Hybrid recommender systems

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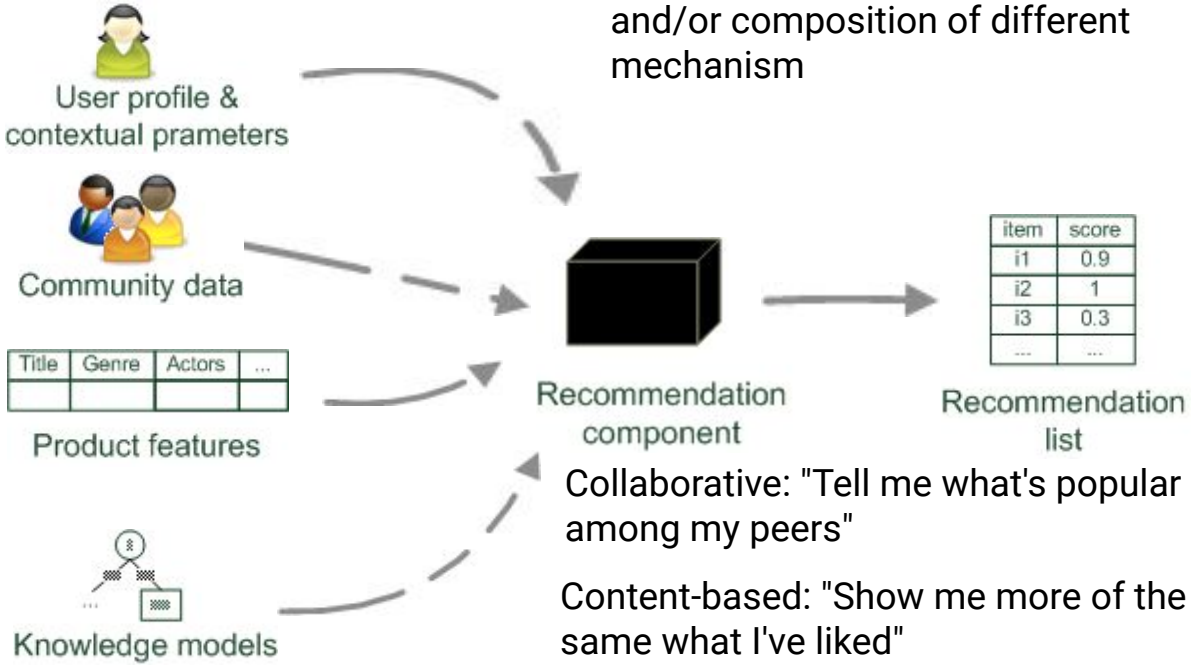

Hybrid: combinations of various inputs and/or composition of different mechanism

Collaborative: "Tell me what's popular among my peers"

Content-based: "Show me more of the same what I've liked"

Knowledge-based: "Tell me what fits based on my needs"

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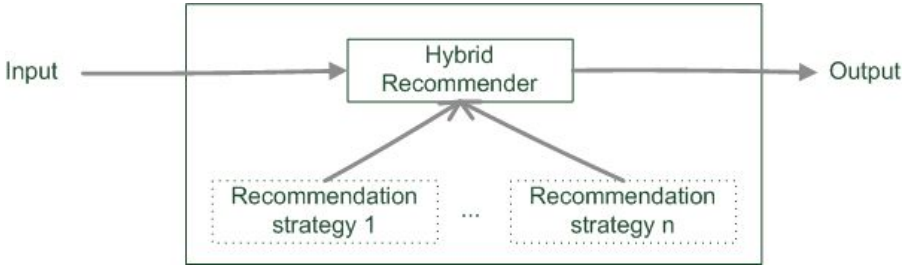
Hybrid recommender systems

- All three base techniques are naturally incorporated by a good sales assistant but have their shortcomings
  - For instance, cold start problems

- Idea of crossing two (or more) species/implementations
  - *hybrida* [lat.]: denotes an object made by combining two different elements
  - Avoid some of the shortcomings
  - Reach desirable properties not (or only inconsistently) present in parent individuals

