

A Bilattice-Based Trust Model for Personalizing Recommendations



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RECOMMENDER SYSTEM

DEFINITION:

System that is designed to suggest items to users, given some information about the user's profile. These items can be anything: books, CDs, travel packages, web pages, ...

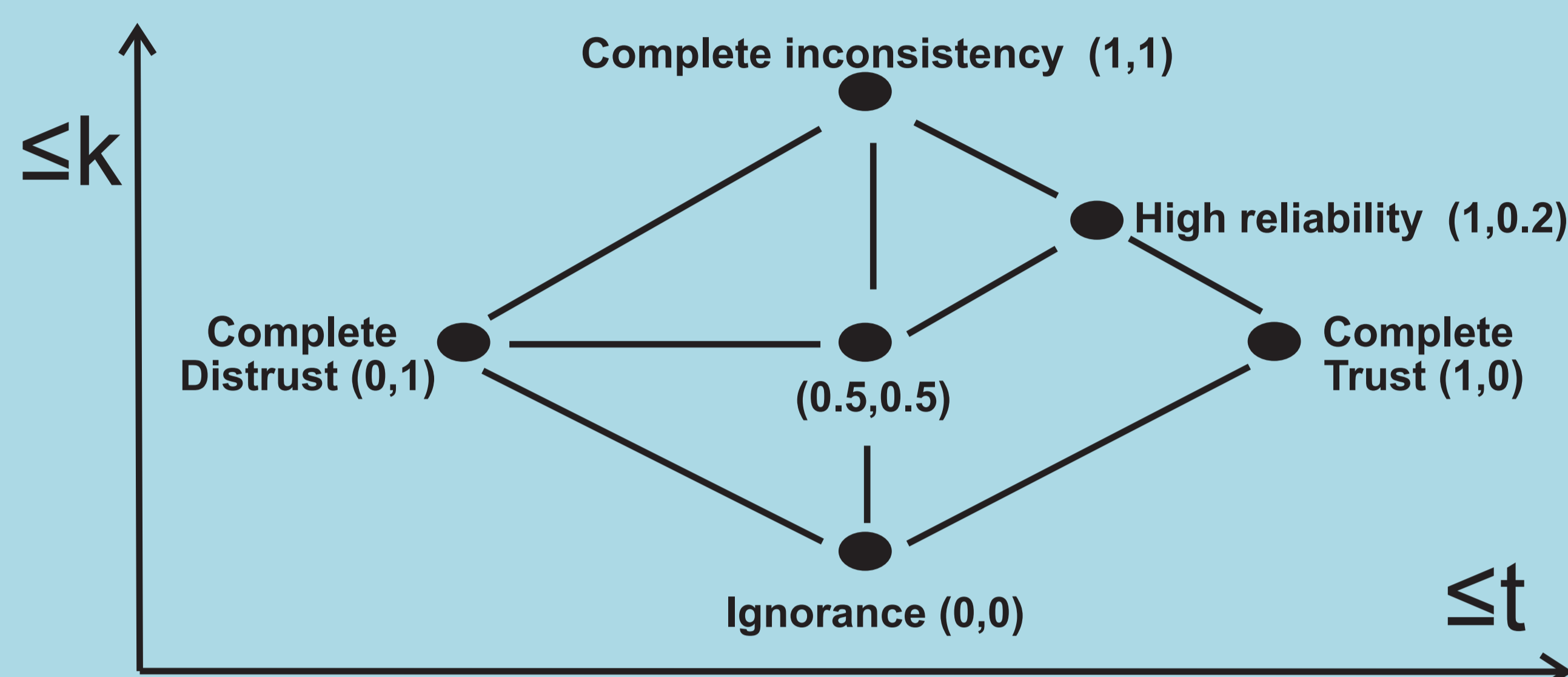
WELL KNOWN EXAMPLES:



