

RS Assignment # 1

Ali Suleman
22K4060

Q.1 a)

u_1

$$r(u_1, u_2) = \frac{(3-3)(1-1.5) + (3-3)(2-1.5) + (3-3)(2-1.5)}{\sqrt{0^2+0^2+0^2} \times \sqrt{0.5^2+0.5^2+0.5^2}} = 0$$

$$r(u_1, u_3), r(u_1, u_4), r(u_1, u_5) = 0$$

u_2 :

$$r(u_2, u_1) = 0$$

$$r(u_2, u_3) = 0$$

$$R(U_2, U_4) = \frac{(1-1.5)(3-3.33) + (2-1.5)(3-3.33) + (1-1.5)(4-3.33)}{\sqrt{0.5^2 + 0.5^2 + 0.5^2} \times \sqrt{0.33^2 + 0.33^2 + 0.67^2}}$$

$$= -0.4737$$

$$R(U_2, U_5) = 0$$

User 4:

$$r(U_4, U_1) = 0$$

$$r(U_4, U_2) = -0.474$$

$$r(U_4, U_3) = 0$$

$$r(U_4, U_5) = 0$$

K=1

Neighbor of User 1: Undefined

Neighbor of User 2: User 3
or User 5

Neighbor of User 4: User 1
or User 5

b)

$R(U1, Item3)$

Adj Cosine Sims:

$$(I3, I1) = \frac{(-0.5)(-0.5) + (-0.33)(0.67)}{\sqrt{0.5^2 + 0.33^2} \times \sqrt{0.5^2 + 0.67^2}} \\ = 0.057$$

$$(I3, I2) = \frac{(0.5)(-0.5) + (-0.33)(0.67)}{\sqrt{0.5^2 + 0.33^2} \times \sqrt{0.5^2 + 0.67^2}} \\ = -0.94$$

$$(I3, I4) = -1$$

$$\cancel{R(U1, I3)} \\ K=3$$

$$R(U1, I3) = 3 + \frac{(0.058 \times 0) + (-0.94 \times 0) + (-1 \times 0)}{0.058 + |-0.94| + |-1|} \\ = 3$$

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$$R(U3, I1)$$

$$(I1, I2) = \frac{(-0.5)(0.5) + (-0.33)(-0.33)}{\sqrt{0.5^2 + 0.33^2} \times \sqrt{0.5^2 + 0.33^2}}$$
$$= -0.393$$

$$(I1, I3) = 0.057$$

$$(I1, I4) = -1$$

$$R(U3, I1) = 3 + \frac{(0.058 \times 0)}{0.058}$$

$$R(U3, I1) = 3$$

$$R(U4, I4)$$

$$(I4, I1) = -1$$

$$(I4, I2) = \frac{0.5(0.5)}{\sqrt{0.5^2} \cdot \sqrt{0.5^2}} = 1$$

$$(I4, I3) = -1$$

$$R(U4, I4) = 3.33 + \frac{[(-1 \times -0.33) + (-1 \times -0.33) + (-1 \times -0.67)]}{| -1 | + | -1 | + | -1 |}$$

$$= 3.33 + \frac{(-0.67)}{3}$$

$$R(U4, I4) = 3.11$$

c) user S is the least reliable user in terms of their provided ratings.

User S₁ has rated all items a score of 5 which shows that user has no preferences. He is a casual user. User S₁ shows no variation between items.

d)

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2-1)}$$

User 2

(u_2, u_1)

Co rated Items : 1, 2, 4

Assigning Ranks:

$u_2: (1, 2.5, 2.5)$

$u_1: (2, 2, 2)$ Since all equal

Diff Vector = $(-1, 0.5, 0.5)$

$$\rho = \frac{1 - 6(-1^2 + 0.5^2 + 0.5^2)}{3(3^2-1)}$$

$$= 0.625$$

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$(u_2, u_3) = \text{Not possible}$

$(u_2, u_4) : \text{co rated items : } 1, 2, 3$

Assigning Ranks:

$$u_2 : (1.5, 3, 1.5)$$

$$u_4 : (1.5, 1.5, 3)$$

~~$$\text{Diff Vector} = (-1, 0.5, 0.5)$$~~

$$D \text{ vec} = (0, 1.5, -1.5)$$

$$\rho = \frac{1 - 6(1.5^2 + 1.5^2)}{3(9-1)}$$

$$= -0.125$$

(u_2, u_5)

$$u_2 : [1.5, 3.5, 1.5, 3.5]$$

$$u_5 = [2.5, 2.5, 2.5, 2.5]$$

$$\rho = \frac{1 - 6(4)}{4(4-1)} = 0.6$$

User 3

Since User 3 has rated
only 1 item (I3)
so not possible to
find ρ .

User 5

$$(u_5, u_1) = 1, 2, 4$$

$$u_5 = (2, 2, 2)$$

$$u_1 = (2, 2, 2)$$

$$\rho = 1 - \frac{6(0^2 + 0^2 + 0^2)}{24}$$
$$= 1$$

$$(u_5, u_2) = \rho = 0.6$$

$$(u_5, u_3) = \text{not possible}$$

(u5, u4)

$$u5 = (2, 2, 2)$$

$$u4 = (1.5, 1.5, 3)$$

$$\rho = \frac{1 - 6(1.5)}{24}$$

$$= 0.625$$

User	Nearest User
User 2	User 1
User 3	NA
User 5	User 1

← END →