

Aggie Game Day

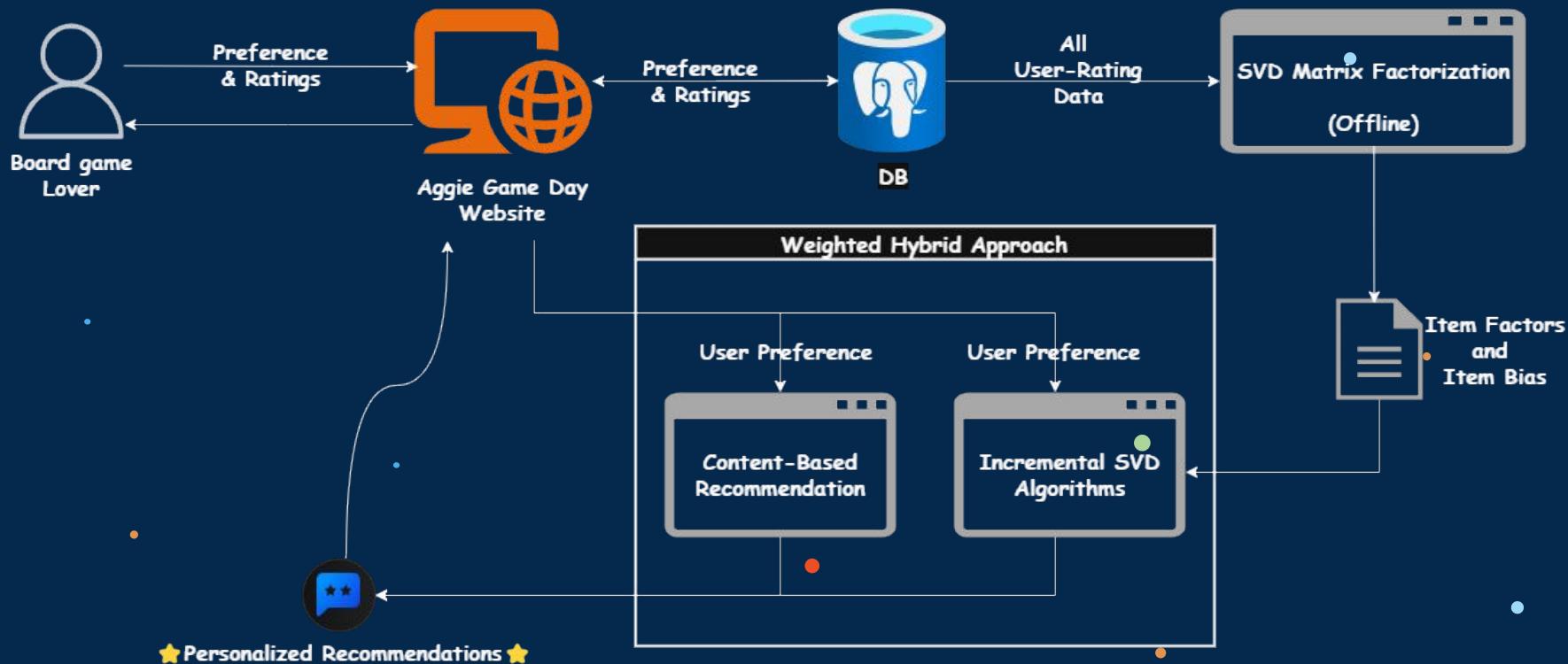


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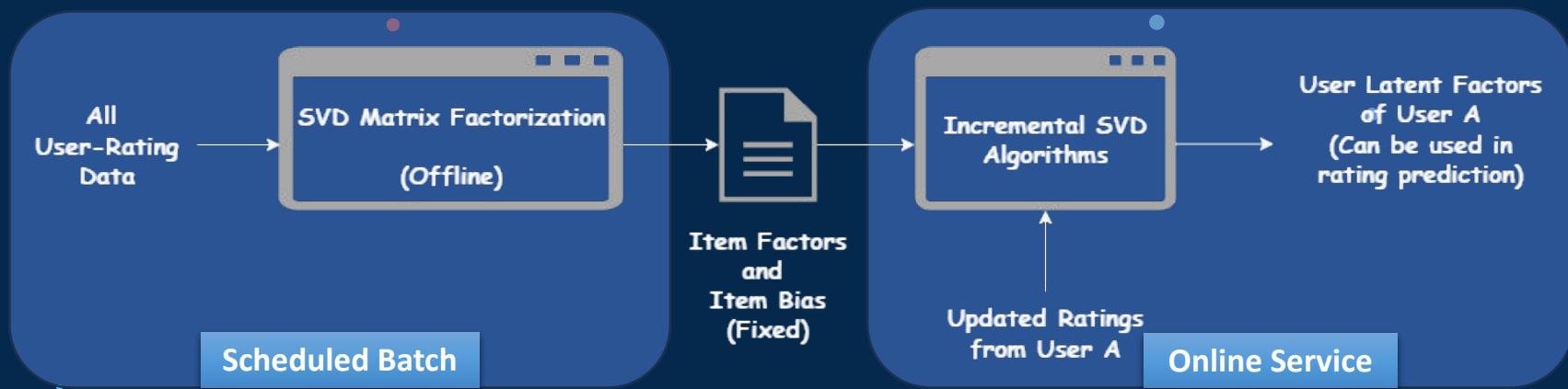
Motivation

- Board games are fun – choosing one shouldn't be a struggle!
- Board game websites usually recommend whatever's new or trending
- Netflix has recommendations. Why not board games?

Hybrid Model - A Smarter Way to Discover Board Games



Collaborative Filtering: 2-Phase SVD Pipeline



	Full Matrix Factorization	Incremental SVD (“Fold-In”)
Input	Complete user–item rating matrix	User’s ratings + precomputed item factors
Output	Updated user & item latent factor matrices	New user latent vector and bias
Latency	Minutes–hours (batch jobs)	Milliseconds–seconds (real-time)

Dynamic Blending of Content-Based and Collaborative-Filtering

- 1. Compute and normalize the CF and CB scores for games.
- 2. Blend them using dynamic weights.

The final hybrid score for item i is

$$\hat{s}_i = \alpha_{CF}(N) \hat{s}_i^{CF} + \alpha_{CB}(N) \hat{s}_i^{CB},$$

where \hat{s}^{CF} and \hat{s}^{CB} are the normalized CF and CB scores.

- 3. Filter, sort, and select top-N recommendations.

Dynamic Blending of Content-Based and Collaborative-Filtering

- How to dynamically decide the CF weight and the CB weight?

$$\alpha_{CF}(N) = \begin{cases} 0, & N = 0, \\ \min\left(\frac{N}{8} \times 0.8, 0.8\right), & N > 0, \end{cases} \quad \alpha_{CB}(N) = 1 - \alpha_{CF}(N).$$

- N = number of ratings the user has provided.

N	CF weight	CB weight	Blend
0	0	1	100 % content-based
1	$1/8 \times 0.8 = 0.10$	0.9	10 % CF + 90 % CB
5	$5/8 \times 0.8 = 0.50$	0.5	50 % CF + 50 % CB
7	$7/8 \times 0.8 = 0.70$	0.3	70 % CF + 30 % CB
≥ 8	0.8	0.2	80 % CF + 20 % CB

Demo

- <https://youtu.be/EntHZxgmYfs>

THANKS!