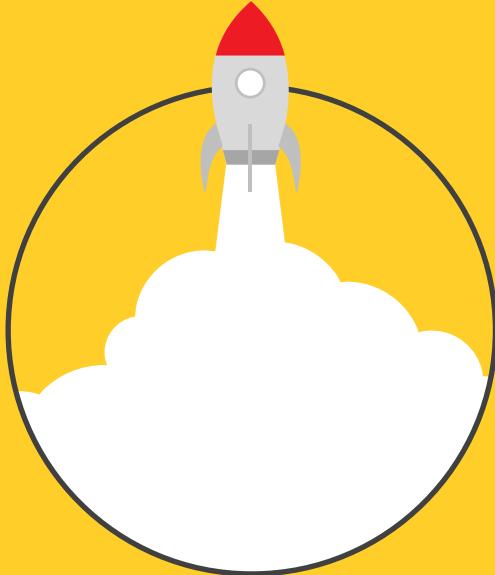


Enhancing customer experience



By- Sudhanshu Saxena



Association Rule Mining

What is Association Rule Mining

Association rule mining finds interesting associations and relationships among large sets of data items.

Association rule can be assumed as :

- If and then relationship
- Generating rules for patterns
- Its not Causality
- It's a method of studying the co-occurrences



Difference Between Correlation and Causality

Correlation suggests an association between two variables. Causality shows that one variable directly effects a change in the other. Although correlation may imply causality, that's different than a cause-and-effect relationship.



Cardinality

The cardinality is way to define the relationship between two entity in a data model.

Cardinality is of many types :

- one-to-one
- optional on one side one-to-one
- one-to-many
- many-to-many



Breaking down Association Rules

An association rule has 2 parts:

- **an antecedent (if) and**
- **a consequent (then)**



“If a customer buys A, he’s 75% likely of buying B.”

In the above association rule, A is the antecedent and B is the consequent.



A yellow slide background featuring a white illustration of a rocket ship launching from a base of white clouds. The rocket has a red pointed nose cone, a white body with a grey stripe, and two grey fins on its side. It is positioned on the left side of the slide.

Getting into Association Rule Mining

- Support
- Confidence
- Lift

Support in Association Rule

- The number of transactions that include items in the {X} and {Y} parts of the rule as a percentage of the total number of transaction. It is a measure of how frequently the collection of items occur together as a percentage of all transactions.

$$\text{Support} = \frac{\text{frq}(X,Y)}{N}$$

An indication of how frequent the itemset appears in the dataset



Confidence in Association Rule

It is the ratio of the no of transactions that includes all items in {B} as well as the no of transactions that includes all items in {A} to the no of transactions that includes all items in {A}.

$$\text{Confidence} = \frac{\text{frq}(X,Y)}{\text{frq}(X)}$$

An indication of how often the rule has been found to be true



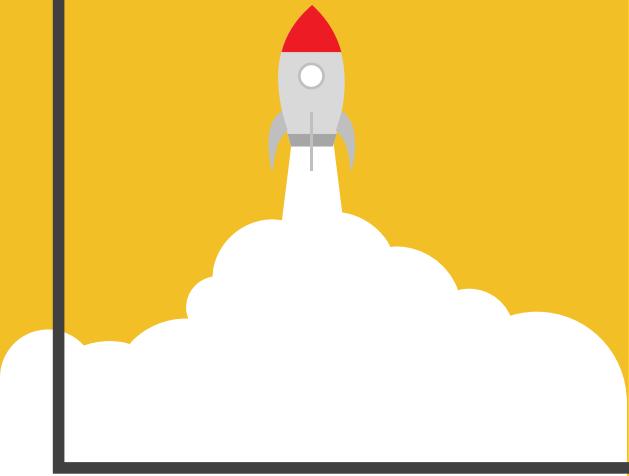
Lift in Association Rule

The lift of the rule $X \Rightarrow Y$ is the confidence of the rule divided by the expected confidence, assuming that the item sets X and Y are independent of each other. The expected confidence is the confidence divided by the frequency of $\{Y\}$.

$$\text{Lift} = \frac{\text{Support}}{\text{Supp}(X) \times \text{Supp}(Y)}$$

Greater lift values (>1) indicate stronger associations between X and Y and they depend on one another

