Towards the Next Generation of Multi-Criteria Recommendation

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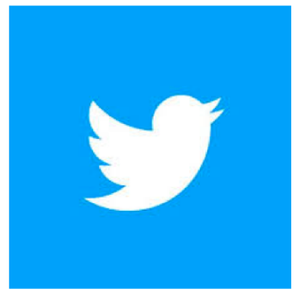
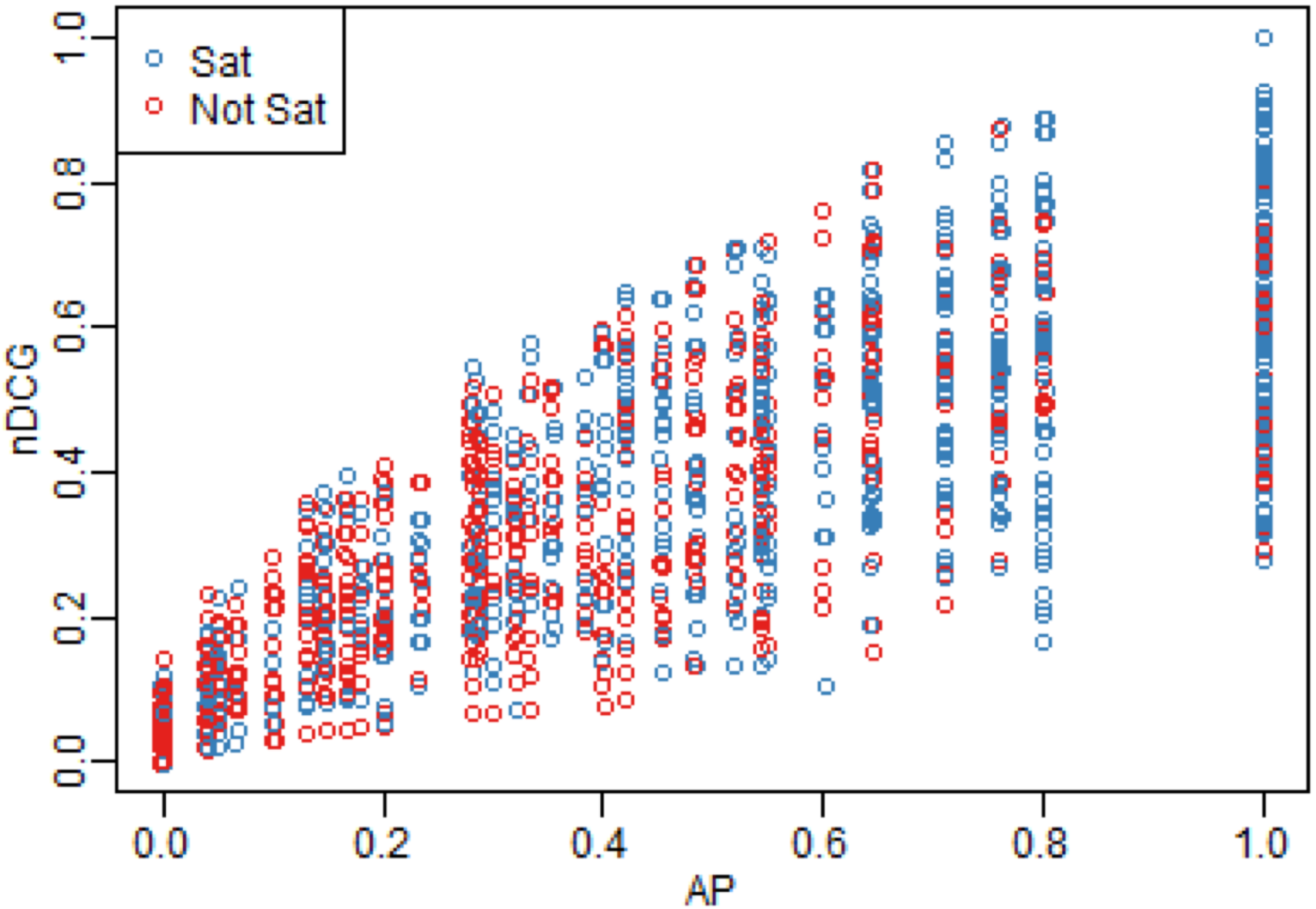
Recommender Systems



How to maximize the user satisfaction of recommender systems?

