Cpts 315 HW2

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| --- | --- | --- | --- | --- | --- | --- |
|  | Item1 | item2 | item3 | item4 | item5 | item6 |
| User1 | 4 | 5 | 0 | 5 | 1 | 0 |
| User2 | 0 | 3 | 4 | 3 | 1 | 2 |
| User3 | 2 | 0 | 1 | 3 | 0 | 4 |

(a)

J (user1, user2) = (0+3+0+3+1+0) / (4+5+4+5+1+2) = 1/3 = 0.333

J (user1, user3) = (2+0+0+3+0+0) / (4+5+1+5+1+4) = 5/20 = 0.250

J (user2, user3) = (0+0+1+3+0+2) / (2+3+4+3+1+4) = 6/17 = 0.353

(b)

C (user1, user2) = (4\*0+5\*3+0\*4+5\*3+1\*1+0\*2)/(√(16+25+25+1)\*√(9+16+9+1+4)) = 0.606

C (user1,user3) = (4\*2+5\*0+0\*1+5\*3+1\*0+0\*4) / (√(16+25+25+1)\*√(4+1+9+16))

= 0.512

C (user2,user3) = (0\*2+3\*0+4\*1+3\*3+1\*0+2\*4) /(√(9+16+9+1+4)\*√(4+1+9+16))

=0.619

(c)

Avg(item1) = 6/2 = 3

Avg(item2) = 8/2 = 4

Avg(item3) = 5/2 = 2.5

Avg(item4) = 11/3 = 3.6667

Avg(item5) = 2/2 = 1

Avg(item6) = 6/2 = 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Item1 | item2 | item3 | item4 | item5 | item6 |
| User1 | 1 | 1 | 0 | 1.333 | 0 | 0 |
| User2 | 0 | -1 | 1.5 | -0.667 | 0 | -1 |
| User3 | -1 | 0 | -1.5 | -0.667 | 0 | 1 |

(d)

C (user1, user2) = (1\*0-1\*1+0+1.33\*-0.67+0+0) /(√(1+1+16/9)\*√(1+9/4+4/9+1))

= -0.448

C (user1,user3) =(1\*-1+0+0+4/3\*-2/3+0+0)/(√1+1+16/9)\*√(1+9/4+4/9+1)=-0.448

C(user2,user3) =(0-0+3/2\*-3/2+-2/3\*-2/3+0+1\*-1)/√(1+9/4+4/9+1)\*√(1+9/4+4/9+1) = -0.597

Summary of Two Decades of Recommender Systems at Amazon.com and Amazon.com Recommendations

Based on the collaborative filtering algorithm of amazon, the author puts forward some improvements and future development directions. In the 1990s, collaborative algorithm is based on the similarity matching of search information between users, and finally outputs the content with high similarity. Through the updating of information patterns, programmers gradually use collaborative filtering between items to match and produce recommendations. The advantage of item cooperative algorithm is that the similarity of items under consideration will not change for a period, so it can be easily calculated offline and the accuracy is acceptable. Collaborative algorithms can predict what users like and thus increase sales. The core of collaborative filtering algorithm is to collect user preferences, find similar users or items, calculate and recommend. For an online website, the number of users tends to exceed the number of items, and the item data is relatively stable. Therefore, the calculation of item similarity is not only small, but also need not be updated frequently. However, this situation is only applicable to e-commerce websites, such as news, blog and other websites of system recommendation, the situation is often the opposite, the number of items is massive, and frequently updated.

Cooperative algorithm has a good development prospect in the future. With the development of artificial intelligence, it is revolutionary that machines can learn personal preferences and work out what they want.

Recommendation algorithms are widely used in e-commerce sites. Ordinary collaborative algorithms can no longer handle millions of different catalog items, so amazon has developed something called item-by-item collaborative filtering. This project is different from the traditional collaborative algorithm. Item-by-item collaborative filtering algorithm can generate recommendations in real time in big data. The item-by-item collaborative algorithm first calculates the similarity between items, and then predicts the items that have not been rated by users based on the similarity between previously calculated items. The algorithm is fast and only depends on the number of items bought or rated by the user. In addition, the item-by-item collaborative filtering algorithm runs on a small data set, which is beneficial for the size of the algorithm.

Author concluded by comparison, item by item, the predictions of a collaborative filtering algorithm is better than common user collaborative algorithm to high quality, due to the collaborative filtering algorithm can be calculated in advance good item by item similarity, predictive performance than its online user collaborative filtering algorithm is high, even with a small subset of users can also get high quality prediction results.