CrossFire: Cross Media Joint Friend and Item Recommendations

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Introduction

- Newly launched social media sites lack of user historical data to build effective recommender systems.
- Would auxiliary information be helpful in making friend and item recommendations?
- **Challenges**:
 - Unknown user anchor links
  - Inconsistent item attributes
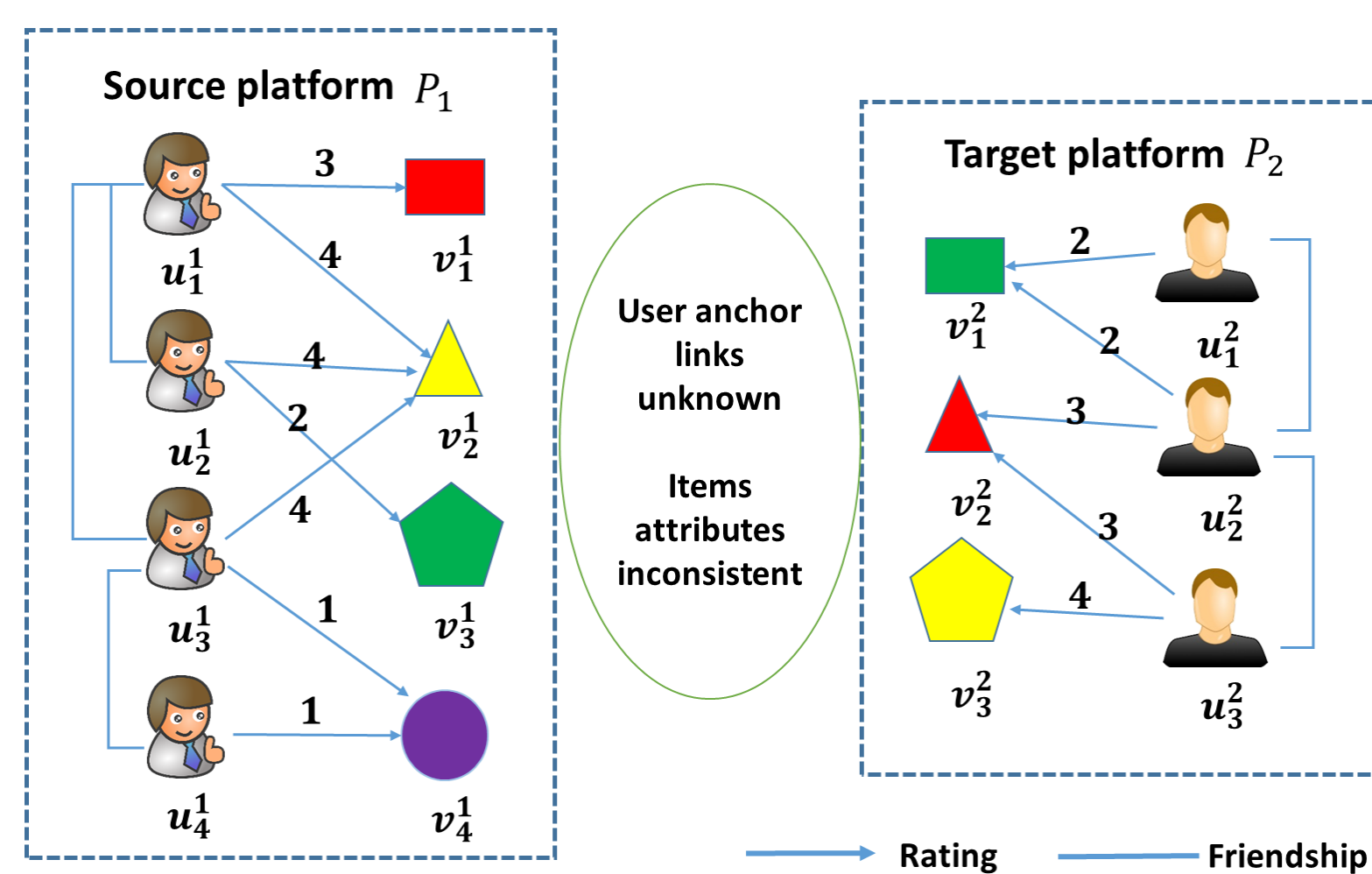
- **Contributions**: (i) A novel problem of cross-media joint friend and item recommendations when no direct connections between users or items are given; (ii) A principled framework CrossFire, which integrates within-platform correlations and cross-platform information into a coherent model for joint friend and item recommendations.