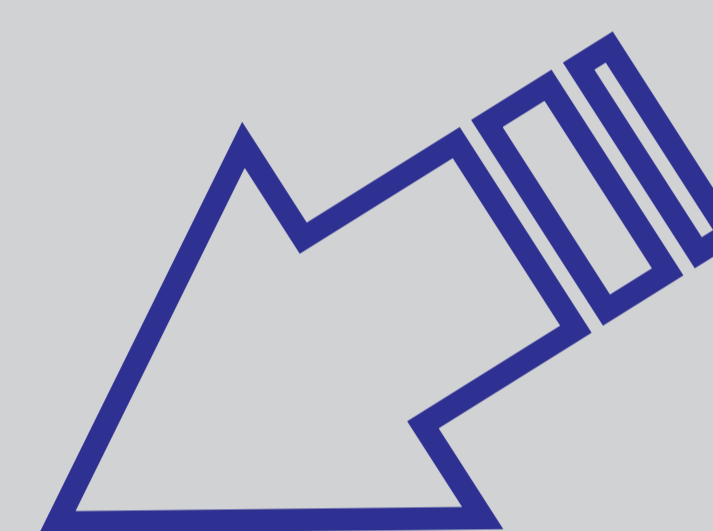
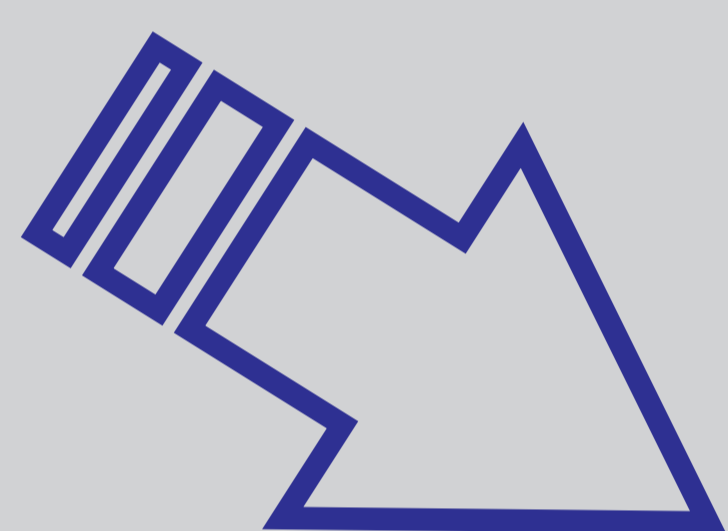
KEY PROBLEMS:

