**Model-based Collaborative filtering**

**Cộng tác dựa trên mô hình.**

**Sự khác nhau giữa Model-based Collaborative filtering, neighborhood-based collaborative filtering (Memory-based collaborative filtering), content-based filtering**

**Latent factor model (tư vấn dựa trên nhân tố ẩn): một Model-based Collaborative filtering**

**OFFLINE:**

User-item rating matrix: 🡪 user-factor matrix ; item-factor matrix ; user bias ; item bias:

Ví dụ:

User-item rating matrix: :

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | I1 | I2 | I3 | I4 | I5 |
| U1 | \* | \* | 1 | 2 | 3 |
| U2 | 1 | 4 | 2 | \* | 3 |
| U3 | \* | 1 | \* | \* | \* |
| U4 | \* | 1 | \* | \* | \* |
| U5 | \* | \* | \* | \* | \* |
| U6 | \* | \* | \* | \* | \* |

User-factor matrix

|  |  |  |  |
| --- | --- | --- | --- |
|  | F1 | F2 | F3 |
| U1 | 0.1 | 0.2 | 0.1 |
| U2 | 0.2 | 0.3 | 0.07 |
| U3 | 0.1 | 0.1 | 0.1 |
| U4 | 0.1 | 0.1 | 0.3 |
| U5 | 1 | 0.2 | 0.4 |
| U6 | 0.1 | 0.3 | 0.5 |

user bias:: 0.02, 0.01,0.1,0.2,0.3, 0.2

User-factor matrix

|  |  |  |  |
| --- | --- | --- | --- |
|  | F1 | F2 | F3 |
| I1 | 0.01 | 0.02 | 0.5 |
| I2 | 0.3 | 0.3 | 0.07 |
| I3 | 0.2 | 0.1 | 0.1 |
| I4 | 0.1 | 0.2 | 0.3 |
| I5 | 1 | 0.2 | 0.4 |

Item bias:: 0.01, 0.2, 0.3,0.1,0.2

ONLINE:

: trung bình các observed rating trong **.**

=(0.01) +(0.01) + +0.2\*0.01 + 0.3\*0.02 +0.07\*0.5

**(\*):**

Giải tối ưu bằng Gradient Descent:

Tính :

;;

|  |
| --- |
| **The learning phase [OFFLINE]** |
| Input. ; : learning rate; : regularization weight |
| Output. ; ; ; |
| Step 1: Initialize randomly ;  and in (-1,1).  Step 2: { | }  Step 3:  Step 6: Repeat until convergence:  Step 7:  Step 11:  Step 12:  Step 13:  Step 14:  Step 15:  Step 14:  Step 15: |

A.B 🡪 AT

A.BT🡪 A

Giải tối ưu bằng stochastic gradient descent:

|  |
| --- |
| **The learning phase [OFFLINE]** |
| Input. ; : learning rate; : regularization weight |
| Output. ; ; ; |
| Step 1: Initialize randomly ;  and in (-1,1).  Step 2: { | }  Step 3:  Step 6: Repeat until convergence: Step 7: Randomly shuffle the elements in 𝕐.  Step 8: For each pair in :  Step 10:  Step 11:  Step 12:  Step 13:  Step 14:  Step 15:  Step 14:  Step 15: |