

* Updated table

5
,
)

3. (o)
$$(70B, TGF) = (1)(1.75)$$

 $\sqrt{2} \times \sqrt{1.75^2 + 1.25^2 + (0.25)^2} \times 2$



						V.		
N	02)	ricot m	novie -	- User	VS.			
e.	JAD,	Insing P	Hom -	Ptem c	alla baxat	ive filtersi	irg.	
1		00110	100,	1100	Dice of the second	V	,	
7				01	V2	V3	04	US
202		MOT		4	0	3	0	5
8		TOB		4	3	0	0	2
7	-	TLOTA		4	· 0 ·	2	2	0
7		TGF		5	2	3	3	2
7		TGTB &		4	4	∇	0	0
1							*	
	>0	Finding	remter	ලෙන් ලන්ද	ne similar	nity for TOB	with a	all movies.
					* *		1.6	
	A	Mean c	of Row	F				
		Row:	1 = 4	+3+5	/3 =	4		
	,				/3 =			
					/3 =			
					-3 /4 =		,	
					2 =			
			-		,	Ē		
	B	Substa	act tr	re. mear	n with	respective ?	RON VI	alves.
		updated	UI	U 2	V 3	U4	US	
		TDN	0	0		0		
		TOB	1	0	0	O		
		TLOTE	1.33	0	-0.67	-067	O	
		TGF	1.95	-1.25	-0.25	-0.25	0	
		TGTBLTU		0	0	0	0	
		1		3				
		1						
	Marie Contraction of the Contrac	1						



Q2) Collaborative Filtering to colon rating.

a. TOB movie - user 03

Using Pterm - Pterm collaborative filtering

	(),	(),	03	. 04	US
TON	24	m	3	0	5
100	ع	3	2		2
+1 A+P	4.	0 *	2	٠ ٥	0
TOB TLOTR TGIF	5	2_	3	3	. 6
TGTBLTU	4	4.	0	20	0
19115810		,			

a finding contered cosine similarity for TOB with all movies.

mean of Pow.

POW1 = 4+3+5 = 4

Row 2 = 4+3+2 = 3

Row 3 = 4+2+2 = 2.67

Row 4 2. 5+2+3+3 _3.25

Rows 2 4+4 -4

(B) Subtract the mean with respective now values.

Cosin

inclusion similarity of user U, & U3 9s the highest = 0.791.
Thus, they are the most similar.

3. Centered Cosine. Similarity:

Calculate mean of each row & substract mean of
that row from all the readings of that row.

Mean of Pow 1 = 4+4+4+5+4 = 4.2

ROWL = 3+2+4. 3

Pow3 3+2+3 2:67

Pow 4 2+3 2-5

Rows = 5+2 3.5

* Revised sectings of all users will be.
.. (subtract mean from respective row values)

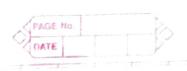
LI [-0.2, -0.2, -0.2, 0.8, -0.2

es [0,0,0,1]

Us [0.33, 0, -0.67, 0.33, 0]

114 [0,0,-0.5,0.5,0

US 1.5, -1.5, 0, 0, 0



a. Cosine Similarity Method:

$$0_1 = [4, 4, 4, 5, 4]$$
 $0_2 = [0, 3, 0, 2, 4]$
 $0_3 = [3, 0, 2, 3, 0]$
 $0_4 = [0, 0, 2, 3, 0]$
 $0_5 = [5, 2, 0, 0, 0]$

$$\frac{\partial C(U_1, U_2)}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 0 + 5 \times 2 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 3 + 4 \times 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0 + 4 \times 4}{||U_1|| ||U_2||} = \frac{4 \times 0$$

b)
$$c(U_1, U_3) = 4 \times 3 + 4 \times 0 + 4 \times 2 + 5 \times 3 + 4 \times 0$$

 $\sqrt{4^2 + 4^2 + 5^2 + 4^2} \times \sqrt{3^2 + 2^2 + 3^2}$

$$c)c(U_1, U_4) = 4x0 + 4x0 + 4x2 + 5x3 + 4x0 = 0.6762$$

$$\sqrt{4^{2}+4^{2}+4^{2}+5^{2}+4^{2}} \times \sqrt{2^{2}+3^{2}}$$

$$d)c(U_{1},U_{5}) = 4\times5 + 4\times2 + 4\times0 + 5\times0 + 4\times0 = 0.551$$

$$\sqrt{4^2+4^2+4^2+5^2+4^2}$$
 $\times \sqrt{5^2+2^2}$

$$e(0_2, 0_3) = 0 \times 3 + 3 \times 0 + 0 \times 2 + 2 \times 3 + 4 \times 0$$
 0.238 $-\sqrt{3^2 + 2^2 + 4^2} \times \sqrt{3^2 + 2^2 + 3^2}$

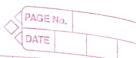
$$\frac{1}{\sqrt{3^2+2^2+4^2}} \times \sqrt{2^2+3^2} = 0.31$$

$$\sqrt{3^2 + 2^2 + 4^2} \times \sqrt{5^2 + 2^2}$$

$$(1)_{C}(0_3, 0_4) = 3 \times 0 + 0 \times 0 + 2 \times 2 + 3 \times 3 + 0 \times 0 \qquad 0.769$$

$$\sqrt{3^2+2^2+3^2} \times \sqrt{2^2+3^2}$$

9)
$$C(03,05) = 3\times 5$$
 0. 594



(92) Collaborative filtering to colon rating Q. TOB movie - user U3

Using Pterm - Pterm collaborative filtering

-		O,	O 2	03	. 04	10
	TOB	29.	· · ·	3	. 0	05
	708	24	3	2.	. 0	5
	TLOTE	4	0 ^	2	. 5	
	TLOTR TGTB&TU	5	2	3.	2	
	TGTB 2TU	4	4.	Q	3	0
		1			0	0

finding contered cosine similarity for TOB with all movies.