The Proposed Framework – CrossFire

- Cross media joint friend and item recommendations
  - Cross-platform knowledge transfer: build implicit bridge
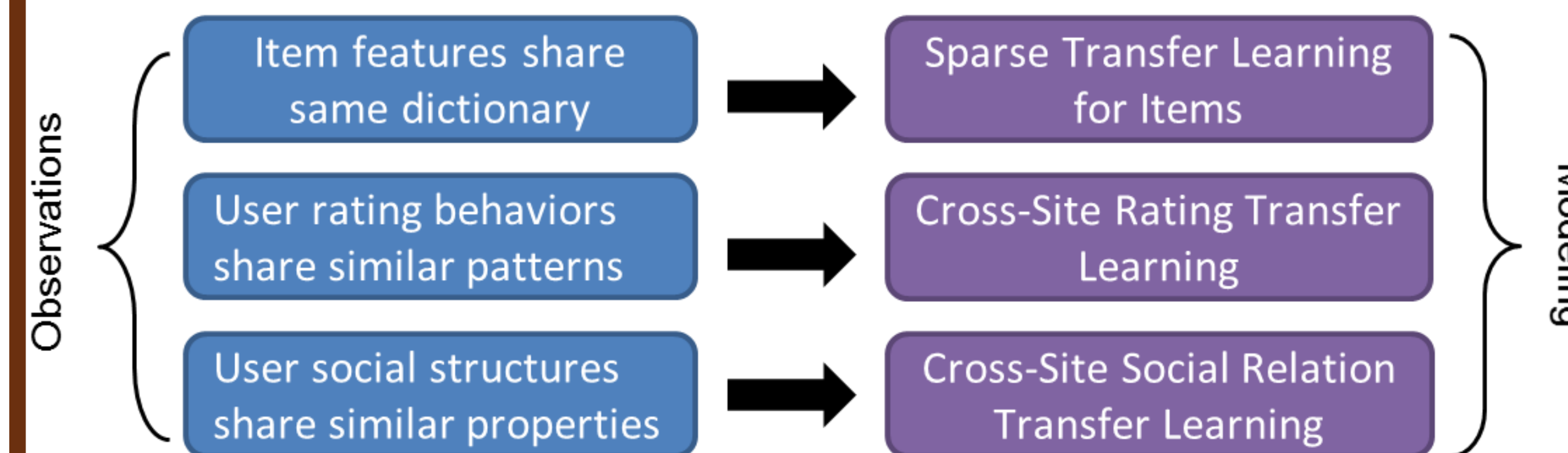
  - Within-platform joint learning: exploring mutual benefits
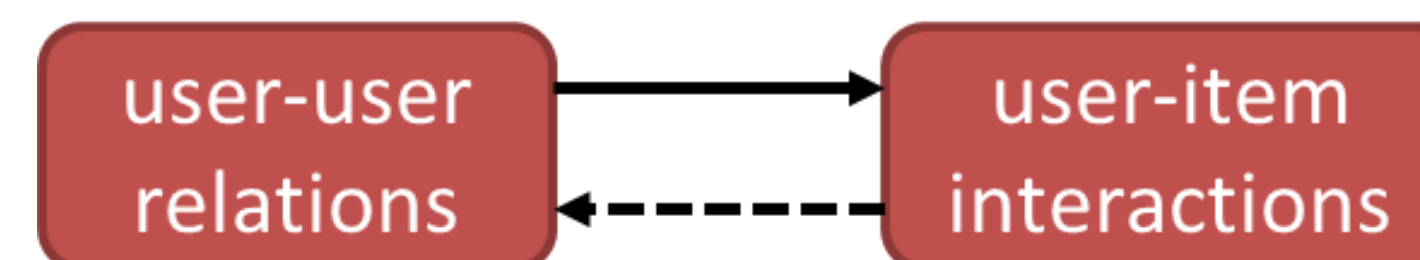

- Objective function of CrossFire

$$\min_{\theta} \sum_{i=1}^{2} \underbrace{\|X_i - DV_i\|_F^2 + \gamma \|V_i\|_1 + Tr(V(\mu L + \nu M)V^T)}_{\text{Item Sparse Transfer Learning}}$$

$$+\alpha \underbrace{\sum_{i=1}^{2} \|W_i \odot (R_i - U_i^T Q^T V_i)\|_F^2 + \lambda(\|P\|_F^2 + \|Q\|_F^2)}_{\text{Cross-Media Item Recommendation}}$$

