Explanation of Pixie Algorithm

Pixie-inspired recommendation systems are a type of recommender system that was originally developed by pinterest. They utilize traversing a bipartite graph of users and a set of items to give users recommendations of new items, based on the frequent interaction/relationships between the users and items. Each node contains either an item or user and these nodes only connect to nodes of the other type. In order to run this type of recommendation system you first start at a random node of either a user or item and then randomly select a node of the other type. This process is continually repeated n number of times and the top n items visited are those that are recommended. The reason this type of algorithm is typically preferred is because it is very scalable and efficient which is useful when you have a large number of datapoints. In addition, it helps combat the problem of cold starts by handling citations where there may not be a lot of new user or item data. There are two types of pixie random walk algorithms, an unweighted random walk is one where every neighbor had an equal chance of being chosen. Meanwhile, a weighted pixie random walk is one where neighbors are chosen based on a weight that can come from similarity, recency and interactions.

The pixie inspired algorithm uses the concept of random walks to help identify suitable recommendations of users. A random walk is when you start at one node, user or item, and you proceed to the next connected node by choosing one at random. You continue this process for a set number of times, or until a certain criterion is met. Through this we can help find the relationships between what one user liked and the relationships of other users. This can uncover indirect relationships because through the continuous hopping and change we can examine how other users and movies are connected to each other. We keep track of the different nodes we see at each hop and the top most seen are considered similar/are recommended because they are considered most relevant,because if an item is popular with several users that are similar it is considered similar.

Some real world examples of these algorithms in industry range are in ecommerce, streaming, social media and online stores. The original use of this algorithm is in Pintrest where the platform uses these algorithms to provide personalized pin algorithms by using a bipartite graph on users and pins as items, allowing for quick, efficient real time recommendations. In ecommerce, companies like Amazon use a similar algorithm to commend users for new items/related items to buy, where items in the bipartite graph are related items. In social media apps like Instagram use this system to recommend content like reels. They will take a user and find videos they liked and then from hat perform random walk on other users and content to get recommendations.