Monolithic hybridization design

- Only a single recommendation component



- Features/knowledge sources of different paradigms are combined

Monolithic hybridization design

User	Item1	Item2	Item3	Item4	Item5
Alice		1		1	
User1		1	1		1
User2	1	1			1
User3	1		1		
User4					1

Item	Genre
Item1	romance
Item2	mystery
Item3	mystery
Item4	mystery
Item5	fiction

Feature	Alice	User1	User2	User3	User4
User likes many *mystery* books	true	true			
User likes some *mystery* books			true	true	
User likes many *romance* books					
User likes some *romance* books			true	true	
User likes many *fiction* books					
User likes some *fiction* books		true	true		true

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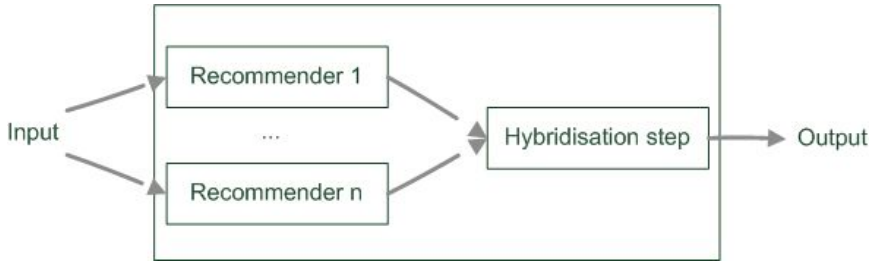
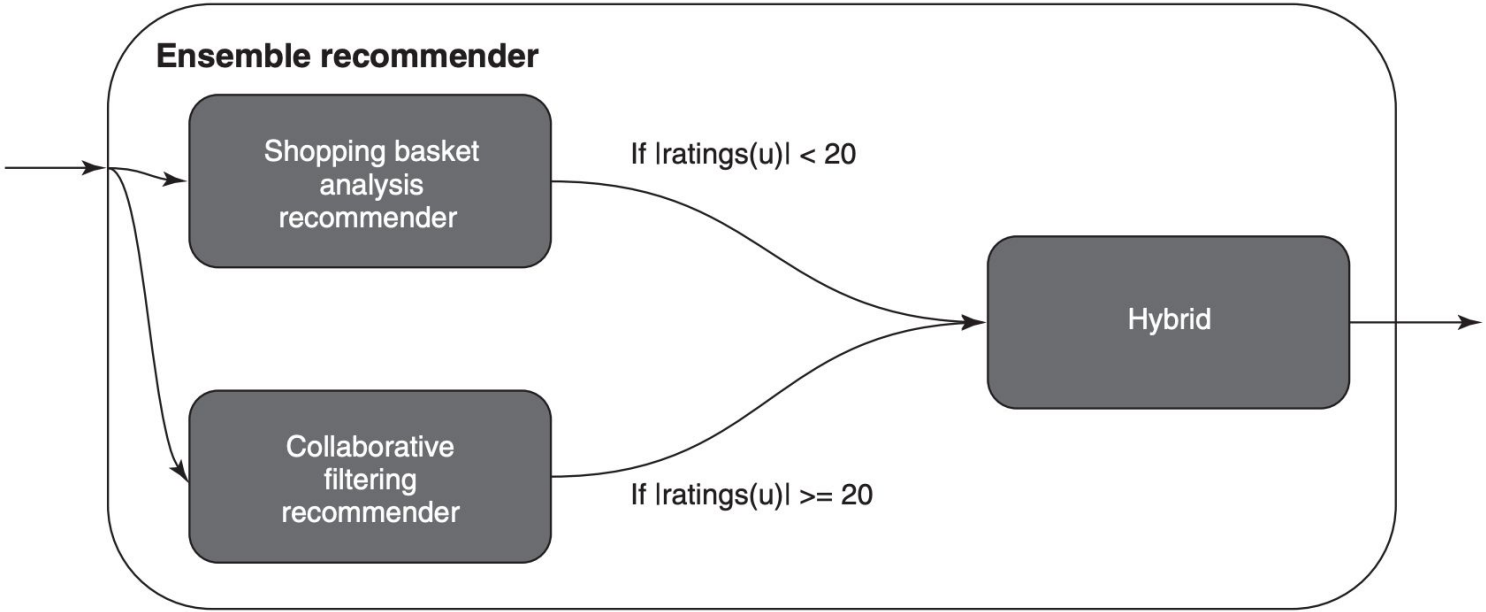
Parallelized hybridization design

