

MARKET BASKET ANALYSIS

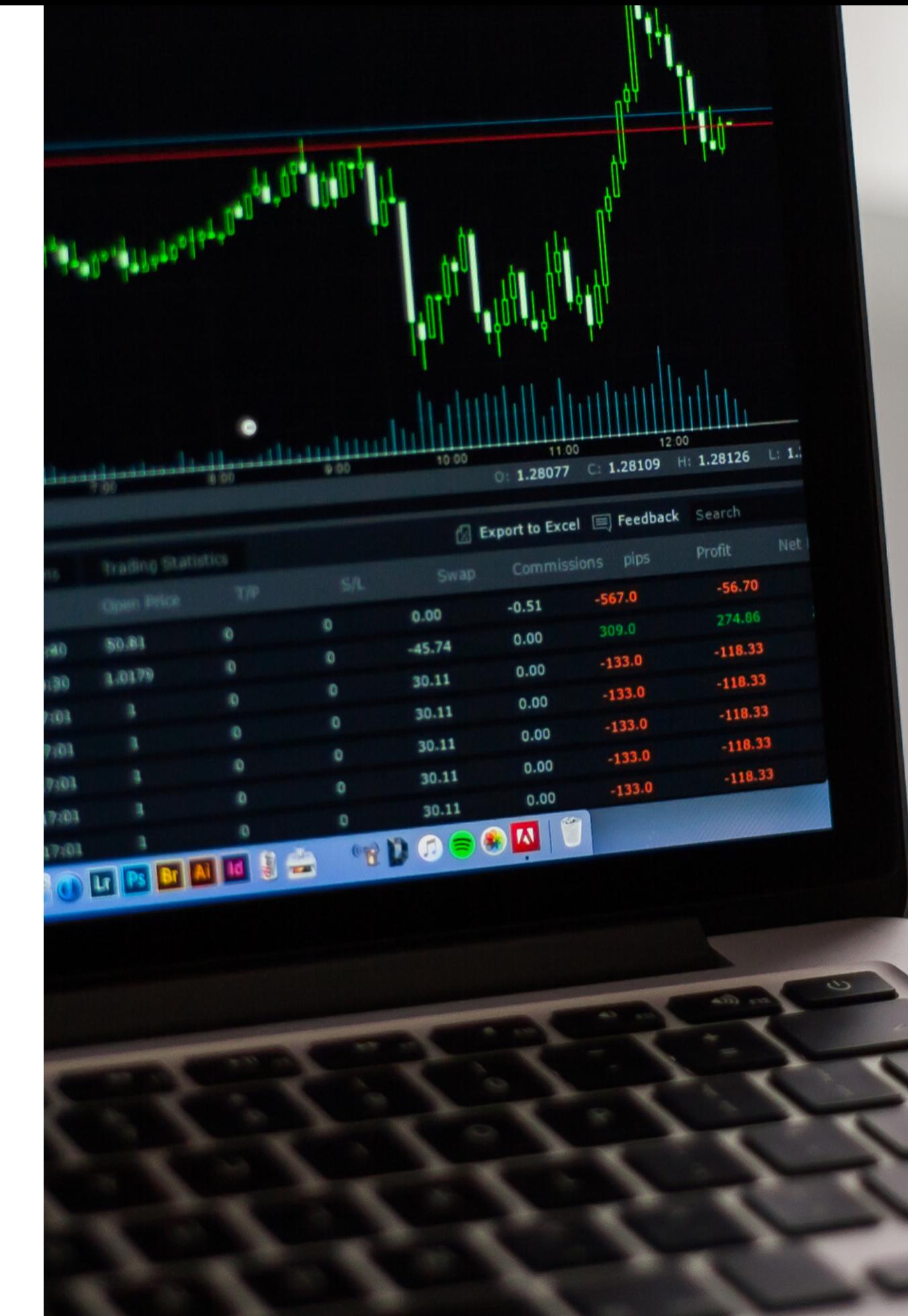
Increasing profitability through purchasing patterns



IN A VERY GENERAL WAY, RECOMMENDER SYSTEMS ARE ALGORITHMS AIMED AT SUGGESTING RELEVANT ITEMS TO USERS

basically these algorithms uncover associations between items

To experiment with recommendation algorithms, you'll need data that contains a set of items and a set of users who have reacted to some of the items.



APRIORI ALGORITHM IS A CLASSICAL ALGORITHM IN DATA MINING. IT IS USED FOR MINING FREQUENT ITEMSETS AND RELEVANT ASSOCIATION RULES.

