Data Quality: Random walk algorithms rely on network data, so data quality and accuracy are essential.

Scalability: For large social networks, performing random walks can be computationally expensive. Approximation techniques are often used.

Privacy: Analyzing user behavior through random walks raises privacy concerns, so anonymization and data protection techniques are important.

In summary, random walks in social networks are a valuable tool in social computing for understanding user behavior, making recommendations, and analyzing network structure. Their applications span various domains, from search engines to recommendation systems, and they continue to evolve as social networks and computational techniques advance.