Experts in the Neighborhood

Discussion on

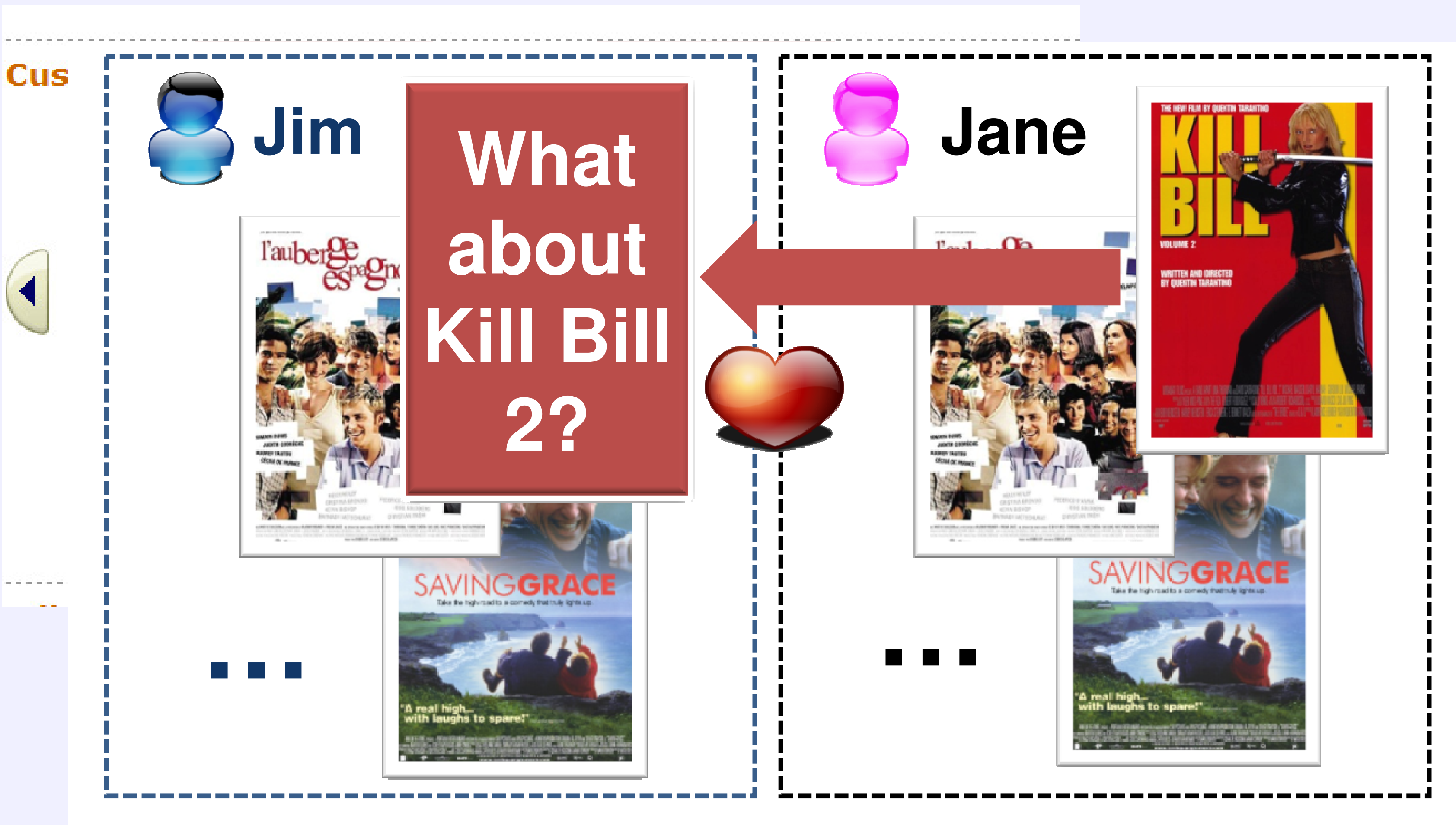
“The Wisdom of the Few” *)

Christoph Pinkel

*) X. Amatrian et al. *The Wisdom of the Few – A Collaborative Filtering Approach on Expert Optinions from the Web*. In *SIGIR* 2009