Research Topic-User-Centric Recommendation



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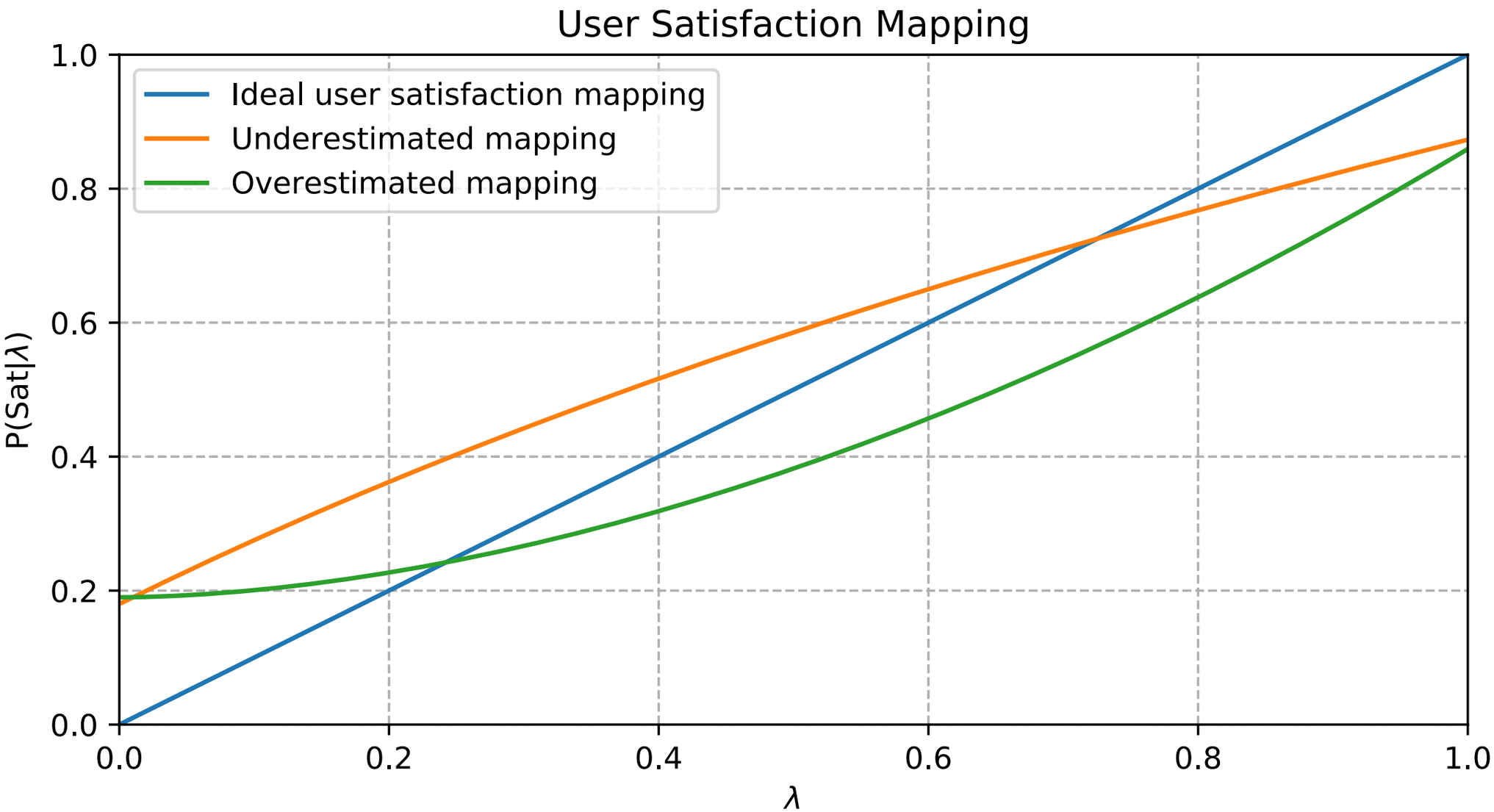


