

4-1: Introduction to User-User Collaborative Filtering

Introduction to Recommender Systems

Historical Reflection ...

- 1992: Tapestry and seeds of ACF
- 1994-1995 Early Automated CF Systems
 - GroupLens
 - Ringo/HOMR
 - Video Recommender

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Learning Objectives

- To understand the intuition and history of the user-user collaborative filtering algorithm
- To review the basic ideas and assumptions (and therefore limitations) behind the algorithm.

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Common Characteristics

- Collection of Ratings
- Measure of Inter-User Agreement
 - Correlation, Vector Cosine
- Personalized Recommendations/Predictions
 - Weighted Combinations of Others' Ratings
- Tweaks to make things work right ...
 - Neighborhood limitations
 - Normalization
 - Dealing with limited co-ratings

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Implementation Issues

- Given m users and n items:
 - Computation can be a Bottleneck
 - Correlation between two users is $O(n)$
 - All correlations for a user is $O(mn)$
 - All pairwise correlations is $O(m^2n)$
 - Recommendations at least $O(mn)$
 - Lots of ways to make more practical
 - More persistent neighborhoods ($m \rightarrow k$)
 - Cached or incremental correlations

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So What Happened?

- GroupLens \rightarrow Net Perceptions \rightarrow GroupLens
- RINGO \rightarrow Agents Inc. \rightarrow Firefly Networks
- Industry Acceptance of ACF
 - Pressure to innovate more efficient algorithms

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Core Assumptions/Limitations

- Why does this work?
 - Let's break it down ...
- Assumption: Our past agreement predicts our future agreement
 - Base Assumption #1: Our tastes are either individually stable or move in sync with each other
 - Base Assumption #2: Our system is scoped within a domain of agreement

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Moving Forward

- Next Lectures
 - Breaking down the core algorithm
 - Tuning and tweaks: normalization, neighborhood size, and more
- Later this Module
 - Explanations, trust, reputation
 - Programming user-user CF

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