Recommender Systems

Nearest Neighbor CF

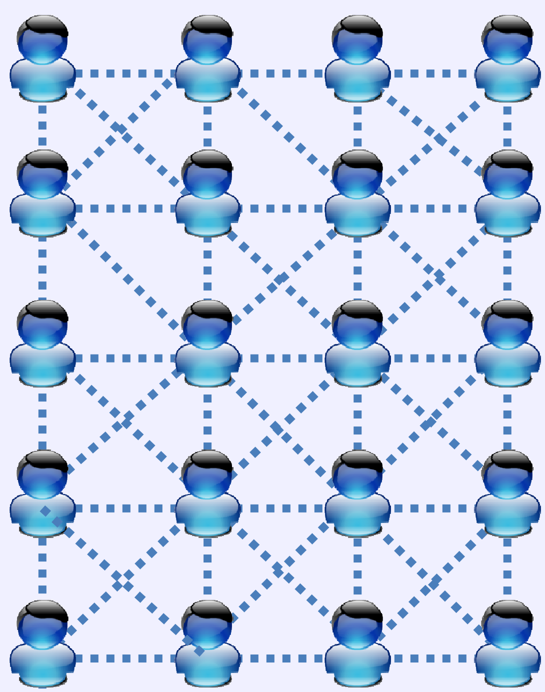


Problems

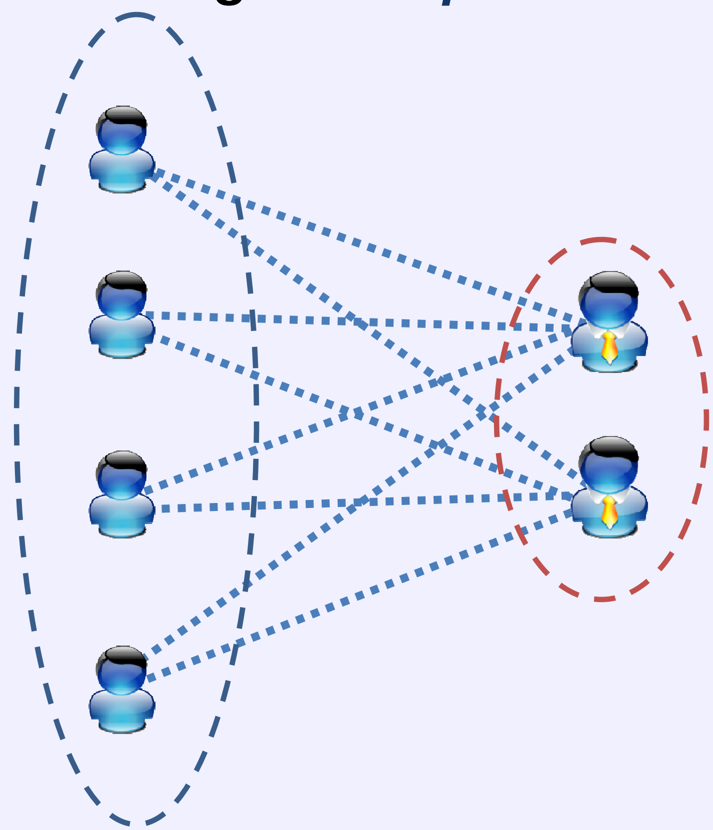
- Cold start problem
- Data sparsity
- Noise (even malicious)
- Scalability
- Privacy

