

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

Anand Nagar, Krishnankoil – 626 126.

END SEMESTER EXAMINATIONS - NOV/DEC 2024

Course Code	:	224MDS3115	Duration	:	180 Minutes
Course Name	:	Recommendation System	Max. Marks	:	100
Degree	:	M.Sc.			

PART – A (20 Marks) Answer All Questions		Pattern	Mapping COs	Marks
1	Mention about Netflix recommender system	Understand	CO1	2.0
2	How user-based collaborative filtering works?	Analyze	CO1	2.0
3	Name the most desired rating system suitable for building recommenders using association analysis?	Remember	CO2	2.0
4	Mention how the problem of sparseness is dealt with while building decision trees for recommenders.	Analyze	CO2	2.0
5	What are the two types of data used in content based recommendation systems?	Understand	CO3	2.0
6	What are damping functions?	Analyze	CO3	2.0
7	Give an example of a symmetric metric used in case based recommendation systems	Understand	CO4	2.0
8	Give example for direct mapping in knowledge bases	Understand	CO4	2.0
9	Why it is necessary to consider experimental design issues while developing recommender evaluation systems?	Create	CO5	2.0
10	Name the quantities used in defining rating-based utility of an item	Remember	CO5	2.0

PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks																																																
11.A	<div>Given the mean centered-rating matrix as given below.</div> <table><tr><td></td><td>i1</td><td>i2</td><td>i3</td><td>i4</td><td>i5</td><td>i6</td><td>Means</td></tr><tr><td>u1</td><td>1.5</td><td>0.5</td><td>1.5</td><td>-1.5</td><td>-0.5</td><td>-1.5</td><td>5.5</td></tr><tr><td>u2</td><td>1.2</td><td>2.2</td><td>?</td><td>-0.8</td><td>-1.8</td><td>-0.8</td><td>4.8</td></tr><tr><td>u3</td><td>?</td><td></td><td>1</td><td>1</td><td>-1</td><td>-1</td><td>?</td></tr><tr><td>u4</td><td>-1.5</td><td>-0.5</td><td>-0.5</td><td>0.5</td><td>0.5</td><td>1.5</td><td>2.5</td></tr><tr><td>u5</td><td>-1</td><td></td><td>-1</td><td>0</td><td>1</td><td>1</td><td>2</td></tr></table> <div>Estimate the rating for user 3 item 1 using UBCF using k=2</div>		i1	i2	i3	i4	i5	i6	Means	u1	1.5	0.5	1.5	-1.5	-0.5	-1.5	5.5	u2	1.2	2.2	?	-0.8	-1.8	-0.8	4.8	u3	?		1	1	-1	-1	?	u4	-1.5	-0.5	-0.5	0.5	0.5	1.5	2.5	u5	-1		-1	0	1	1	2	Apply	CO1	16.0
	i1	i2	i3	i4	i5	i6	Means																																													
u1	1.5	0.5	1.5	-1.5	-0.5	-1.5	5.5																																													
u2	1.2	2.2	?	-0.8	-1.8	-0.8	4.8																																													
u3	?		1	1	-1	-1	?																																													
u4	-1.5	-0.5	-0.5	0.5	0.5	1.5	2.5																																													
u5	-1		-1	0	1	1	2																																													

PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks																																													
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11 .B	<table><tr><td>i1</td><td>i2</td><td>i3</td><td>i4</td><td>i5</td><td>i6</td></tr><tr><td>7</td><td>6</td><td>7</td><td>4</td><td>5</td><td>4</td></tr><tr><td>6</td><td>7</td><td>?</td><td>4</td><td>3</td><td>4</td></tr><tr><td>?</td><td>3</td><td>3</td><td>1</td><td>1</td><td>?</td></tr><tr><td>1</td><td>2</td><td>2</td><td>3</td><td>3</td><td>4</td></tr><tr><td>1</td><td>?</td><td>1</td><td>2</td><td>3</td><td>3</td></tr></table> <p>Estimate the rating r_{36} using item-based collaborative filtering using cosine similarity assuming $k=2$</p>	i1	i2	i3	i4	i5	i6	7	6	7	4	5	4	6	7	?	4	3	4	?	3	3	1	1	?	1	2	2	3	3	4	1	?	1	2	3	3	Apply	CO1	16.0									
i1	i2	i3	i4	i5	i6																																												
7	6	7	4	5	4																																												
6	7	?	4	3	4																																												
?	3	3	1	1	?																																												
1	2	2	3	3	4																																												
1	?	1	2	3	3																																												
12.A	Write a descriptive note on Model Based Collaborative Filtering Systems	Remember	CO2	16.0																																													
OR																																																	
12.B	<p>Consider a rating matrix with 8 users and items with possible ratings 1,2 and 3 as given below</p> <table><tr><td></td><td>i1</td><td>i2</td><td>i3</td><td>i4</td></tr><tr><td>u1</td><td>1</td><td>2</td><td>1</td><td>3</td></tr><tr><td>u2</td><td>2</td><td>2</td><td>3</td><td>1</td></tr><tr><td>u3</td><td>3</td><td>2</td><td>1</td><td>3</td></tr><tr><td>u4</td><td>1</td><td>2</td><td>1</td><td>3</td></tr><tr><td>u5</td><td>?</td><td>2</td><td>1</td><td>3</td></tr><tr><td>u6</td><td>2</td><td>1</td><td>1</td><td>3</td></tr><tr><td>u7</td><td>1</td><td>2</td><td>1</td><td>3</td></tr><tr><td>u8</td><td>1</td><td>3</td><td>2</td><td>1</td></tr></table> <p>Compute the predicted rating of item 1 for user 5 using the two approaches of naïve Bayesian collaborative filtering</p>		i1	i2	i3	i4	u1	1	2	1	3	u2	2	2	3	1	u3	3	2	1	3	u4	1	2	1	3	u5	?	2	1	3	u6	2	1	1	3	u7	1	2	1	3	u8	1	3	2	1	Understand	CO2	16.0
	i1	i2	i3	i4																																													
u1	1	2	1	3																																													
u2	2	2	3	1																																													
u3	3	2	1	3																																													
u4	1	2	1	3																																													
u5	?	2	1	3																																													
u6	2	1	1	3																																													
u7	1	2	1	3																																													
u8	1	3	2	1																																													

PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks																														
13.A	<p>Consider a hypothetical situation involving a rating system with 4 possible ratings namely 1, 2, 3 and 4. Assume there are 5 keywords and 100 documents. The data given below explains distributions of keywords over various documents along with ratings.</p> <table border="1"> <tr> <td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr> <td>k1</td><td>8</td><td>5</td><td>0</td><td>3</td></tr> <tr> <td>k2</td><td>12</td><td>10</td><td>5</td><td>2</td></tr> <tr> <td>k3</td><td>10</td><td>5</td><td>10</td><td>4</td></tr> <tr> <td>k4</td><td>5</td><td>6</td><td>5</td><td>1</td></tr> <tr> <td>k5</td><td>5</td><td>4</td><td>0</td><td>0</td></tr> </table> <p>Using entropies, identify the most discriminative and least discriminative features.</p>		1	2	3	4	k1	8	5	0	3	k2	12	10	5	2	k3	10	5	10	4	k4	5	6	5	1	k5	5	4	0	0	Evaluate	CO3	16.0
	1	2	3	4																														
k1	8	5	0	3																														
k2	12	10	5	2																														
k3	10	5	10	4																														
k4	5	6	5	1																														
k5	5	4	0	0																														
OR																																		
13.B	Describe in detail the general framework of Learning User Profiles and Filtering	Remember	CO3	16.0																														
14.A	(i) Explain the three phases in which the interaction between user and recommender system generally proceeds	Understand	CO4	8.0																														
	(ii) Give an example user interface for dynamic critiquing in a case-based recommender	Understand	CO4	8.0																														
OR																																		
14.B	(i) Explain how utility functions are used to rank matched items in constrained based recommenders	Create	CO4	8.0																														
	(ii) Explain the three forms of interaction between user and recommender.	Remember	CO4	8.0																														
15.A	<p>(i) Explain : Spearman Correlation and Kendall's tau</p> <p>(ii) . Consider a user John, for whom you have hidden his ratings for Aliens (5), Terminator (5), Nero (1), and Gladiator (6). The values in brackets represent his hidden ratings, and higher values are better.</p> <p>Now consider a scenario where the recommender system ranks these movies in the order Terminator, Aliens, Gladiator, Nero.</p> <p>a. Compute the Spearman rank correlation coefficient as a measure of recommendation ranking quality</p> <p>b. Compute the Kendall rank correlation coefficient as a measure of ranking quality.</p>	Evaluate	CO5	16.0																														
OR																																		
15.B	Explain any five measures meant for measuring the accuracy of ratings predictions	Remember	CO5	16.0																														

Assessment Pattern as per Bloom's Taxonomy:

C0s	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
C01	0	2.0	32.0	2.0	0	0	36
C02	18.0	16.0	0	2.0	0	0	36
C03	16.0	2.0	0	2.0	16.0	0	36
C04	8.0	20.0	0	0	0	8.0	36
C05	18.0	0	0	0	16.0	2.0	36
Total	60	40	32	6	32	10	180