- * Malicious users
- * Sparsity of the dataset
- * Cold start (new) users

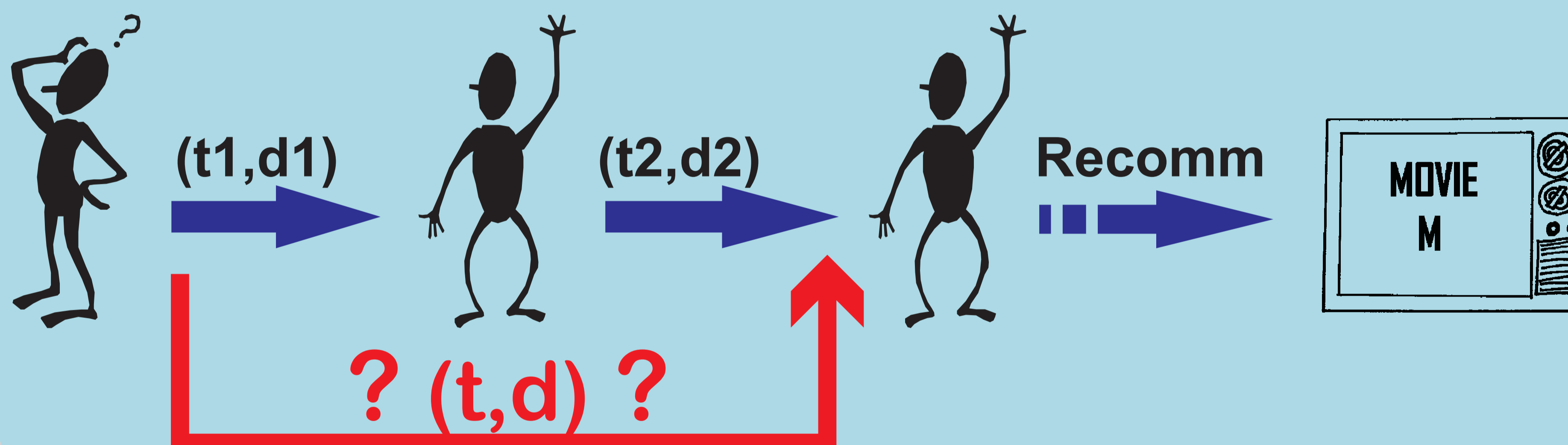
TRUST MODEL



TRUST SCORE SPACE $BL^k = ([0,1]^2, \leq t, \leq k)$



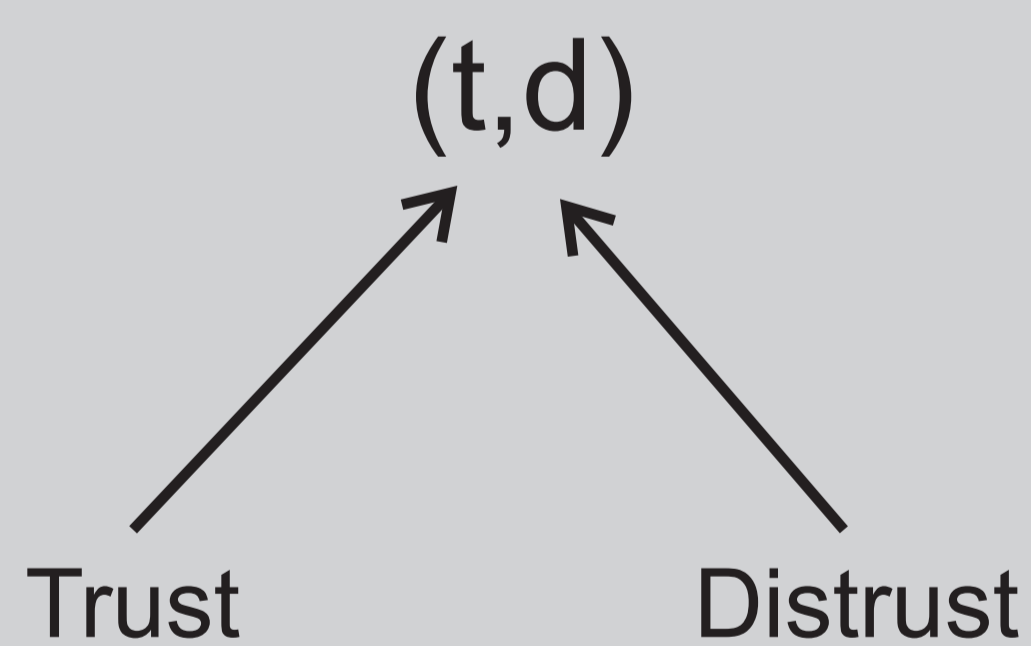
TRUST PROPAGATION



TRUST SCORE PROPAGATION:

Computation of a meaningful trust score for agent a in agent c , given the trust scores for a in agent b , as well as for b in c .

TRUST SCORE



OTHER PROFILES?

- Skeptical
- Paranoid
- Benefit of the doubt
- ...

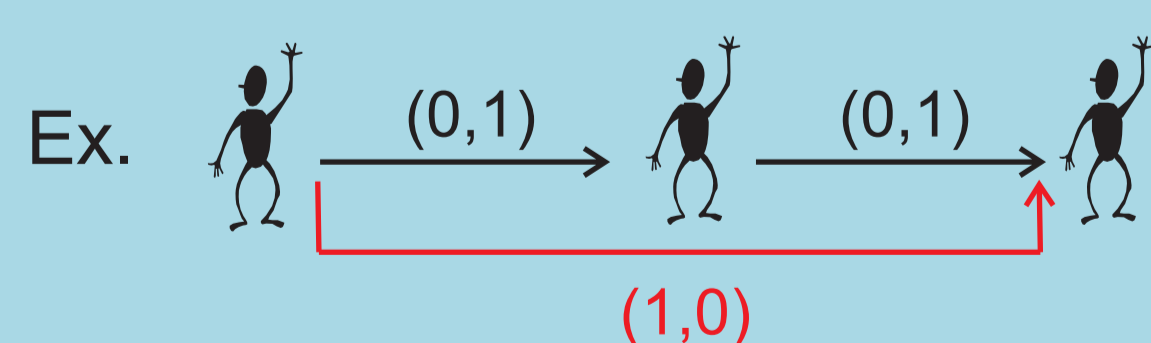
PROFILE 1

- *Friend of your enemy is your enemy
- *Enemy of your enemy is your friend

- c is trusted when a trusts b **and** b trusts c
or when a distrusts b and b distrusts c
 - c is distrusted when a trusts b **and** b distrusts c
or when a distrusts b and b trusts c

$$t = S(T(t1, t2), T(d1, d2))$$

$$d = S(T(t1, d2), T(d1, t2))$$



Conjunction t-norm T :
 $\min(x, y)$,
 $x \cdot y$,
 $\max(x+y-1, 0)$,
 ...