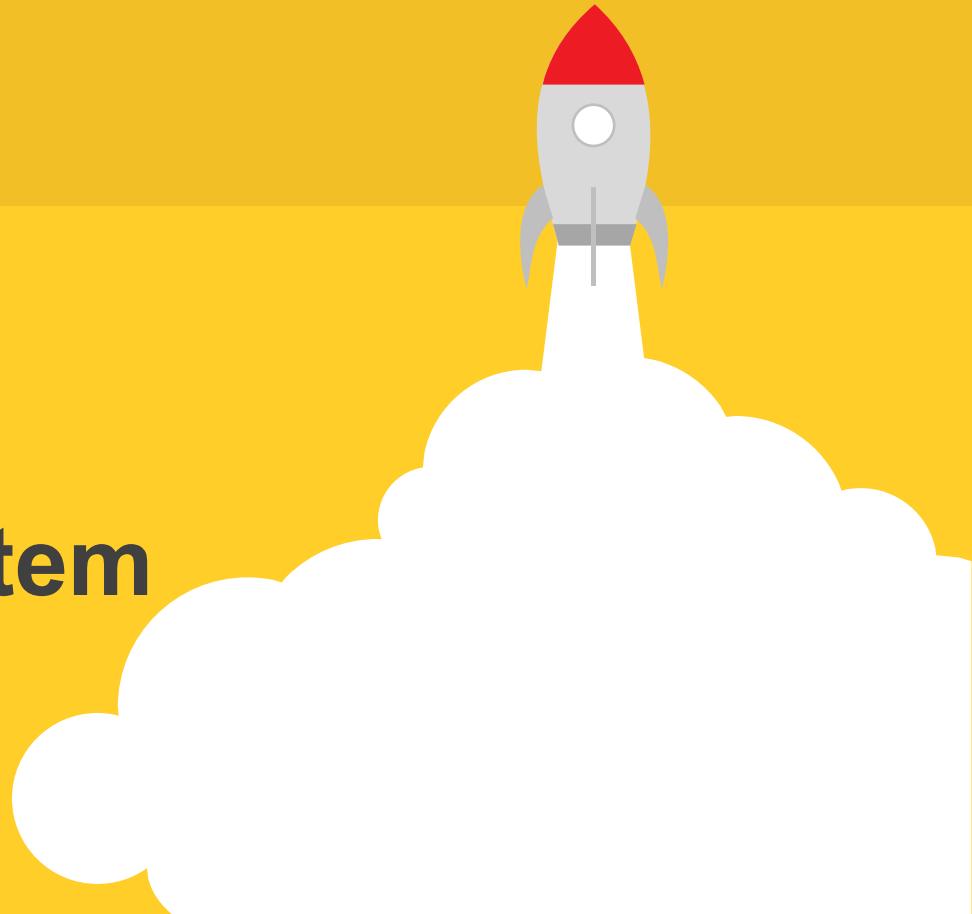




Recommender system

Recommender system

Application of association rules Mining



Why Recommendation Systems

Value for the Business

- Identifying patterns
- Enhancing user experience
- Fetching out relevant information
- More revenue \$\$\$

Value for the customer

- Find things that are interesting
- Narrow down the set of choices
- Explore the space of options
- Discover new things
- Entertainment

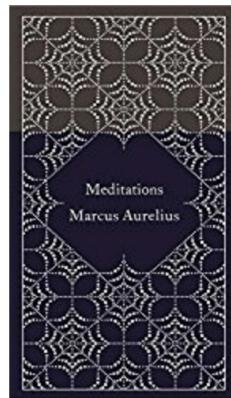


RECOMMENDED READING

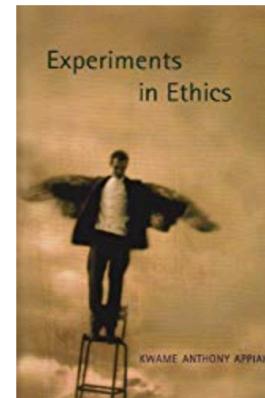
Book Recommendations

For anyone out there looking for a good book to read, these ones all changed the way I look at things.

