

e-Portfolio Activity: Data Structures Reflection

Read Dicheva & Hodge (2018). Think about an online system which you use on a daily basis. Consider how it might operate at the back-end using data structures.

An online system I use daily, which I am confident uses multiple data structures at the foundation level is X (formerly known as Twitter). Generally, the key data structures are arrays incl. linked lists, stacks, queues, and trees and graphs (Hopcroft et al., 1983). To assess relevant data structures, it is worth outlining X's front-end system, which can be split into the following key components:

1. *Home Feed* – the main user interface, where the user is presented with content either in chronological or algorithmically-recommended order
2. *Explore Feed* including *Search* functionality – a feed of trending content based on certain keywords, and the ability to search for additional content and users

Additional section is the Communities, which is similar to explore feed but focuses on algorithmically suggested groups of users concentrated in an interest area.

Home Feed

At a surface level, the Home feed could be making use of arrays for post ordering, particularly, the queue structure, which operates on a first-in first-out (FIFO) basis. As the user refreshes their feed, new posts are added at the end of the list and removed at the start of the list. Alternatively, to account for any dynamic changes in the feed, such as a user deleting a post, a linked list is more appropriate as it is more efficient when changes need to be made in the middle of the array (Stieg, 2022).

For post recommendation based on the algorithm, the back-end system could be making use of a graph structure, where users are stored as nodes connected by edges. Depending on the stored attributes of the nodes and the interactions between users, edges with certain weighting are created between users. Given this, the user may receive posts from users which are more closely connected to them in this graph structure.

Explore Feed and Search

Similarly to the Home feed, the Explore feed could also be making use of the queue or linked list structure as described above. The additional Search functionality of the Explore page, however, could be making use of a tree structure to enhance the search efficiency and speed. For example, the Trie structure, a type of search tree (Schwarz, 2021), enables fast traversal of strings. Each node is represented as individual characters, and is traversed using a depth-first approach with each character.

In summary, the online system supporting X is likely making use of the full range of data structures to support its various functionalities. These are enhanced by existing algorithms including machine learning algorithms to deliver an effective user experience.

References:

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