PARAMETERS:
- CONFIDENCE
- SUPPORT
- LIFT

STRONG RULES



Best-Sellers: iPhone Apple Care, AirPods, Apple Lightning Cable, EarPods, Samsung 850 EVO

Strongest Rules:

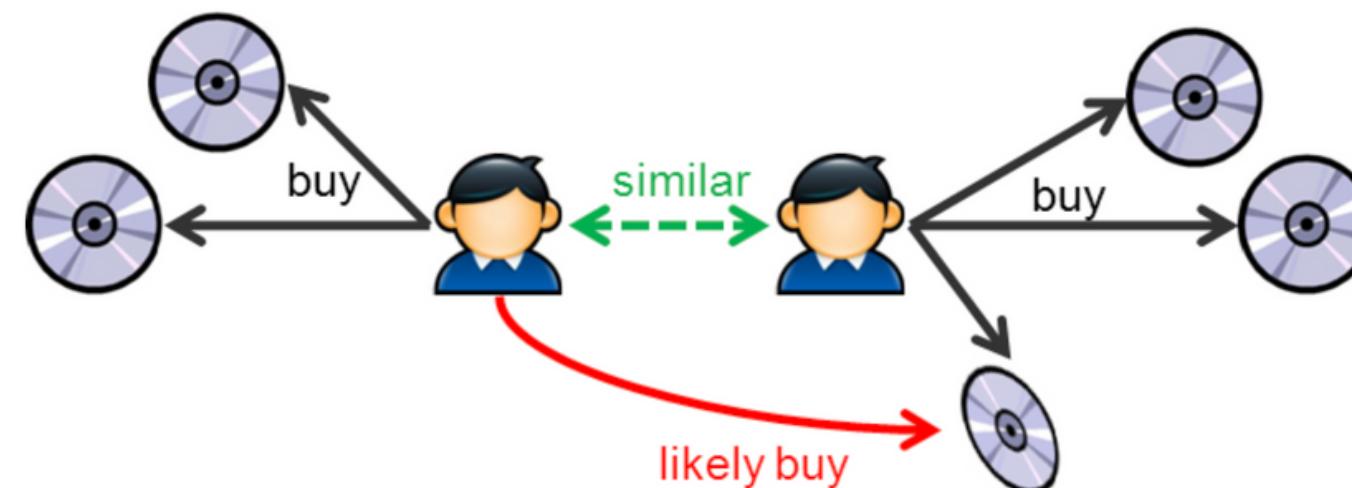
- Apple Pencil and Apple Tips and iPad case
- iPad Pro and Apple Pencil
- Apple Magic Keyboard and Magic Mouse
- Lightning Cable and USB Power

...but how is this relevant?

