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Text Information Systems (CS 410)

6th November 2022

Google's Multitask Ranking Analysis

Technology is an ever-evolving subject matter that dominates today's economic and societal change. How we interact with one another, learn, work: all of it changes as new technologies emerge and integrate within our everyday lives. One very important, and often unnoticed feature is *how* information is sent and received. In its simplest form, ranking in an information retrieval setting is "given a query *q* and a collection *D* of documents that match the query, the problem is to rank, that is, sort the documents in D according to some criterion so that the 'best' results appear early in the result list displayed to the user" (Wikipedia, 1). This is wherever changing and sophisticated systems such as Google's multitask ranking system come into consideration, as technology companies such as google have created such intuitive algorithms that are able to predict what information we want only based on a few simple metrics given and supply us with that information quickly and efficiently. These metrics could be anything from what site you are currently visiting, video you may be watching, or key words you choose to search. With these variables ranking systems are able to understand the user and supply them with the next topic or piece of information they may want, without the user even noticing they have been consuming information for hours on end. Google's multitask ranking system embodies that sophistication, and in comparison, to other ranking methods proves why it is leading in information distribution.

First let us analyze and understand Google's multitask ranking system to assess its strengths and characteristics. Initially, we should understand what variables are being tracked and understood to produce There are two categories named within the article 'Recommending What Video to Watch Next: A Multitask Ranking System', namely "engagement objectives, such as user clicks, and degree of engagement with recommended videos" as well as "satisfaction objectives, such as user liking a video on YouTube, and leaving a rating on the recommendation" (Zhao, 43). These are complex factors, as understanding whether the user is having positive or negative engagement with the information in front of them is the key to building the ranking in a way that recommends future information they actually like. The technique that Google has implemented to mitigate any issues with the multiple factors that are involved when making the calculation is Multi-gate Mixture-of-Experts (MMoE). As described by this article MMoE is "designed to capture the task differences without requiring significantly more model parameters compared to the shared-bottom model" (Zhao, 47). Essentially, with Google's model they are able to extract more information about the user with less starting information. Another key design feature which makes Google's model so sophisticated is the way that they trained their system. Both their "proposed model and baseline models" are trained such that they follow a "temporal order and keep running [their] trainer to consume newly arriving data" (Zhao, 48). This design allows their system to adapt to ever changing user tendencies. These are a few reasons why Google's multitask system is clearly at a level of sophistication which reigns them supreme in the retrieval and distribution of information and data.

Now that we have a firm understanding of Google's Multitask Recommendation system, let's compare it to another prominent and current system used for ranking. Twitter, another

prominent entity when it comes to the distribution and gathering of information for a user, is a great example to compare to. Twitter chose the interesting route of using Deep Learning as a way to measure and bring information to their users. They also emphasize newer content first, the general model being a reverse-chronological order in the timeline. The key factors Twitter chooses to focus on are "Location info, Content meta data, Chronology, User Access Patterns, Signals of interest (such as tagging, commenting, favoriting)" (Smith, 29). An easy description of Twitter's ranking system is it being the "Flickr interestingness algorithm, expanding upon some of the factors involved, computing it through a more sophisticated machine learning process, interpreting content based upon natural language processing" (Smith, 30). Clearly Twitter's model is just as sophisticated as Google's, as they have similar variables that can indicate positive or negative user interaction with the Tweet, a high volume of users that they need to simultaneously distribute information to, as well as high level machine learning that takes these different variables and ranks information for display.

In this investigation, it is easy to conclude that Google's ranking method is as sophisticated as it gets. All the biggest tech tycoons are using complex methodologies such as AI/ML to build systems that can reduce the time it takes for a user to find the information they are looking for and keep them engaged in the applications they are using. Whether its Google's Multitask ranking system or Twitter's Deep Learning machine language processing, each of these have their strengths and are able to gather incredible amounts of data and distribute them to their users instantaneously. Whether or not Google's reigns supreme can be debated, but clearly, they are a contender for being the most sophisticated.

Bibliography

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