Mean of Pow. A

Pow1 = 4+3+5 = 4

Row 2 = 4+3+2 = 3

Row 3 = 4+2+2 = 2.67

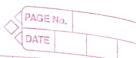
Pow 4 = 5+2+3+3 _3.25

Pows = 4+4 -4

B) Subtract the mean with respective row values.

SMA.	Assignm	ient 3	_	reclawar ps - A	PAGE No.			
81	Dataset	: Periew.	s for t	he movie	۵.			
	1. Jo 2. (o 3. Ce	nilar use accord Six sine Sim	nilarit	/		nods,		
*	Table:			1		1		
	508	TDN	TOB	TLOTR	TGF	TGTBETU		
	VI	4	4	4	5	4		
	V2		3		2	4		
	V3	3		2	3	,		
	04			2	3			
	US	5	2					
1,	1. $Jaccord$ Similarity Method: $Jacc = A \cap B $ $J(U_1, V_2) = 3 = 0.6$ $J(U_1, U_3) = 3 = 0.6$ $J(U_1, U_3) = 3 = 0.6$ $J(U_1, U_3) = 3 = 0.6$ $J(U_3, U_4) = 2 = 0.4$ $J(U_3, U_5) = 1 = 0.15$							
	$J(U_1, U_5) = 2 = 0.4$ $J(U_4, U_5) = 0$							
		5			٠	4		
	J (U2	(V3) = 1 =	0.2	•				
-	J (U2, U4) = 1 = 0.25 wers U3 & 1)4?							
	3 (02) 04/= 1.	= 0.25			& U4 is th		
	J (11)	, (15)=1	A. > <			thus		
	7 (02	4	= 0 -7			8 04 one		
		-		The	, inost	- Similar.		
		7 4						

(osine Tech) 1. $c(u_1,u_2) = (0.8)(-1) + (0.12)(1)$ $\sqrt{(-0.2)^2 \times 4 + (0.8)^2} \times \sqrt{(-1)^2 + 1^2}$ 2. c(llyllg)= (-0.2)(0.33)+(-0.2)(-0.67)+(0.8)(0.33) = $\sqrt{(0.2)^2 \times 4 + (0.8)^2} \times \sqrt{(0.33)^2 \times 2 + (0.64)^2}$ = 0.791 3. c(U1, U4)= (-0.2) (-0.5)+(0.8)(0.5) V(0.2)2X4 +(0.8)2 XV (0.5)2 X2 4. ((U1) H5)= (-0.2) (1.5)+ (-0.2)(-1.5) V (0.2)2 × 4 + (0.8)2 × V (1.5)2 x2 -0.286 5. c (ly, 1/2)= (-1) (0.33) V2 x 1/ (0.33)2 x2 + (0.67)2 6. ((112 x114)= (-1) (0.5) V2 x - 1 (0.5) x2 7. c(1/2, 1/5) = 0 8.c (lig, ulu) = (-0.67) (-0.5) +(0.33) (0.5) 0. 26.6 V(0.33) 2x2 + (0.67)2 x -1/(0.5) x2 9. c(13, 115)= 6.33)(1.5) 0.286 V (0.33)2 x2 + (0.67)2 * (1.5)2 x2 10. c(ly, lis) = 0 Users 3 l user 4 have highest centered cosine similarity. thus they are most similar.



(92) Collaborative filtering to colon rating Q. TOB movie - user U3

Using Pterm - Pterm collaborative filtering

-		O,	O 2	03	. 04	10
	TOB	29.	· · ·	3	. 0	05
	708	24	3	2.	. 0	5
	TLOTE	4	0 ^	2	. 5	
	TLOTR TGTB&TU	5	2	3.	2	
	TGTB 2TU	4	4.	Q	3	0
		1			0	0

finding contered cosine similarity for TOB with all movies.

Mean of Row. A

Pow1 = 4+3+5 = 4

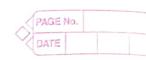
Row 2 = 4+3+2 = 3

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Pow 4 = 5+2+3+3 _3.25

Pows = 4+4 -4

B) Subtract the mean with respective row values.



(Osine Similarity.

dB .	Song	Tempo	Duration	Loudness	Dandoilty	Enen
(SA)	Sony A	0	1	0	0.6	0.8
(SB)	Song B	© >	©	1	0.2	0.7
(Sc)	Song C	0	0	1	0.5	0.7
(UP) A	Hice Prest	0	0	0	0.8	0.7
						_

Formula: _ P. P2.

 $\cos(OP, SA) = 0.6 \times 0.8 + 0.8 \times 0.7 - 0.42$ $\sqrt{1^2 + 0.6^2 + 0.8^2} \times \sqrt{0.8^2 + 0.7^2}$

 $\frac{\cos(UP,SB) = 0.5 \times 0.8 + 0.7 \times 0.7}{\sqrt{1^2 + 0.5^2 + 0.7^2} \times \sqrt{0.8^2 + 0.7^2}} = 0.373$

 $cos(OP, SC) = 0.5 \times 0.8 + 0.7 \times 0.7$ $\sqrt{1^2 + 0.5^2 + 0.7^2} \times \sqrt{0.8^2 + 0.7^2}$ 0.373

·: the similarity of Alice perference & song A is more (0.42),

: Ptis more likely to be recommended to
Alice.