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**Weekly Assignment 8**

**Weekly Assignment-8**

**Learn to Rank Model:**

Learning to rank model is the application of machine learning, typically supervised, semi-supervised or reinforcement learning, in the construction of ranking models for information retrieval systems. Ranking is the main part of many information retrieval problems such as document retrieval, collaborative filtering, sentiment analysis and online advertising.

**Process of Learn to Rank Model:**

Training data consists of queries and documents matching them together with relevance degree of each match. Training data is used by a learning algorithm to produce a ranking model which computes relevance of documents for actual queries. Typically, users expect a search query to complete in a brief time (such as a few hundred milliseconds for web search), which makes it impossible to evaluate a complex ranking model on each document in the corpus, and so a two-phase scheme is used.

First, a small number of potentially relevant documents are identified using simpler retrieval models which permit fast query evaluation, such as the vector space model, Boolean model, weighted AND, or BM25. This phase is called top-k {\displaystyle k}kkdocument retrieval and many heuristics were proposed in the literature to accelerate it, such as using a document's static quality score and tiered indexes. In the second phase, a more accurate but computationally expensive machine-learned model is used to re-rank these documents.

**Approaches:**

Tie-Yan Liu has analysed existing algorithms for learning to rank problems in his paper “Learning to Rank for Information Retrieval” He categorized them into three groups by their input representation and loss function

**Pointwise Approach:**

In this case it is assumed that each query-document pair in the training data has a numerical or ordinal score. Then learning-to-rank problem can be approximated by a regression problem given a single query-document pair, predict its score.

**List wise Approach:**

These algorithms try to directly optimize the value of one of the above evaluation measures, averaged over all queries in the training data. This is difficult because most evaluation measures are not continuous functions with respect to ranking model's parameters, and so continuous approximations or bounds on evaluation measures must be used.

**Pairwise Approach:**

In this case learning-to-rank problem is approximated by a classification problem learning a binary classifier that can tell which document is better in each pair of documents. The goal is to minimize average number of inversions in ranking.