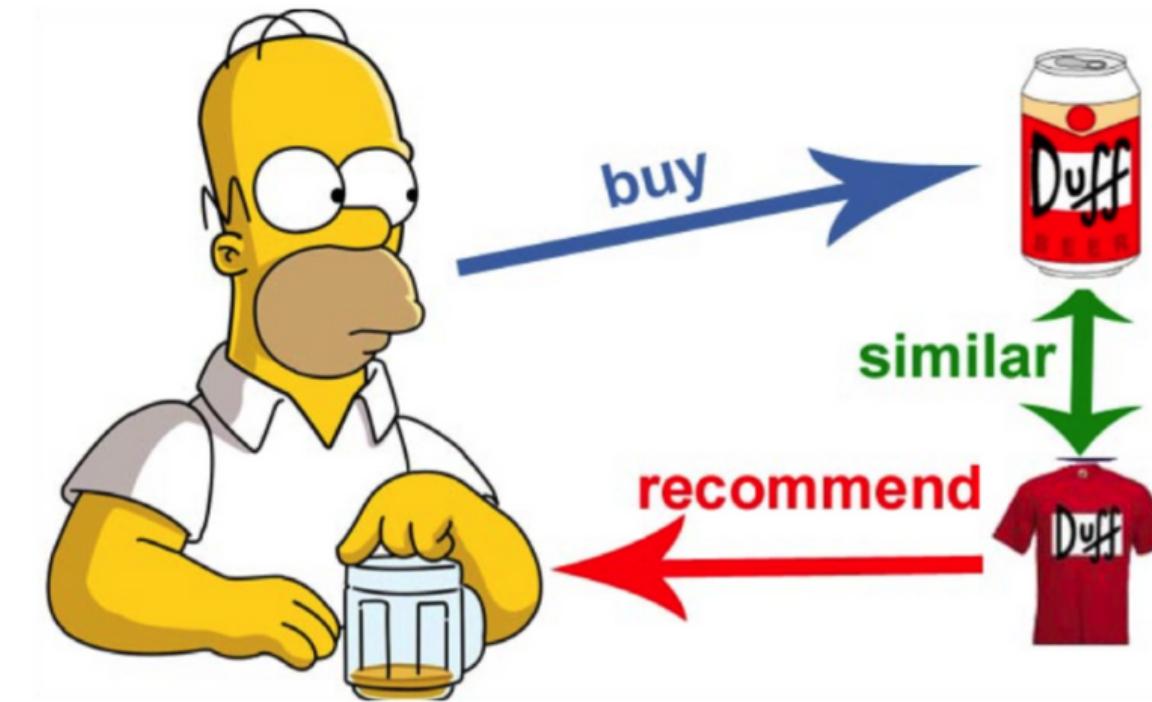


COLLABORATIVE VS. CONTENT BASED

USER BASED CF



ITEM BASED CF



CONTENT-BASED APPROACH REQUIRES A GOOD AMOUNT OF INFORMATION OF ITEMS' OWN FEATURES, RATHER THAN USING USERS' INTERACTIONS AND FEEDBACKS. **COLLABORATIVE FILTERING**, ON THE OTHER HAND, DOESN'T NEED ANYTHING ELSE EXCEPT USERS' HISTORICAL PREFERENCE ON A SET OF ITEMS. BECAUSE IT'S BASED ON HISTORICAL DATA, THE CORE ASSUMPTION HERE IS THAT THE USERS WHO HAVE AGREED IN THE PAST TEND TO ALSO AGREE IN THE FUTURE.



RECOMMENDERLAB

The package allows to create evaluation schemes following accepted methods and then use them to evaluate and compare recommender algorithms.

PROBLEMS AND POSSIBLE SOLUTIONS

Hybrid recommender systems combine two or more recommendation strategies in different ways to benefit from their complementary advantages.

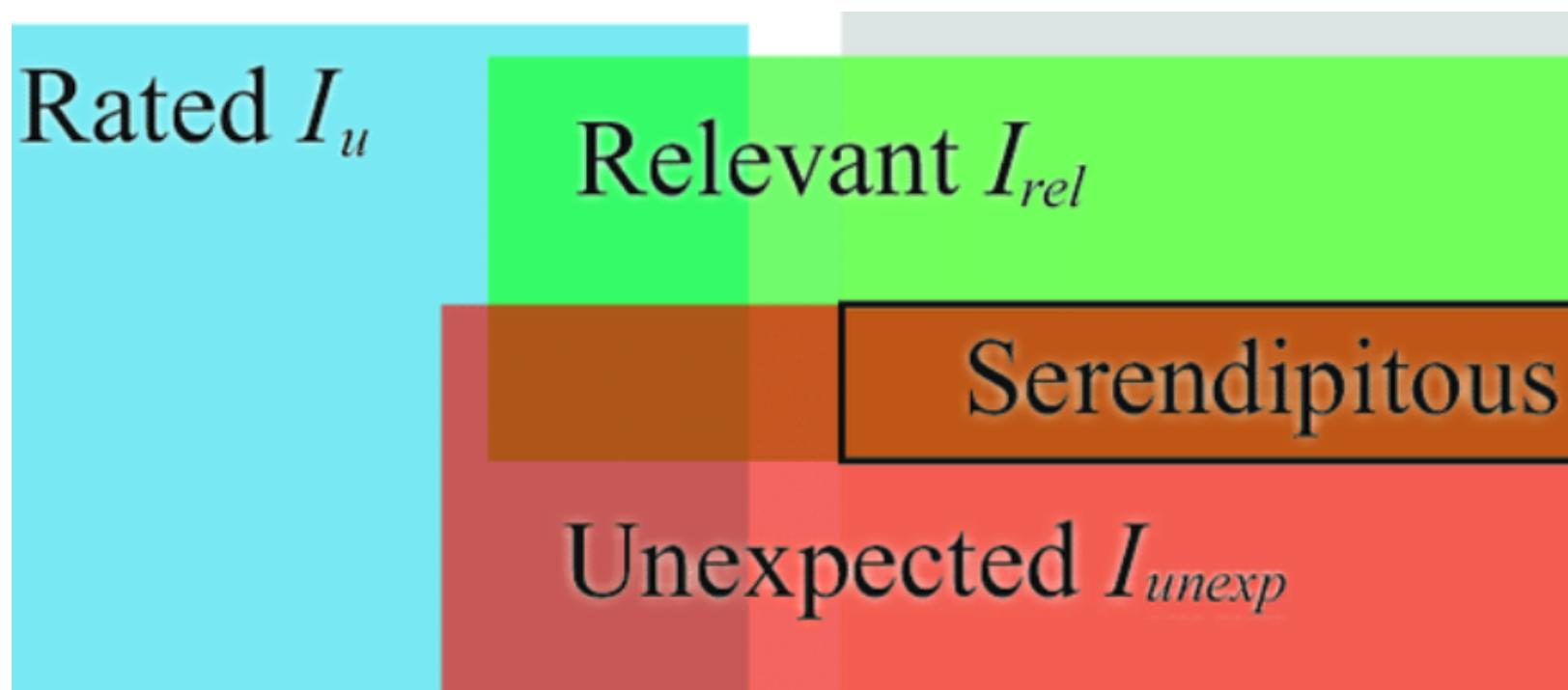
Problems	Possible Solutions
Cold-Start	Use association rule mining on item or user data to find relations which can compensate the lack of ratings. Mathematical constructs for feature extraction and combination of different strategies can also be used.
Sparsity	Use the few existing ratings or certain item features to generate extra pseudo ratings. Experiment with Matrix Factorization or Dimensionality Reduction.
Accuracy	Use Fuzzy Logic or Fuzzy Clustering in association with CF. Try putting together CF with CBF using Probabilistic Models, Bayesian Networks or other mathematical constructs.
Scalability	Try to compress or reduce the datasets with Clustering or different measures of similarity.
Diversity	Try modifying neighborhood creation by relaxing similarity (possible loss in accuracy) or use the concept of experts for certain item tastes.