$$+\beta \underbrace{\sum_{i=1}^{2} \|Y_i \odot (A_i - U_i^T P U_i)\|_F^2}_{\text{Cross-Media Friend Recommendation}} + \lambda \sum_{i=1}^{2} \|U_i\|_F^2$$
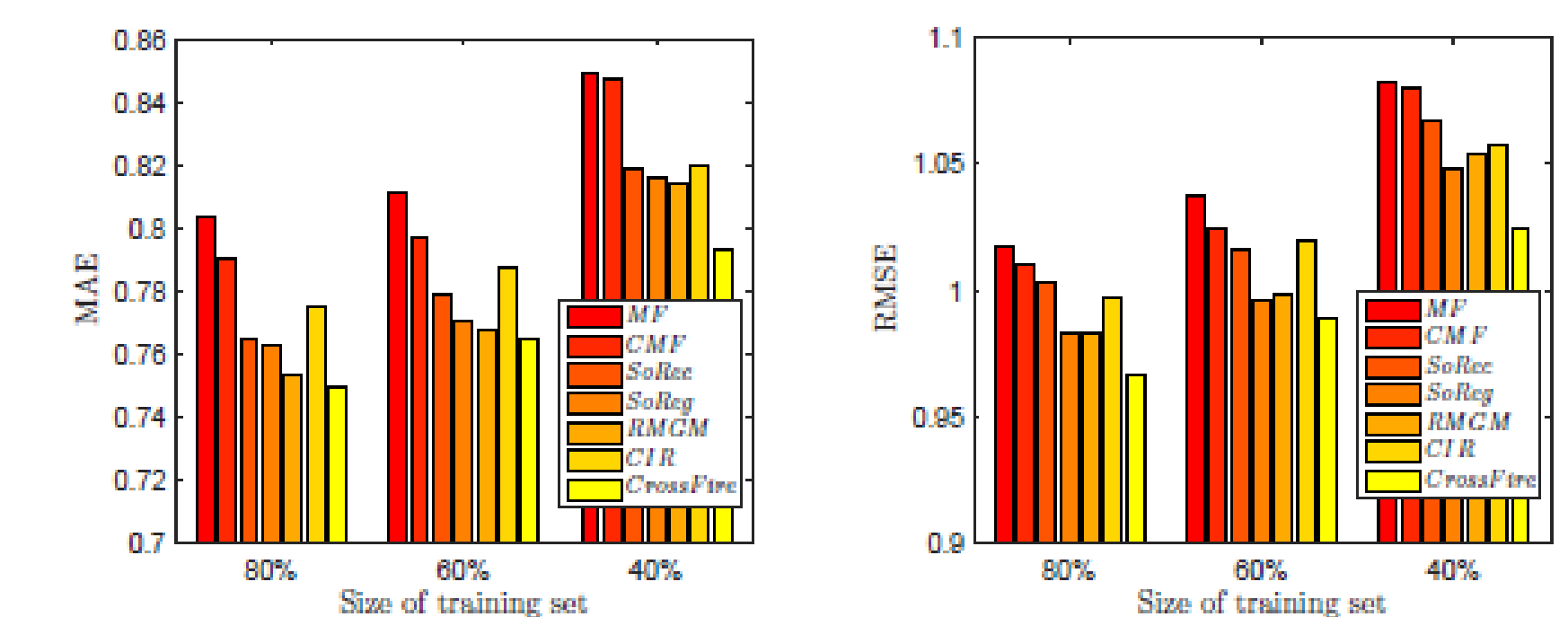
$$s.t. \ \|d_j\|_2^2 \le 1, j = 1, \ldots, p, \ Q^T Q = I$$

- Latent user and item feature matrix U_2, V_2, projection matrix Q, and interaction matrix P are obtained to recommend friends and items.
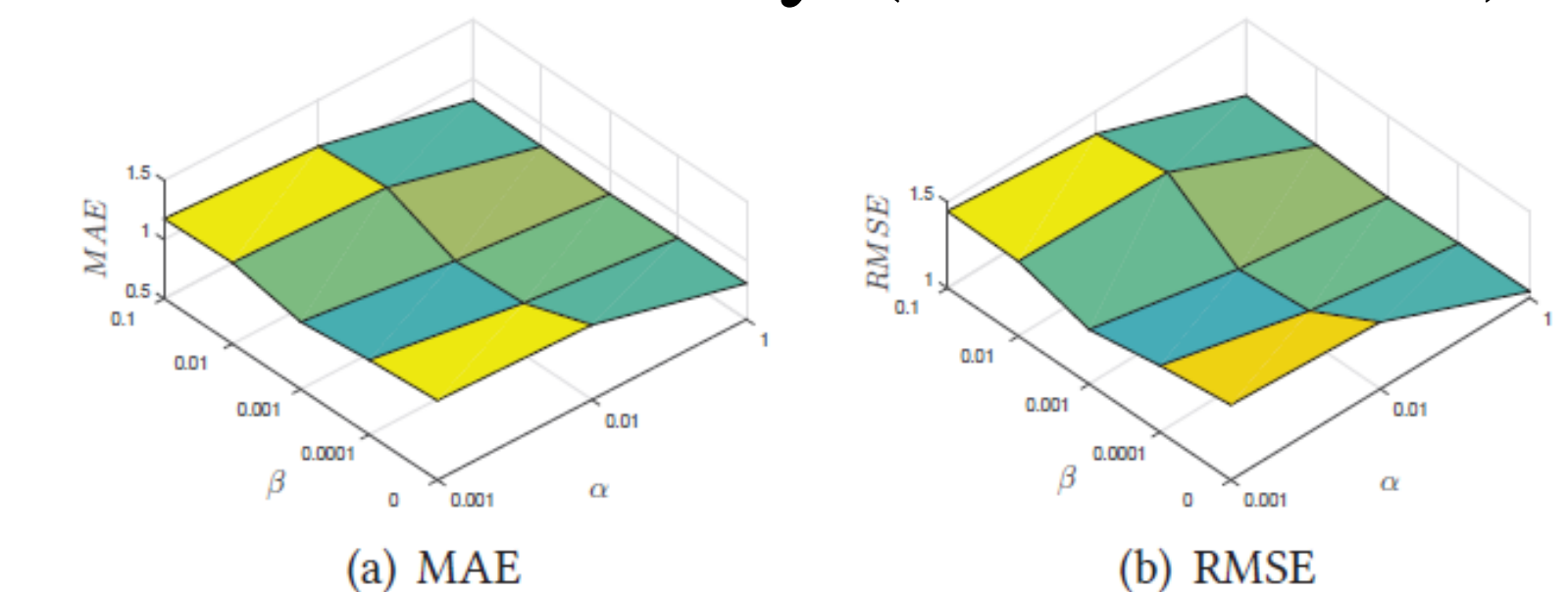
Experimental Results

- Friend recommendation performance
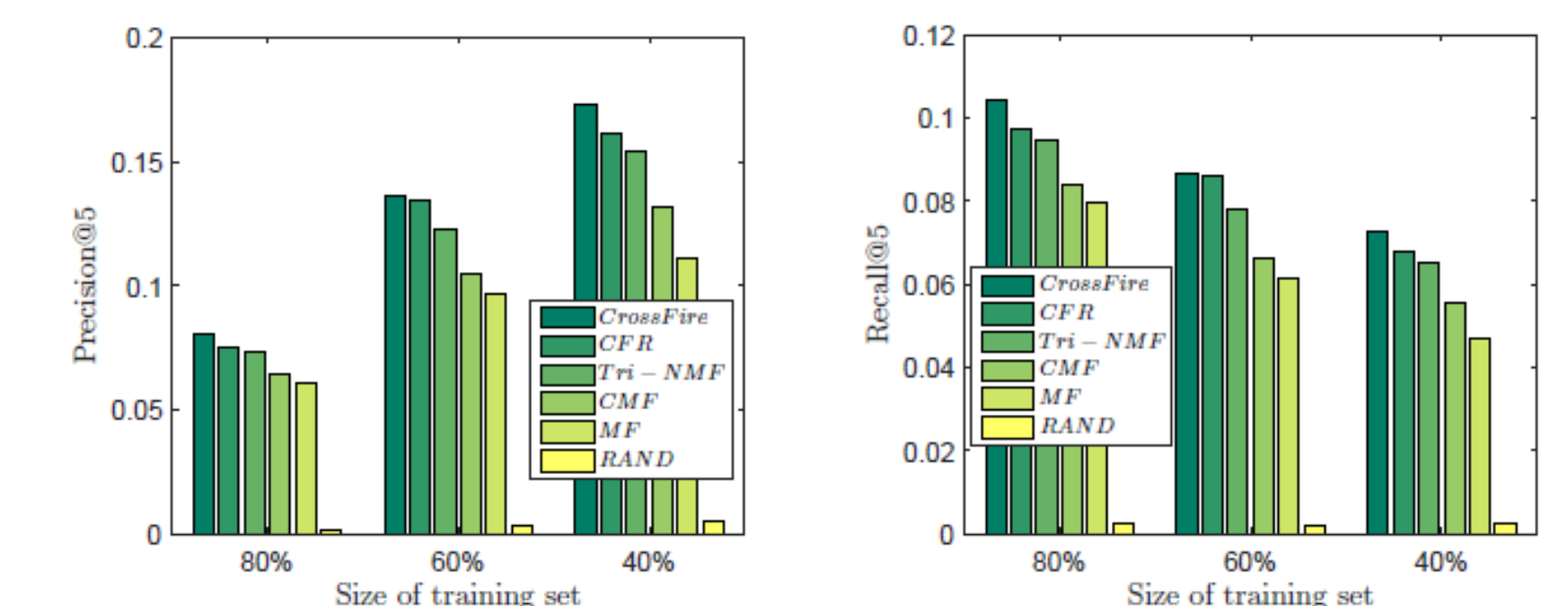
- Item recommendation performance

- Parameter Sensitivity (on Ciao dataset)

(a) MAE   (b) RMSE

Future Work

- (i) Extend CrossFire to scenario with limited explicit user/item correspondences are given; (ii) Explore CrossFire in a streaming recommendation setting.

Data Mining and Machine Learning Lab

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