DATA.ML.360, Assignment 2b

Optimizing Group Recommendations: Our Proposal

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Kendall Tau Distance and Disagreement

- Kendall tau distance is a metric that counts the pairwise disagreements of two rankings.
  - It is the number of pairs that are in different order in the two rankings.
  - $\tau_{A,B}$ is the Kendall tau distance between rankings A and B.
- **Disagreement** captures the differences in the item ratings between group members.
- We have defined disagreement to be large when users have very large Kendall tau distance difference, and small when they are very close to each other.
- Now disagreement d for movie ranking R and users' personal movie suggestion rankings M_u of user u in the group g is defined as follows:

$$d_R = \max_{u \in g}\left(\tau_{R,M_u}\right) - \min_{u \in g}\left(\tau_{R,M_u}\right)$$

Kemeny-Young Method

- Finds optimal order of recommendations. Logic is as follows:

1. Generate a permutation of the order of the items (movies) in the group recommendations.
2. Calculate the Kendall tau distance between the permutation and the group members' rankings.
3. Sum the Kendall tau distances (calculated at step 2) for all group members.
4. Repeat steps 1-3 for all permutations.
5. Choose the permutation that minimizes the sum of Kendall tau distances. This is now the optimal aggregation order.

Our Proposal I

- Modify Kemeny-Young to minimize our disagreement metric.
- Now our aggregation method:
    1. Find the movies that are in all users' recommendations and find the common ones.
    2. From all the movie permutations, find the one which minimizes disagreement defined above.
    3. This is now the group movie recommendations, where the disagreement between users is the smallest.

Our Proposal II

- Our method takes disagreement into account, unlike the previous methods.
  - Average: some like, others may not.
  - Least Misery: nobody hates or loves.
- Thus, the resulting group recommendations are both:
  1. movies recommended to the users (they are predicted to like them), and
  2. movies for which their opinions align best with each other.
- Please see our repository and README.md for futher details.