

Test-plan

Value-based recommendation

1 Formulation

For each article A_i in our database we know its 3 properties:

1. v_i^1 is a vector of its graph-representation:

Let (V^1, E^1) be the coviewership graph. Here V^1 represents the set of graph-embeddings of all nodes (articles) v^1 , and E^1 represents set of all edges connecting those nodes. d_{ij}^1 's be the distance between v_i^1 and v_j^1 .

2. v_i^2 is a vector of its sentence embedding:

Let (V^2, E^2) be the similarity graph. As above, d_{ij}^2 's be the distance between v_i^2 and v_j^2 .

3. c_i is the value associated with that article

So, each article A_i is represented by this triad $\{v_i^1, v_i^2, c_i\}$. Although, this is a very general formulation. For the sake of simplicity, for now we will just assume that each article is characterized by its sentence embedding and its value.

In this work, we will use Healthline content recommendation as a setting usecase to demonstrate our idea.

Problem Statement:

Now, the problem statement is:

Given that a user is reading an article A_i , what article must be recommended next so that we

1. maximize the content relevance to the user
2. maximize the ad-monetary value.

Mathematically, given A_i , we seek A_j such that:

$$j = \arg \max_J \phi(A_i, A_J),$$

where ϕ is the utility function. This above formulation is mainly for our *Read Next* pages, but it could be easily extended to *Infinite scroll*.