HOW HYBRID RSS OVERCOME COMMON TROUBLES

Cold-start was the most acute problem that was found. Hybrid RSs try to overcome the lack of ratings by combining CF or other recommendation techniques with association rules. **Data sparsity** is also a very frequent problem in the field of RSs. Hybrid approaches try to solve it by combining several matrix manipulation techniques with the basic recommendation strategies. They also try to make more use of item features, item reviews, user demographic data or other known user characteristics.

SERENDIPITY

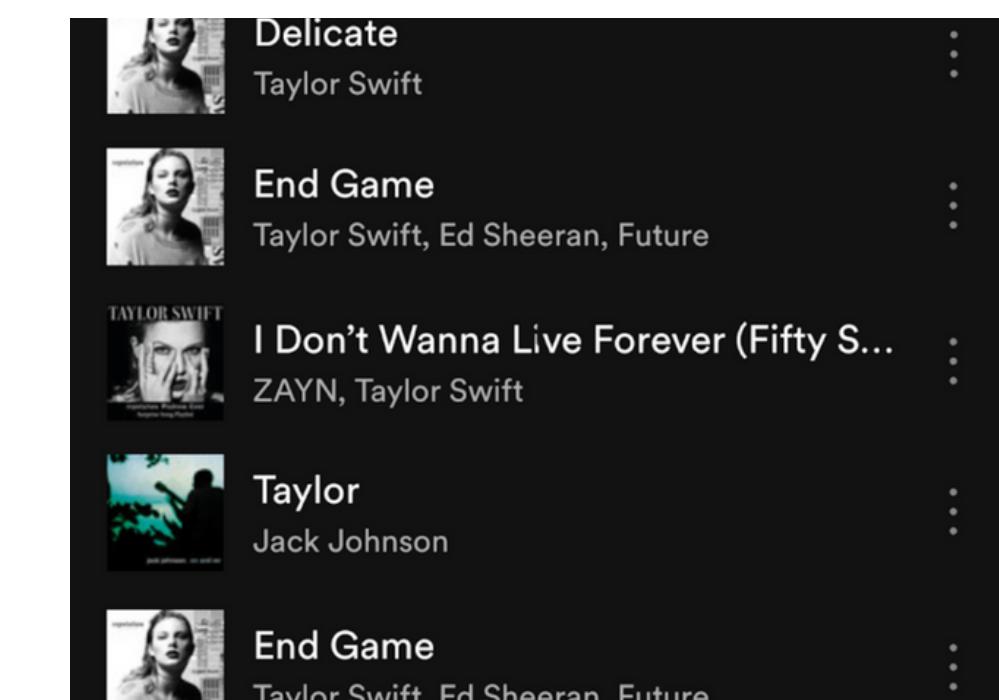
The notion of “serendipity” is often used to express the tendency a model has or not to create such a confinement area (diversity of recommendations).



Anti-Flood: Penalise the second and third recommendations if they have the same similarity scores to the top recommendation.

Dithering: Add a wildcard recommendation to create interesting new data points for the recommendation system to keep learning about other content.

Explainability is another key point of the success of recommendation algorithms. Indeed, it has been proven that if users do not understand why they had been recommended as specific item, they tend to loose confidence into the recommender system.



CONCLUSION

1

PROBLEM RECOGNITION

2

INFORMATION SEARCH

3

EVALUATION OF ALTERNATIVES

4

PURCHASE DECISION

5

POST PURCHASE BEHAVIOUR

**ANALYZING
CUSTOMER BEHAVIOR
BY ASSOCIATING
PURCHASES WITH
DEMOGRAPHIC AND
SOCIO-ECONOMIC
DATA.**

The package allows to create evaluation schemes following accepted methods and then use them to evaluate and compare recommender algorithms.