The Wisdom of the Few

Classical Nearest Neighbor Collaborative Filtering



Nearest Neighbor Collaborative Filtering *with experts*



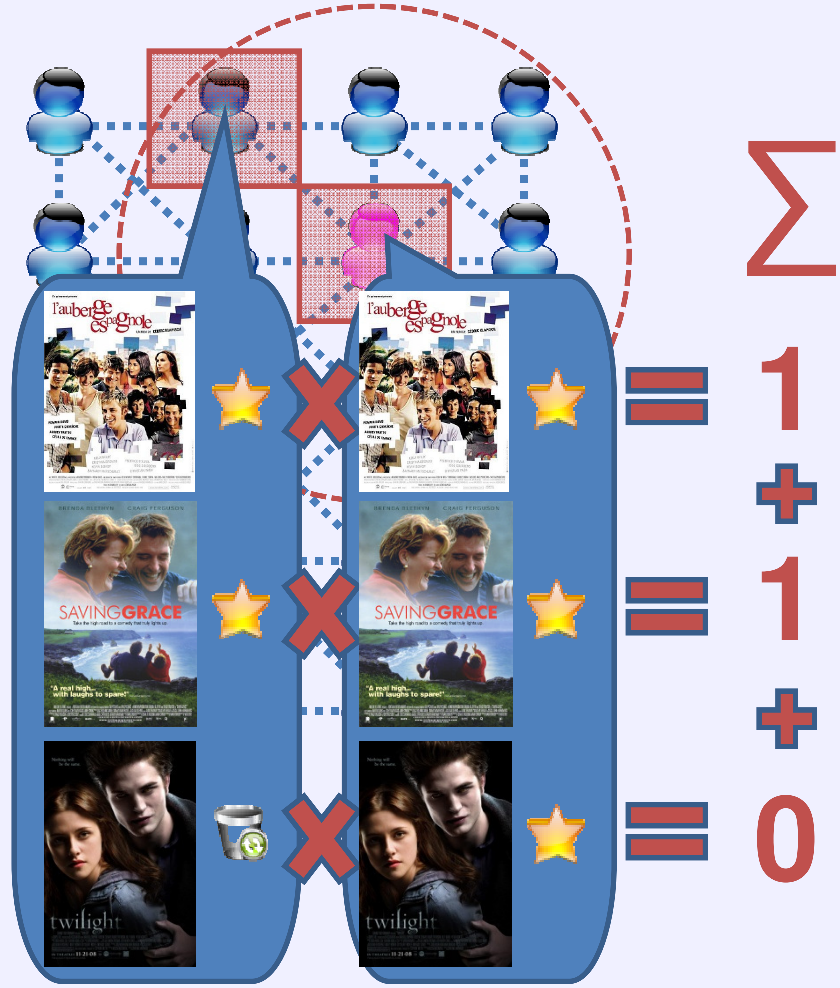
Outline

- Nearest-Neighbor Collaborative Filtering
- Proposal: “The Wisdom of the Few”
- Findings
- Measuring User Satisfaction
- Outlook & Discussion
- Conclusions

User Based Nearest Neighbor Collaborative Filtering (NN-CF)

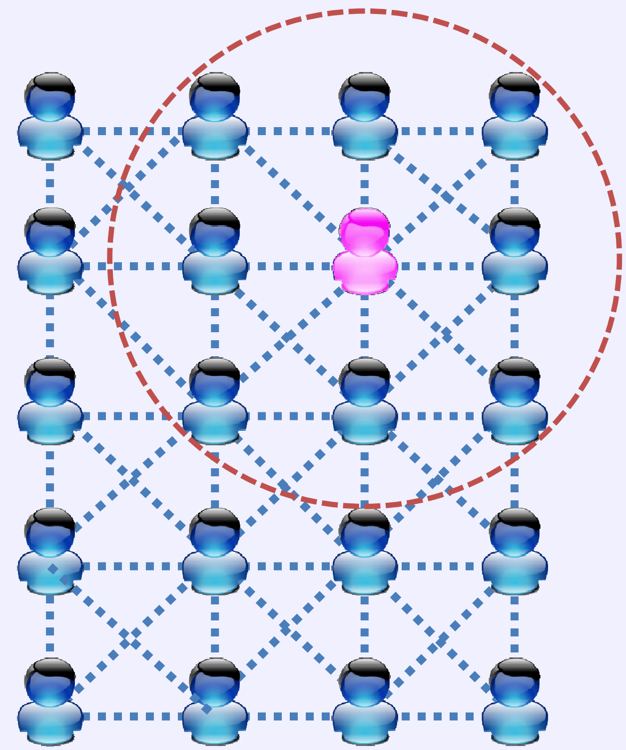
- User similarity
- Pearson Correlation Coefficient / Cosine Similarity

$$sim(a,b) = \frac{\sum^i (r_{ai} r_{bi})}{\sqrt{\sum^i r_{ai}^2}\sqrt{\sum^i r_{bi}^2}}$$



