



Recommender Workshop

Part 3: Matrix Factorization

Recommender Workshop Agenda

- Part 1: Introduction
 - Overview of Machine Learning Process, Amazon SageMaker
 - Hands-on: **Data Exploration**
- Part 2: Collaborative Filtering
 - Core Concepts for Recommendations
 - Hands-on: **K-Means Clustering**
- **Part 3: Matrix Factorization** (You Are Here)
 - Refining Recommendations
 - Hands-on: **Factorization Machine**
- Part 4: Hyperparameter Optimization

Recommender: Matrix Factorization

		Item			
		W	X	Y	Z
User	A		4.5	2.0	
	B	4.0		3.5	
	C		5.0		2.0
	D		3.5	4.0	1.0

Rating Matrix

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A	1.2	0.8
B	1.4	0.9
C	1.5	1.0
D	1.2	0.8

User Matrix

X

	W	X	Y	Z
A	1.5	1.2	1.0	0.8
B	1.7	0.6	1.1	0.4

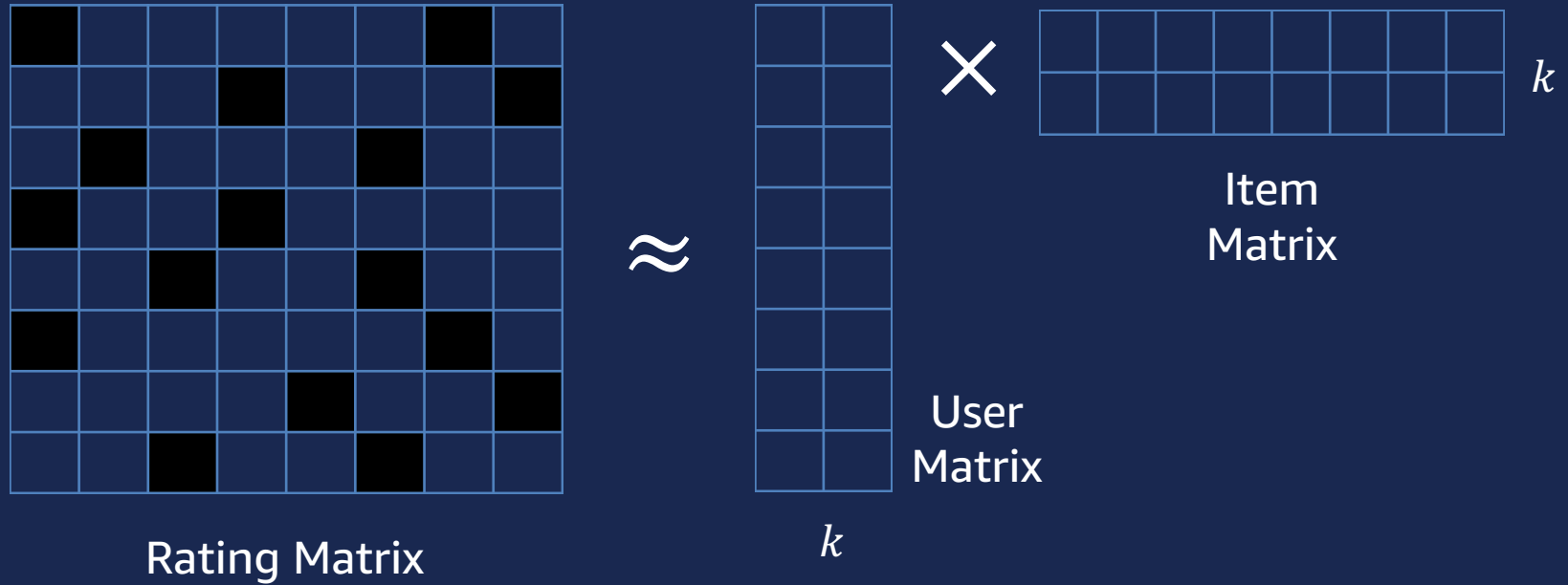
Item Matrix

Factorization Machines

$$\tilde{y} = w_0 + \langle w_1, x \rangle + \sum_{i,j > i} x_i x_j \cdot \langle v_i, v_j \rangle$$

- Generalization of linear regression, but adds a k-dimensional vector for each feature, and captures pairwise interactions between them.
- Suited for sparse, high dimensional data sets, so they work well for recommendation systems and click prediction.
- Unlike Collaborative Filtering, FM can take advantage of user and item metadata such as tags, categories, genres.
- More general than a use case-specific matrix factorization, and SageMaker's version has better parallelization, faster training, and faster

Matrix Factorisation With Factorisation Machines



Recommender Workshop Repository

<http://bit.ly/2wkaV0N>

Recommender Workshop Activity

- Log into the AWS console
- Change to **us-east-1** region
- Find the **Amazon SageMaker** service
- Find **Notebooks**
- Find your existing notebook instance (or create another instance)
 - Recommended: m1.m4 type
- Open the notebook instance and find within the repo path:
 - **03_factorization_machines.ipynb**

Next: Part 4