Pixie is a recommendation algorithm developed by Pinterest that quickly and effectively generates recommended content that is personalized to the user. It is designed to be fast, lightweight, and effective. Pixie is different from other recommendation algorithms as it provides many benefits, such as being fast, graph-based, scalable, and designed for real-time applications. Pixie uses a bipartite graph to show how certain topics are represented to users. An edge on the graph shows that a specific user is interested in a specific topic. In platforms like Pinterest, there are billions of nodes and edges connected to each other that make decisions on recommendations.

With a user-item bipartite graph, Pixie performs random walks that help it decide what to recommend to a user. A random walk occurs when a user or item starts at a node and randomly hops to a neighbor for every step. The nodes of a graph represent users and items, and the edges represent interactions, such as views, likes, or rating. Some random walks can be weighted as edges have probabilities based on frequency or ratings. The weights can be determined by a visit count, which is the number of times an item is visited during a walk. The higher the view count, the higher the weight, and the more likely that item will be recommended.

Pinterest is a real world application that uses the Pixie random walk algorithm. When a user likes an image or gifs, they can pin it, which saves it to their board. Based on those pins, the home page displays similar recommendations. When the user clicks on an item, they will see similar items when scrolling down because of random walk. For the bipartite graph, the nodes represent pins and boards, and each edge connecting them shows that a person saved a pin to a board. Pinterest provides real-time, highly personalized suggestions as you scroll or search for topics. It handled millions of pins and users very efficiently.