User Based Nearest Neighbor Collaborative Filtering (NN-CF)

- Pick **top n** neighbors
- Predicting (**top k** results)
- Weighting
  - By neighbor
  - By significance



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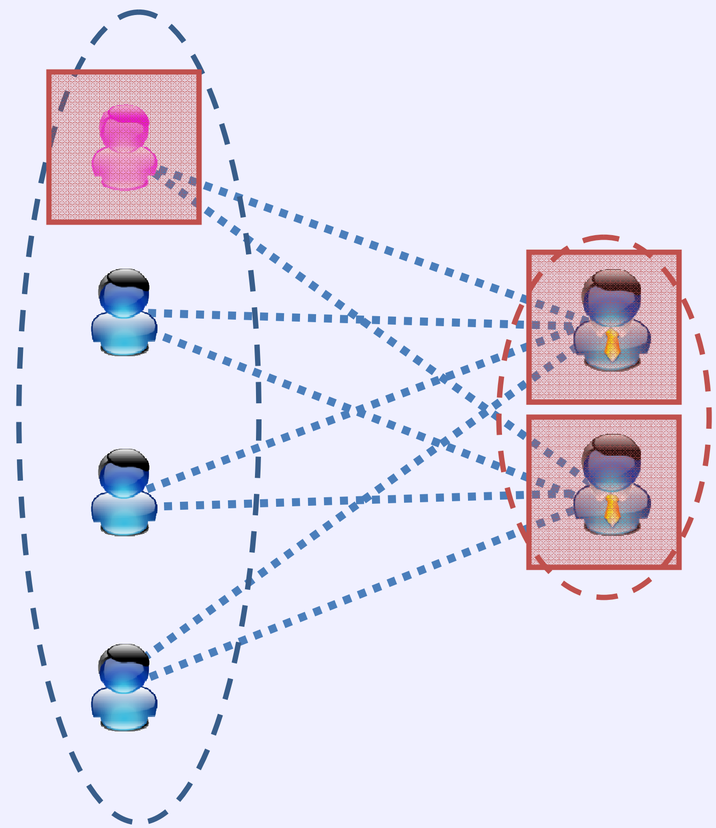
“The Wisdom of the Few”

