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Pixie-inspired Random Walk Algorithms

Pixie-inspired recommendation systems are graph-based algorithms that can determine recommendations based on random walks. Collaborative Filtering algorithms usually utilize user-to-user similarity or item-to-item similarity. Pixie recommendation systems treat each recommendation as a graph problem. By employing random walks, we can explore the current node's neighbors and determine implicit connections. The Pixie-inspired algorithm utilizes bipartite graphs to represent the data where users and items from different node sets are connected with each other with edges. We can understand these connections based on the edges that represent the interaction.

The random walk helps to identify the relevant recommendation made by simulating graph runs and determining the nodes' frequency. If a node is frequently reached, it is similar to the starting point. The random walk algorithm starts at a node (start) and randomly selects a path or edge to follow. At the next node, it again randomly selects an edge to follow. The algorithm keeps selecting edges and nodes randomly until the specified parameter values are reached, allowing you to understand relationships further than just the neighbors but also the neighbors' neighbors. The algorithm goes further than direct relationship unlike item-to-item and user-to-user Collaborative Filtering. Once the random walk algorithm is complete, they are able

to capture the direct and indirect associations with items and users by keeping track of this information. Storing this information can allow the algorithm to assign scores to the relationships and tailor recommendations based on the frequency.

In the real world, Pixie-inspired recommendation systems are incorporated into many applications. They are used in the real world because all you need is a large amount of user data in graphs. A system with large-scale data and information graphs can find these algorithms incredibly useful. A great example of this is social networks and e-commerce applications. Social networking has benefited from the incorporation of Pixie-inspired recommendation systems. Pinterest was able to employ a variant of Pixie-inspired recommendation systems to recommend personalized content for every user incredibly quickly. E-commerce applications can provide personalized recommendations based on interaction data using random walks. Amazon uses these recommendations to provide recommended items from user behavior. Overall, the Pixie-inspired recommendation systems and the random walk algorithm a powerful tools that can provide great insight into user behavior and connections which can lead to better recommendations and user interaction.

Works Cited

Eksombatchai, Chantat, et al. “Pixie.” *Proceedings of the 2018 World Wide Web Conference on World Wide Web - WWW ’18*, 2018, pp. 1775–1784, https://doi.org/10.1145/3178876.3186183.