Previous Work

URM: 0.5 * Rating + 0.5 * ListRanking

Variation: 0.5 * Relevance + 0.5 * Trust

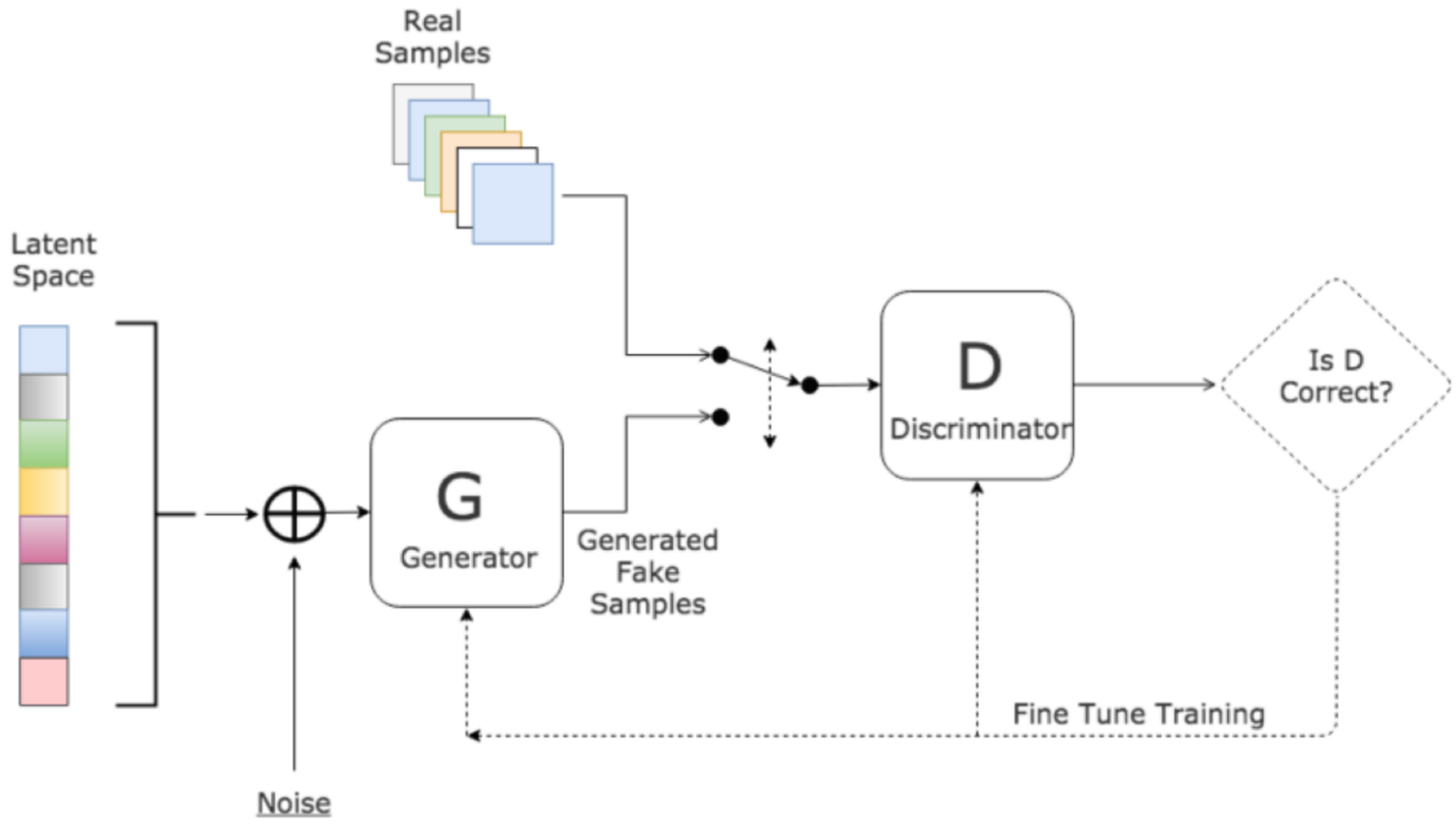
Multiple Objective Optimization:
AP + p * DCG

Calibration recommendation

Shi Y, Larson M, Hanjalic A. Unifying rating-oriented and ranking-oriented collaborative filtering for improved recommendation[J]. Information Sciences, 2013, 229: 29-39.

Rodriguez M, Posse C, Zhang E. Multiple objective optimization in recommender systems[C]//Proceedings of the sixth ACM conference on Recommender systems. ACM, 2012: 11-18.

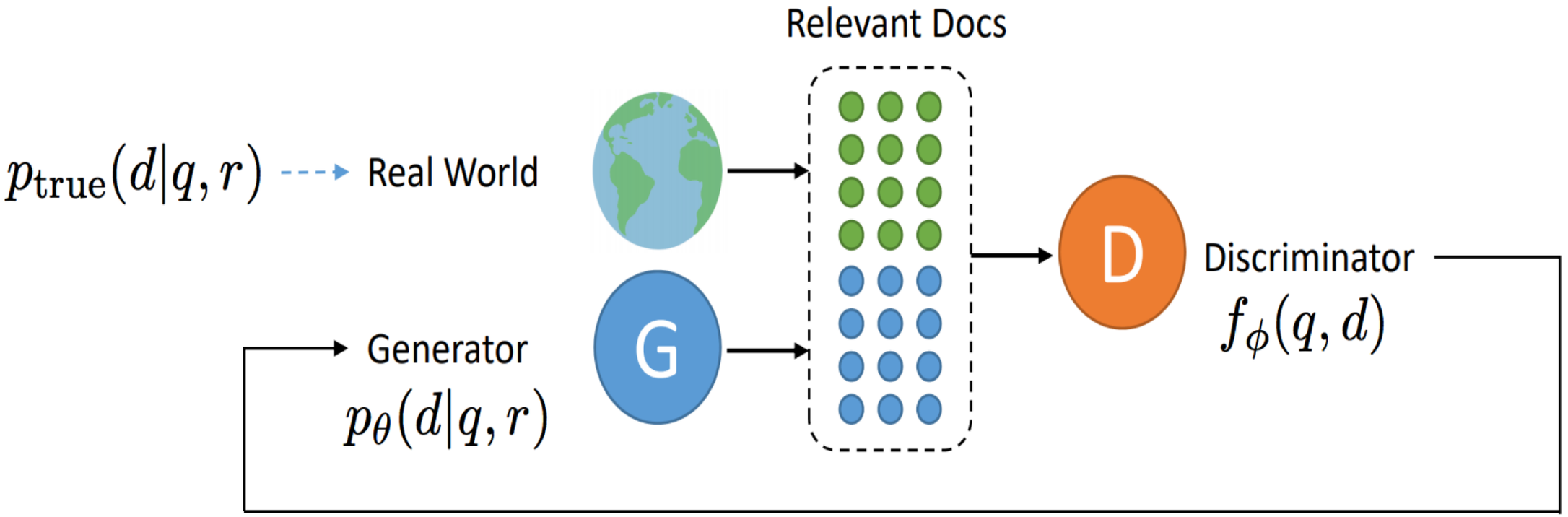
Theoretical Backgrounds: GAN



GAN [1]

Goodfellow, Ian, et al. "Generative adversarial nets." Advances in neural information processing systems. 2014.