- Separate experts set
- Neighbors are experts
- Bipartite graph

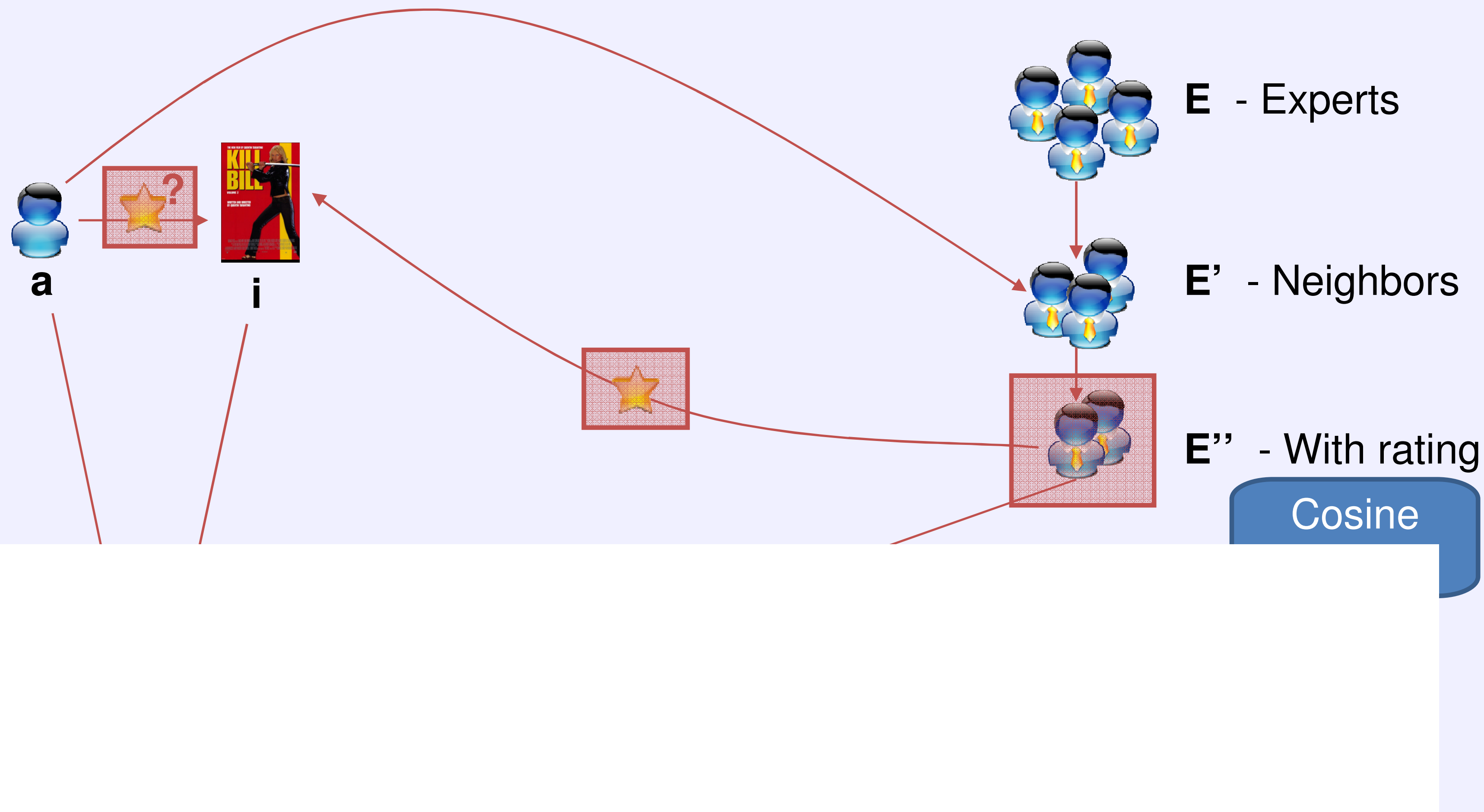


User Similarity

$$sim(a,b) = \frac{\sum^{i}(r_{ai}r_{bi})}{\sqrt{\sum^{i} r_{ai}^2}\sqrt{\sum^{i} r_{bi}^2}} \cdot \frac{2N_{a\cup b}}{N_a + N_b}$$

Weighting
co-rated items

Predicting Ratings



Evaluation

- Netflix data set
- Experts data set
- Showing top-k predictions
- Double evaluation
  - statistical measures (MAE)
  - user study (user satisfaction)

Authors’ Focus

- Expert approach feasible?
- How does this differ from traditional CF?
- Can we avoid some pitfalls?
- Can noise be reduced?

- **NOT**: increase (technical) CF accuracy

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Evaluation – MAE

- **M**ean **A**bsolute **E**rror (MAE) works fine

Method	MAE	Coverage
Critics	0.885	100.0%
Expert-CF	**0.781**	**97.7%**
Neighbor-CF	0.704	92.2%

- Better than critics' choice alone
- slightly worse than NN-CF
- Remember: this is not the main focus!

Targeting Problems

Traditional NN-CF

- Cold start problem
- Data sparsity
- Noise (even malicious)
- Scalability
- Privacy

“Wisdom of the Few”

- Employ experts in advance
- Change job description
- Hopefully little
- Small number of experts
- Experts are public persons