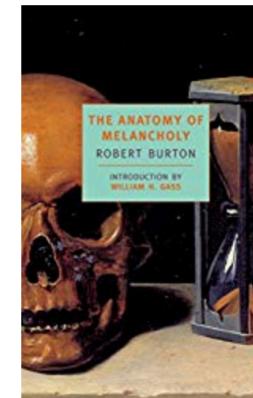
Meditations
(A Penguin Classics
Hardcover)



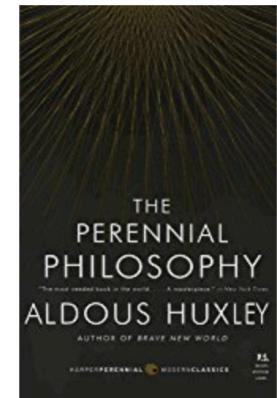
Experiments in Ethics
(Mary Flexner Lectures of
Bryn Mawr College)



The Anatomy of Melancholy
(New York Review Books
Classics)



The Perennial Philosophy



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RECOMMENDED MOVIES

The Bourne Legacy

134 min 2012 13+ CC

The Bourne Legacy takes the action-packed Bourne series to an explosive new level. On the verge of having their conspiracy exposed, members of the government's intelligence community will stop at nothing to erase all evidence of their top secret programs — even the agents involved. Aaron Cross (Jeremy Renner) must use his genetically-engineered skills to survive the ultimate game of cat-and...

Director	Tony Gilroy
Starring	Jeremy Renner, Rachel Weisz, Edward Norton
Genres	Drama, Action
Subtitles	አማርኛ, Dansk, English [CC], Español, Suomi, हिन्दी, 한국어, Norsk Bokmål, Nederlands, Português, Svenska
Audio Languages	Deutsch, English, Español (España), Español (Latinoamérica), Français, Italiano, Polski, Português, Türkçe, हिन्दी



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Customers Also Watched



RECOMMENDED PRODUCTS

Customers who viewed this item also viewed

Page 1 of 7



Apple iPhone XR (64GB) -
White

★★★★★ 136
₹ 69,999.00 ✓prime



Apple iPhone XR (64GB) -
Black

★★★★★ 136
₹ 69,999.00 ✓prime



Apple iPhone Xs (64GB) -
Gold

★★★★★ 132
₹ 99,900.00 ✓prime



Apple iPhone Xs (64GB) -
Space Grey

★★★★★ 132
₹ 99,900.00 ✓prime



Apple iPhone 8 Plus
(64GB) - Space Grey

★★★★★ 390
₹ 67,990.00 ✓prime



Apple iPhone Xs (64GB) -
Silver

★★★★★ 132
₹ 99,900.00 ✓prime



Apple iPhone XR (64GB) -
Coral

★★★★★ 136
₹ 69,999.00 ✓prime

What other items do customers buy after viewing this item?



Redmi 6A (Black, 2GBRAM, 16GB Storage)

★★★★★ 22,549
₹ 5,999.00 ✓prime

System Preferences

RECOMMENDED VIDEOS



Narendra Modi Recommended channel for you

SUBSCRIBE 2M



PM Shri Narendra Modi's exclusive interview to...

Narendra Modi ✓
387K views • 3 days ago



Why TDP government in AP doesn't want to complete...

Narendra Modi ✓
464 views • 3 hours ago



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Narendra Modi ✓
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ICN Studio ✓
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Cars Overview
1.7M views • 4 months ago



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MercBenzKing ✓
74K views • 2 weeks ago



par...
yahan
mein
PIGHAL
gaya...

makhan malai SUV (IMB) it's me Bishnoi

it's me BISHNOI
170K views • 1 week ago



2019 Aston Martin CAR FACTORY - PRODUCTION

GommeBlog.it: Car & Perform...
95K views • 5 days ago

iTunes

Recommender Systems

Application areas



ALTERNATIVE PRODUCTS

Beko Washing Machine
Code: WMB81431LW
£269.99

Zanussi Washing Machine
Code: ZWH6130P
£269.99

Blomberg Washing Machine
Code: WNF6221
£299.99



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London, England

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Read Commented Recommended

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There Is Almost No Gold In The Olympic Gold Medal