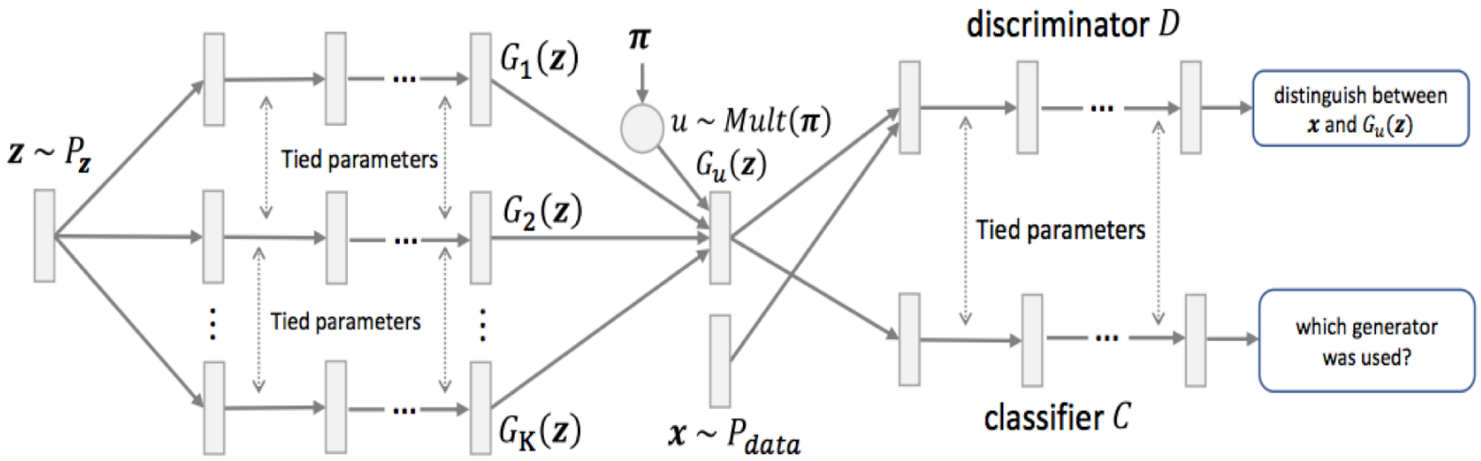
Theoretical Backgrounds: IRGAN



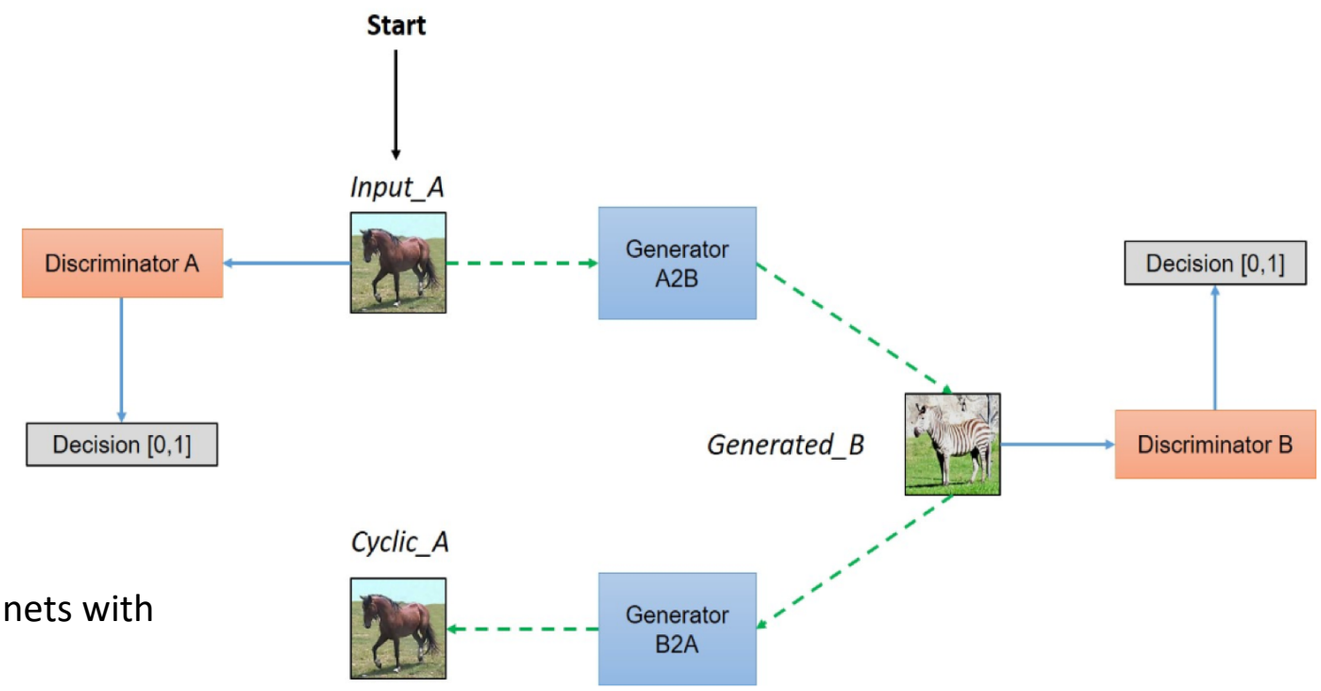
Wang, Jun, et al. "Irgan: A minimax game for unifying generative and discriminative information retrieval models." Proceedings of the 40th International ACM SIGIR conference on Research and Development in Information Retrieval. ACM, 2017.