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User Study

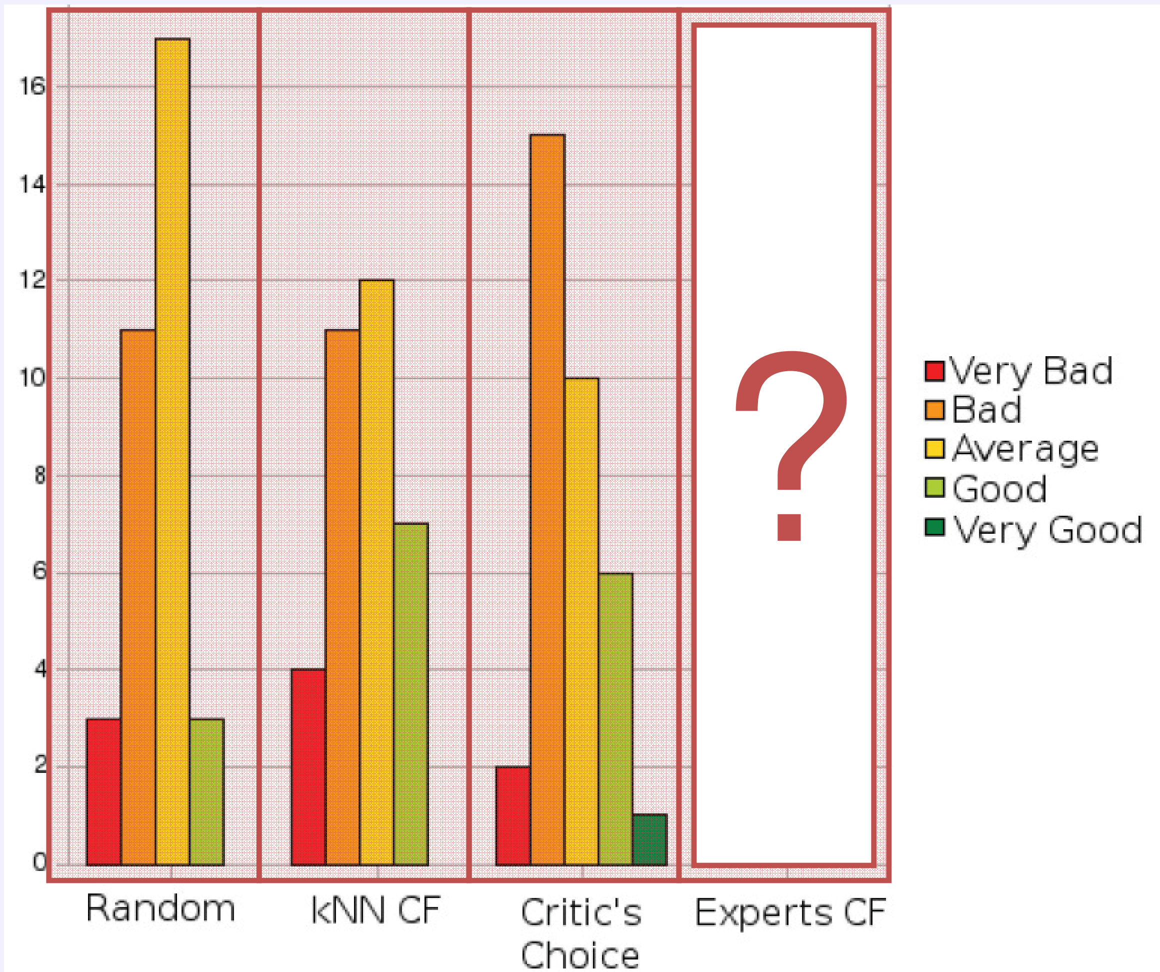
- Additional user study – rather unusual
- Focus on user **satisfaction**

- 100 preselected movies
- 57 participants

Satisfaction

- Nice MAE/RMSE alone are of no use
- MAE as indicator might be suboptimal
- It’s all about satisfaction
- User study gets real feedback

User Study Results



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Outlook & Future Work

- Generalizing for other domains
- Might want to see more studies
- Combinations with traditional CF

Strengths

- Alternative to traditional NN-CF
- Avoids several CF pitfalls
- Incredible user satisfaction – in one study

Weaknesses

- Requires experts
  - Might be too costly (economically)
  - Or even impossible
- No more precise than baseline
- Currently very domain specific
- User study is not a conclusive proof

Conclusion

- CF – Recommendations
  - Issues to traditional CF (like noise)
- **Expert** neighbors
  - Partially solve issues
- Approach works
- Great user satisfaction (user study)
- Domain-specific, need experts

Thank you!
Questions?