MOST POPULAR RECOMMENDED

How to Break NRA's Grip on Politics: Michael R. Bloomberg +

Growth in U.S. Slows as Consumers Restraine Spending +

A recommender system is traditionally composed of:

Users : People in the system who have preferences for items and people who can be source of data as well are called Users

Items : Products the system is choosing to recommend are known as Items

Preferences : These represent users' likes and dislikes



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MARKET BASKET ANALYSIS

INPUT: list of purchases by purchaser

- do not have names

identify purchase patterns

- what items tend to be purchased together
 - obvious: steak-potatoes; beer-pretzels
- what items are purchased sequentially
 - obvious: house-furniture; car-tires
- what items tend to be purchased by season



Market Basket Analysis

- Categorize customer purchase behavior
- identify *actionable* information
 - purchase profiles
 - profitability of each purchase profile
 - use for marketing
 - layout or catalogs
 - select products for promotion
 - space allocation, product placement

Market Basket Analysis

- Steve Schmidt - president of ACNielsen-US
- *Market Basket Benefits*
 - selection of promotions, merchandising strategy
 - sensitive to price: Italian entrees, pizza, pies, Oriental entrees, orange juice
 - uncover consumer spending patterns
 - correlations: orange juice & waffles
 - joint promotional opportunities

Market Basket Analysis

- Retail outlets
- Telecommunications
- Banks
- Insurance
 - link analysis for fraud
- Medical
 - symptom analysis

Market Basket Analysis

- Chain Store Age Executive (1995)
 - 1) Associate products by category
 - 2) what % of each category was in each market basket
- Customers shop on personal needs, not on product groupings

Possible Market Baskets

Customer 1: beer, pretzels, potato chips, aspirin

Customer 2: diapers, baby lotion, grapefruit juice, baby food, milk

Customer 3: soda, potato chips, milk

Customer 4: soup, beer, milk, ice cream

Customer 5: soda, coffee, milk, bread

Customer 6: beer, potato chips

Co-occurrence Table

	Beer	Pot.	Milk	Diap.	Soda
	Chips				
Beer	3	2	1	0	0
Pot. Chips	2	3	1	0	1
Milk	1	2	4	1	2
Diapers	0	0	1	1	0
Soda	0	1	2	0	2
beer & potato chips - makes sense	milk & soda - probably noise				

Purchase Profiles

beauty conscious	kids' play	convenience food
health conscious	pet lover	women's fashion
sports conscious	gardener	kid's fashion
smoker	automotive	hobbyist
casual drinker	photographer	student/home office
new family	tv/stereo enthusiast	illness (prescription)
illness over-the-counter	seasonal/traditional	personal care
casual reader	homemaker	
home handyman	home comfort	
men's image conscious	fashion footwear	
sentimental	men's fashion	

Purchase Profiles

- **Beauty conscious**
 - cotton balls
 - hair dye
 - cologne
 - nail polish

Purchase Profiles

- Each profile has an **average profit per basket**
 - Kids' fashion \$15.24 **push these**
 - Men's fashion \$13.41
 -
 - Smoker \$2.88 *don't push*
 - Student/home office \$2.55 *these*

Market Basket Analysis

- *Affinity Positioning*
 - coffee, coffee makers in close proximity
- *Cross-Selling*
 - cold medicines, kleenex, orange juice
 - Monday Night Football kiosks on Monday p.m.

Market Basket Analysis

- **LIMITATIONS**
 - takes over 18 months to implement
 - market basket analysis only identifies hypotheses, which need to be tested
 - neural network, regression, decision tree analyses
 - measurement of impact needed
 - difficult to identify product groupings
 - complexity grows exponentially

Market Basket Analysis

- **BENEFITS:**
 - simple computations
 - can be undirected (don't have to have hypotheses before analysis)
 - different data forms can be analyzed

Pros of the Apriori algorithm

- It is an easy-to-implement and easy-to-understand algorithm.
- It can be used on large item-sets.



Cons of the Apriori Algorithm

- Sometimes, it may need to find a large number of candidate rules which can be computationally expensive.
- Calculating support is also expensive because it has to go through the entire database.





Thank you