Weinan Zhang. Generative adversarial nets for information retrieval: Fundamentals and advances. In SIGIR, 2018.

Theoretical Backgrounds: Multiple Generators



MGAN [4]



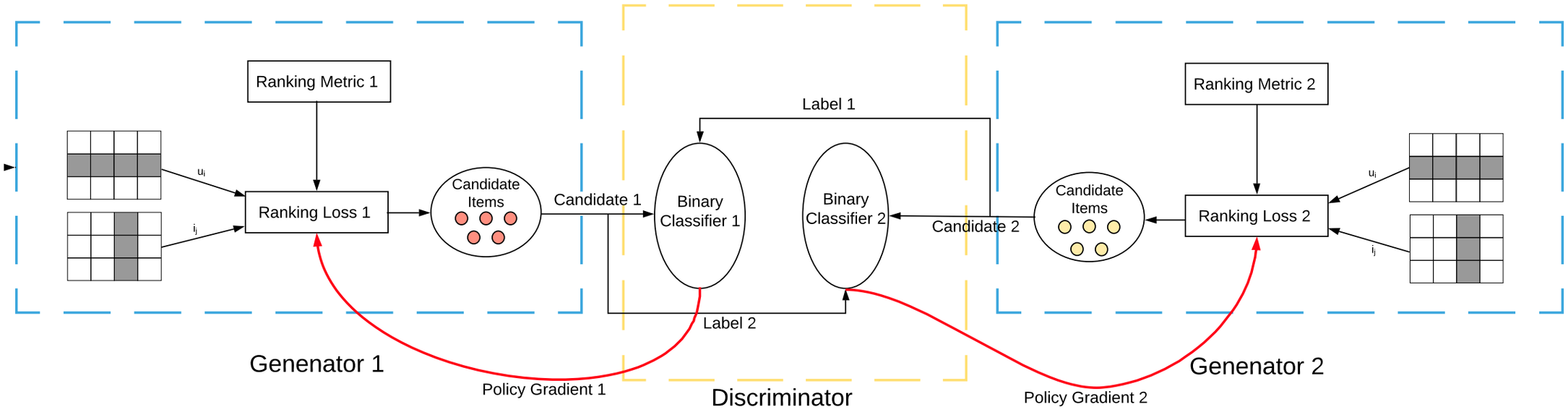
Cycle-GAN [5]

Hoang, Quan, et al. "MGAN: Training generative adversarial nets with multiple generators." (2018).

Zhu, Jun-Yan, et al. "Unpaired image-to-image translation using cycle-consistent adversarial networks." arXiv preprint(2017).

Current Work: MOGAN

Motivation: Whether a user finds a particular recommendation satisfying or not is independent of how we measure the performance of that recommendation.



Evaluation: The model shows good performance on all kinds of evaluation metrics.

MOGAN: Experimental Design

Datasets

Dataset	Amazon Digital Music	Movielens-100K	Yelp
#users	5,541	943	366,715
#items	3,568	1,682	60,785
#ratings	64,706	100,000	1,569,264
Scale	1-5	1-5	1-5
Sparsity/%	99.67	93.70	99.99