Disjunction t-conorm S :
 $\max(x, y)$,
 $x+y-x \cdot y$,
 $\min(x+y, 1)$,
 ...

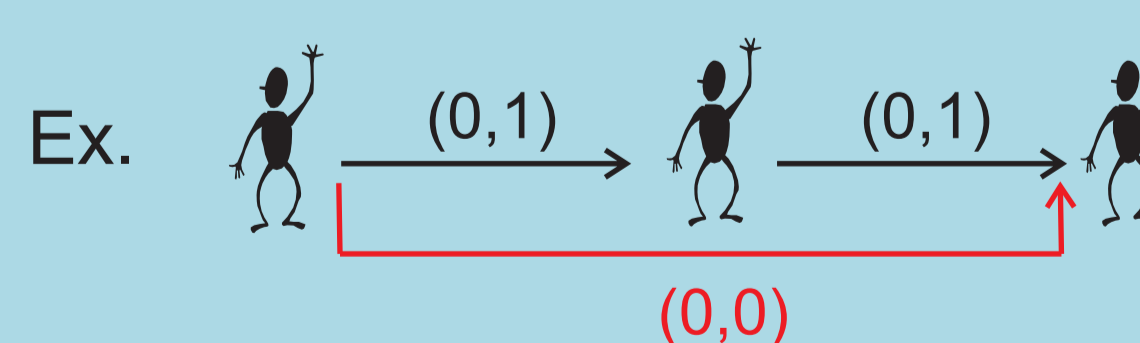
PROFILE 2

- *Friend of your enemy is your enemy
- *Ignore an enemy of an enemy

- c is trusted when a trusts b **and** b trusts c
 - c is distrusted when a trusts b **and** b distrusts c
or when a distrusts b and b trusts c

$$t = T(t1, t2)$$

$$d = S(T(t1, d2), T(d1, t2))$$



EXPERIMENT

Question 1/20: You hear a **complete stranger** talking to his friend: 'Personally, I do not know anything about movie M, but I have just asked **some guy I do not know** if he had seen the movie, and he said he liked M a lot, and greatly recommended it to me'.

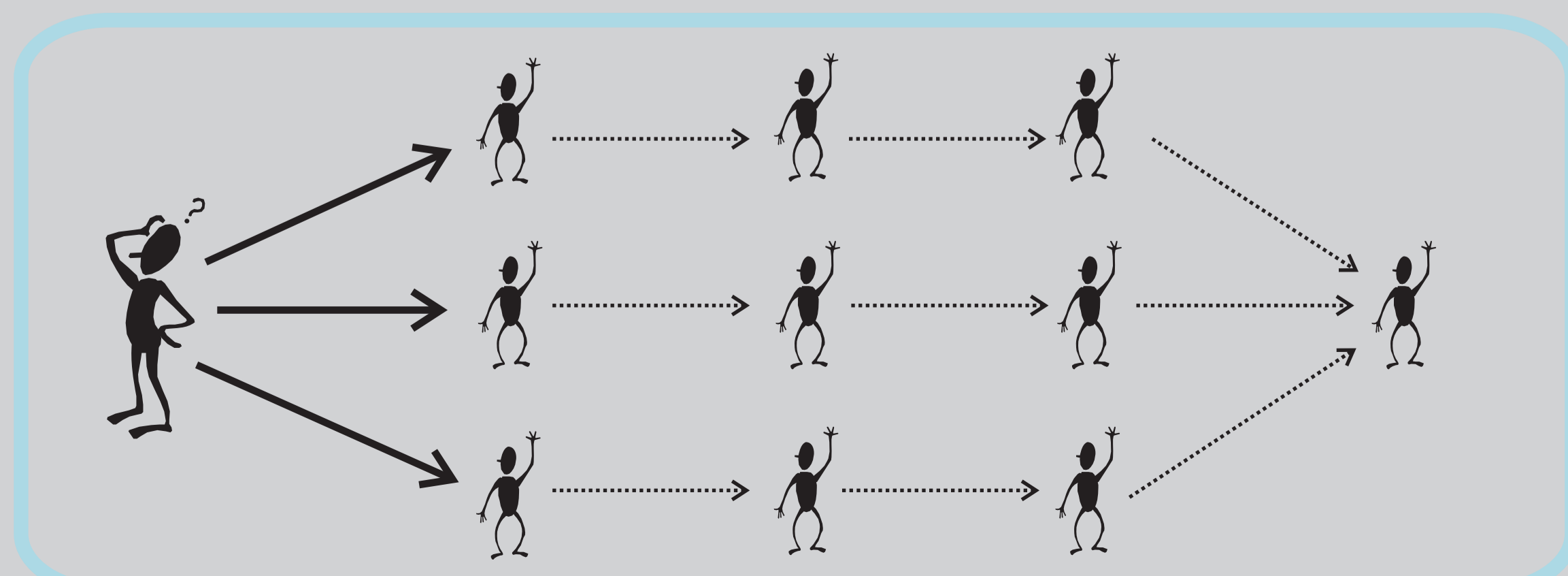
What do you do with this advice?

