

Incorporating Disagreements In Group Recommendations

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Optimal Aggregation

1. For N items, find all $N!$ ordering of items
2. Calculate total Kendall τ distance for each of the $N!$ sortings.
3. Choose the sorting with minimum total τ distance

The optimal algorithm is NP-Hard.

Kendall tau Distance

- The number of pairwise disagreements

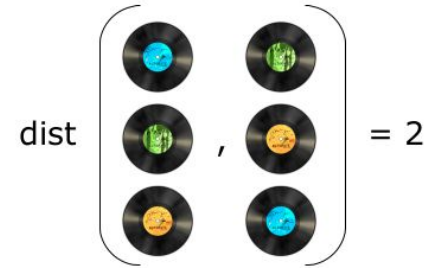


Fig. 1. Kendall τ distance definition.

From course Lecture series, Lecture
04 Group Recommendations

Hill Climbing Optimization

Hill Climbing proposes a greedy heuristic to find a local optimum for a problem.

Implementation (Pseudo Code)

Initialization

```
def hill_climbing_optimization(users_movie_orderings):  
    current_ordering = get_random_ordering_of_movies()  
    current_distance = total_tau_distance(current_ordering, users_movie_orderings)  
  
    best_distance = +INF
```

Adjacents

```
    while current_distance < best_distance:  
        best_distance = current_distance  
        for adjacent_ordering in get_adjacent_orderings(current_ordering):  
            adjacent_distance = total_tau_distance(adjacent_ordering, users_movie_orderings)  
            if adjacent_distance < current_distance:  
                current_distance = adjacent_distance  
                current_ordering = adjacent_ordering
```

Optimization

```
    return current_ordering, current_distance
```

Results

Users' Ranked Movie Lists

[260, 2762, 1219, 32, 5952]
[2762, 1219, 32, 5952, 260]
[2762, 5952, 32, 260, 1219]
[1219, 260, 5952, 2762, 32]
[32, 260, 1219, 5952, 2762]
[1219, 260, 2762, 32, 5952]
[260, 32, 1219, 5952, 2762]
[1219, 5952, 32, 260, 2762]
[2762, 1219, 32, 260, 5952]
[2762, 32, 260, 1219, 5952]

- Average Aggregation -

[260, 1219, 32, 2762, 5952]

Total Kendall τ distance: 42

- Least Misery Aggregation -

[1219, 260, 32, 2762, 5952]

Total Kendall τ distance: 42

- Hill Climbing -

[260, 1219, 2762, 32, 5952]

Total Kendall τ distance: 38

Any Questions?

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