Minimax Games

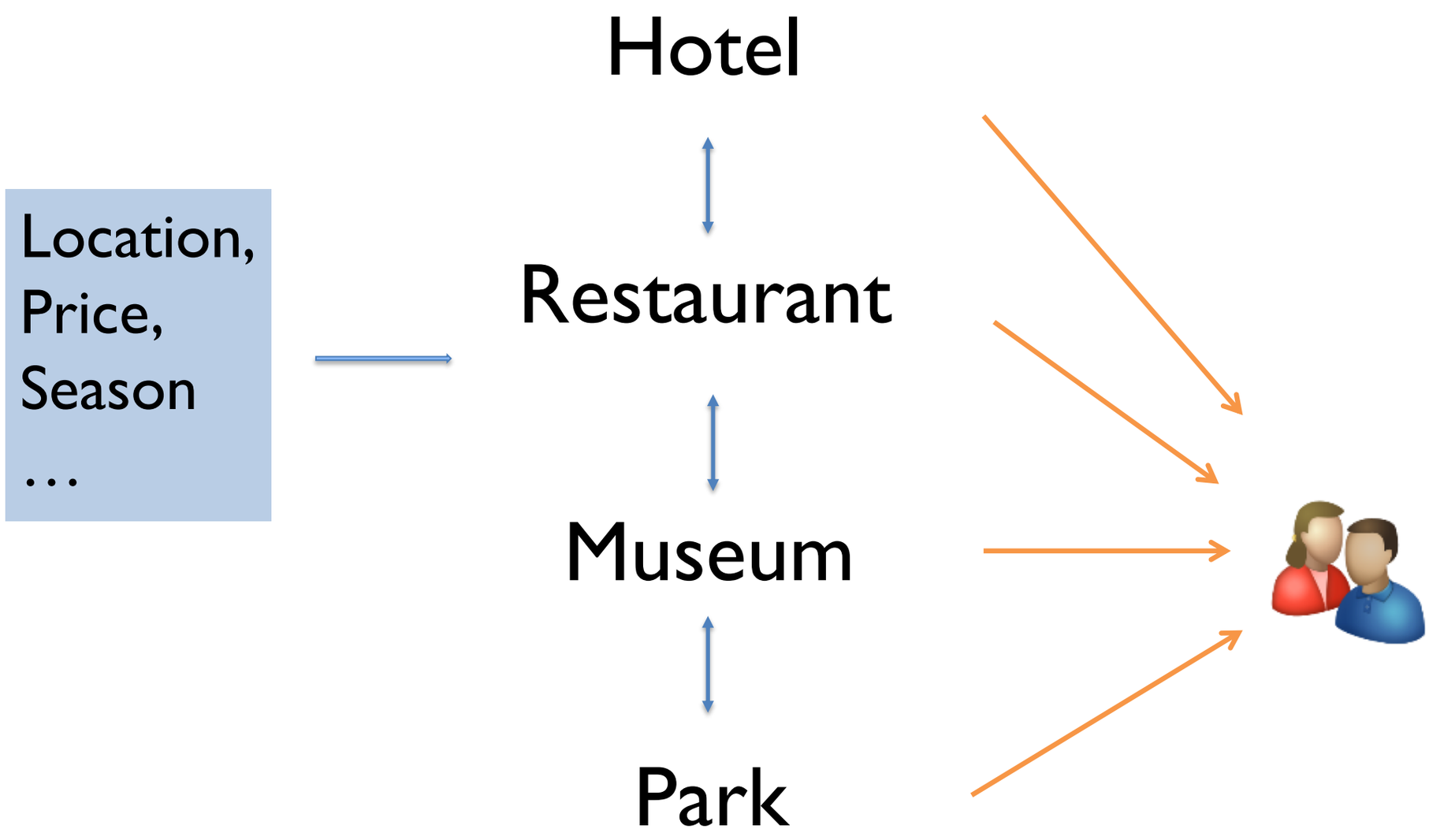
Game 1: DCG vs AP

Game 2: Different gain functions in DCG

Game 3: Different discount functions in DCG

Research Topic-Package Recommendation

