Multi-directional interest propagation in ontology based UM

Goal

The goal is to address the cold-start and the sparsity problem in recommender systems, by allowing interest propagation from a small number of initial concepts to other related domain concepts.

Multi-directional Propagation

We propose a multi-directional propagation process taking into account:
1. ontological structure of the domain
2. type and the amount of feedbacks
3. context-dependance, that allows to change the propagation according to various contexts for specific applications;
4. ontology modification support, i.e. the possibility to add or remove a node in the ontology.

Properties

The propagation algorithm is built to allow:
1. The possibility of isolating every node contribute
2. A balanced propagation ratio from every node
3. The possibility of modifying the ontology without losing information

Evaluation

For this test we collected a total of 7854 ratings and calculated Spearman’s rank correlation ρ coefficient for 231 pairs of lists (list obtained from half of the user’s ratings vs list generated on the basis of the other half).

Downward propagation and Upward propagation: We compare this new approach which our older approach that propagates only vertically. In both cases the multi-directional approach works much better.

After 34 user feedbacks: We were able to generate the lists with ρ ≥ 0.5 in 61% of the cases and ρ ≥ 0.7 in 34% of the cases. We had no cases with a moderate or severe inverse correlation with the user preference and just 3.5% of cases with negative ρ.

Future Developments

- Integration with properties propagation
- Semantic Relationships correction
- Short/Long term interests

References:

