



Collaborative Translational Metric Learning



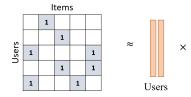
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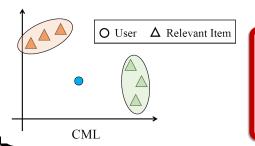
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Background

Matrix Factorization (MF)



- MF is based on inner product operation, which violates triangle inequality
- Previous work: Metric learning-based method [WWW17]
 - Project users and items into a low-dimensional metric space



Limitation?

- User is projected to a single point
- Not easy to modeling intensity and heterogeneity of user-item relationship

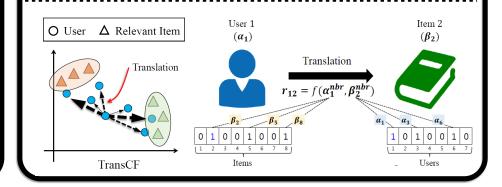
Approach

Adopt "Translation mechanism"



Example - (Barack Obama, place of birth, Honolulu)

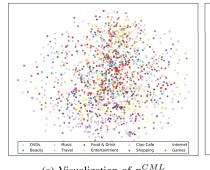
Barack Obama + place of birth ≈ Honolulu **Translation vector**

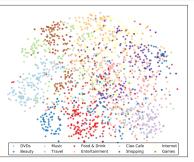


Evaluation

$$\|\alpha_{u} - \beta_{i}\|_{2}^{2} > \|\alpha_{u} + r_{ui} - \beta_{i}\|_{2}^{2}$$

	Rating						
BookCr.	1-4	5	6	7	8	9	10
Acc.	55.3%	52.7%	55.2%	56.1%	57.2%	58.4%	58.8%
Portion	3.8%	10.3%	7.9%	17.0%	24.5%	17.3%	19.2%
Flixster	0.5-2.5	3.0	3.5	4.0	4.5	5.0	
Acc.	19.6%	19.9%	19.9%	22.2%	25.7%	27.2%	
Portion	17.3%	17.0%	16.8%	19.6%	10.1%	19.2%	





(a) Visualization of $m{r}_{ui}^{CML}$

(b) Visualization of $r_{ui}^{\mathsf{TransCF}}$