- Fully accept. You accept the advice wholeheartedly. Unless an even better recommendation comes along, you'll choose M.
- Rather accept. You accept the recommendation as mild (non-compelling) evidence in favour of M. In case this is the only information (about any movie) you obtained, you'd probably go for M.
- Ignore. It doesn't have an influence on your decision whether to watch M or not.
- Rather reject. You don't have much faith in this recommendation; it actually makes M a less attractive alternative.
- Fully reject. You will definitely not watch M.
- Don't know. This recommendation confuses you: it gives you reasons both to see M, and not to see it.

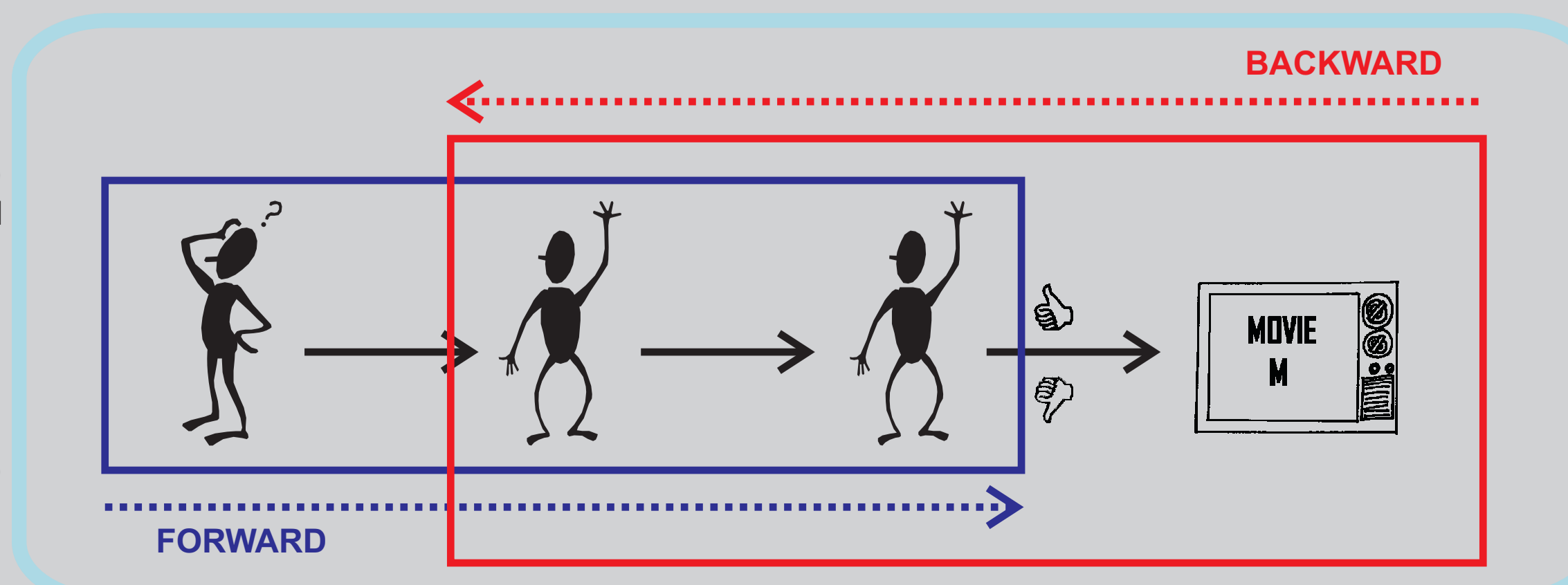
PLEASE PARTICIPATE!

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FUTURE CHALLENGES



AGGREGATION



COMBINATION