Example: Trip in Vancouver



Research Topic-Package Recommendation

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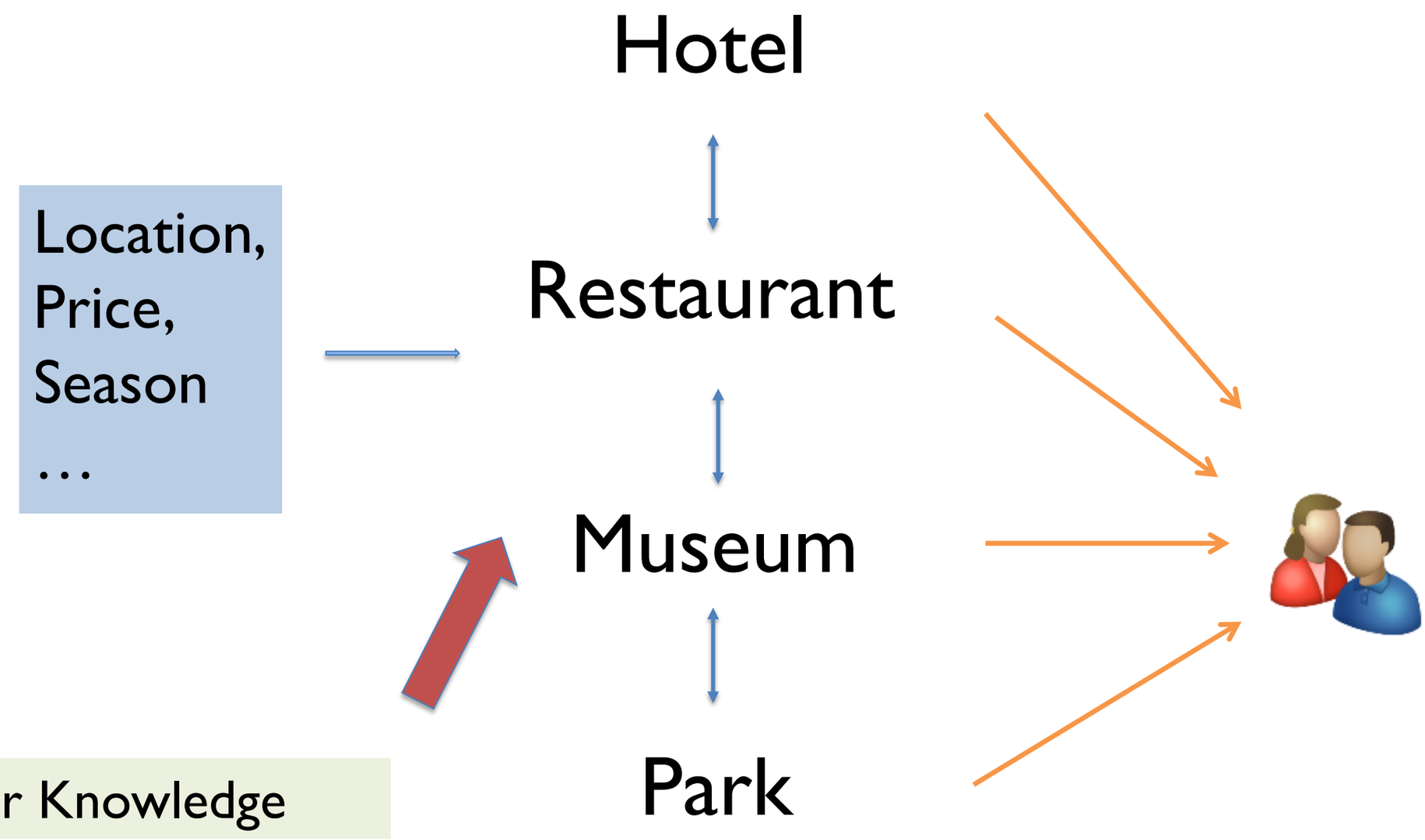
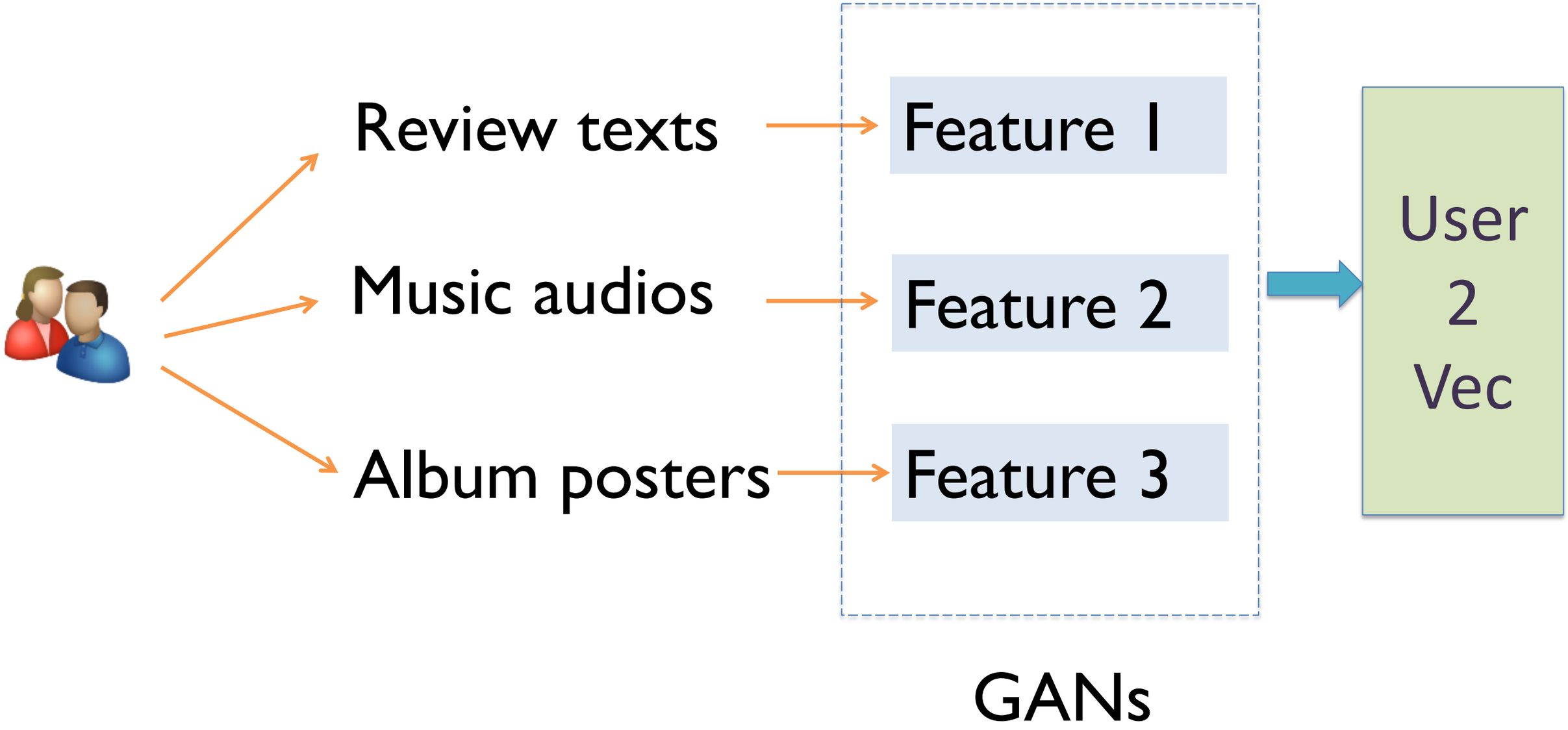