- Output of several existing implementations combined
- Some weighting or voting scheme
  - Weights can be assigned to each method
  - Switching in which based on a condition we switch to a different recommender

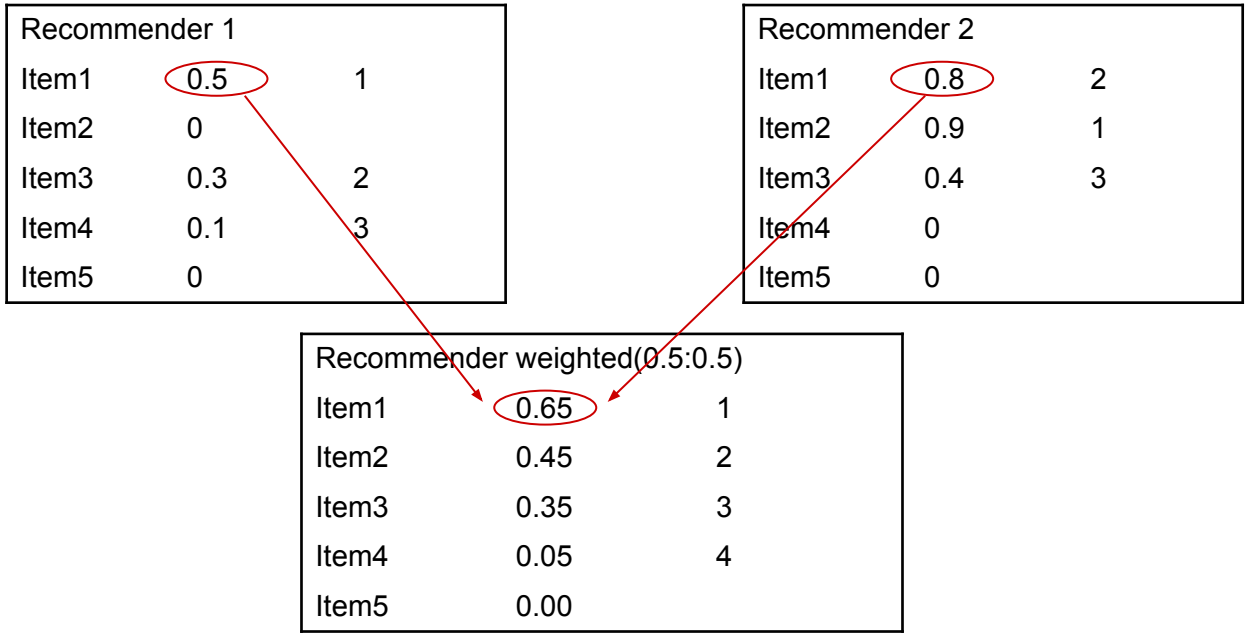


Parallelized hybridization design: Switched Ensemble



Parallelized hybridization design: Weighted

- Compute weighted sum: $rec_{weighted}(u,i) = \sum_{k=1}^{n} \beta_k \times rec_k(u,i)$



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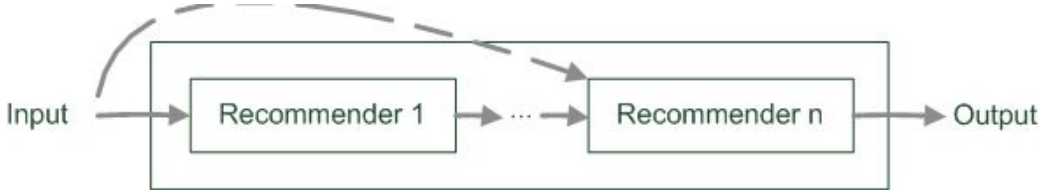
Pipelined hybridization designs

- One recommender system pre-processes some input for the subsequent one
- Refinement of recommendation lists (cascade)
- One recommender builds a model that is exploited by the principal recommender to make recommendations. (Meta-level)



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What’s Next?

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