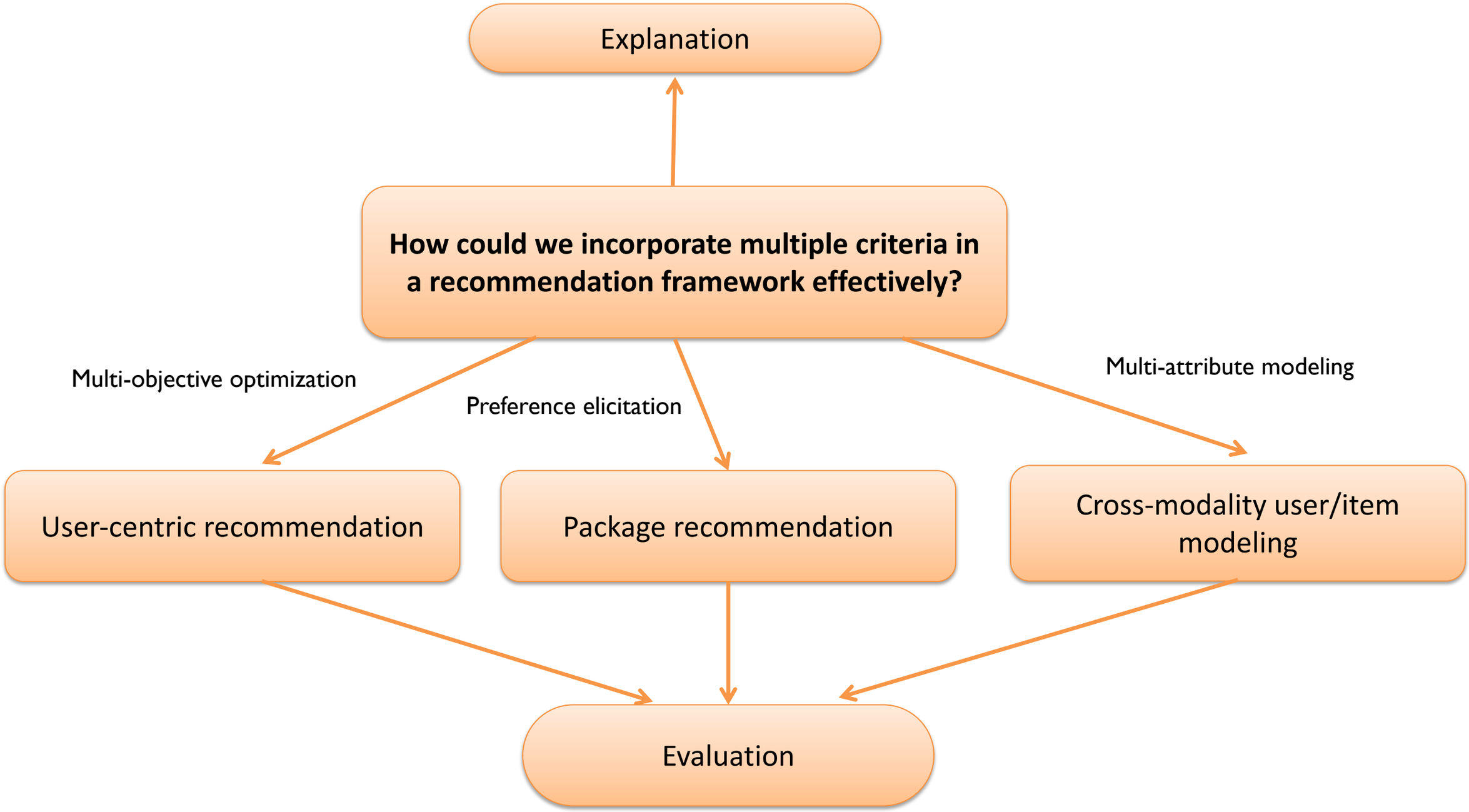
Research Topic- Cross-Modality User/Item Modeling

Example: Music recommendation



Wang B, Yang Y, Xu X, et al. Adversarial cross-modal retrieval[C]//Proceedings of the 2017 ACM on Multimedia Conference. ACM, 2017: 154-162.

Research Questions



Wrap-up

- Multi-criteria recommendations
  - Why?
- A brief introduction to MOGAN
  - Framework
  - Experimental design
- 3 different research topics in Multi-criteria RecSys
  - User-oriented recommendation
  - Package recommendation
  - Cross-modal user/item modeling

Special thanks goes to my promotors: Prof. Alan Hanjalic and Dr. Julián Urbano

References

1. Goodfellow, Ian, et al. "Generative adversarial nets." Advances in neural information processing systems. 2014.

2. Wang, Jun, et al. "Irgan: A minimax game for unifying generative and discriminative information retrieval models." Proceedings of the 40th International ACM SIGIR conference on Research and Development in Information Retrieval. ACM, 2017.

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5. Zhu, Jun-Yan, et al. "Unpaired image-to-image translation using cycle-consistent adversarial networks." arXiv preprint(2017).

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