DECISION MODELING

PRACTICAL WORKS 4

COLLABORATIVE FILTERING AS A MODEL OF GROUP DECISION-MAKING

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AGENDA

Ratings Generation

1 Question 4 – Same Recommendation

2 Question 5 – Different Recommendation

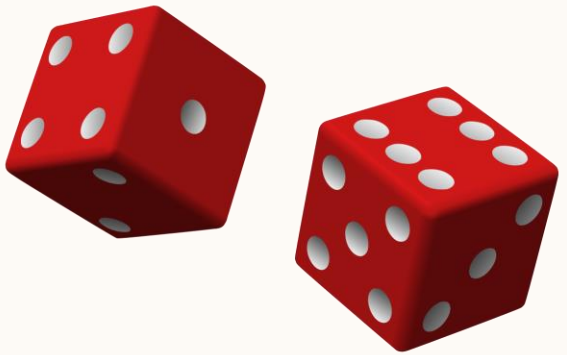
Q&A

RATINGS GENERATION

1. For each critic c
    - For each movie m
        - Assign a random rating

2. For each critic c
    - For each movie m
        - Remove a rating with probability 40%

3. Check conditions 1,2,3 with C0 as the target



QUESTION 4

Elaborate an example with the following conditions:

- Number of critics ≥ 10
- Number of movies ≥ 15
- 30% ≤ Missing data in total ≤ 50%
- Chosen critic to recommend (movies seen) ≤ 50%
- Recommendation is same for 5 different similarity measures:

1. Manhattan
2. Euclidean
3. Minkowski, with p = 3
4. Pearson
5. Cosine

QUESTION 4

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
C1	2.5	4.5	4	1	2.5	4	2.5	1	4	-	2.5	4	2.5	4.5	4
C2	4	1	5	5	4.5	4	4	1	5	5	4.5	4	1	4.5	5
C3	2.5	4	-	4.5	-	4	2.5	4	-	4.5	-	4	2.5	4	1
C4	-	-	4	4	2.5	-	-	4.5	4	4	2.5	4.5	-	4.5	4
C5	4	4	2	4	2	4	4	4	2	4	2	4	4	4	2
C6	4	4	-	5	-	-	4	4	-	5	4.5	4	4	4	-
C7	-	-	-	-	1	-	-	4.5	-	4	1	-	-	4.5	-
C8	5	-	4	-	2	-	5	-	4	-	2	-	5	-	4
C9	4	4	1	-	-	-	-	-	-	-	-	4	-	4	2
C10	-	-	-	4	-	-	-	4.5	-	4	-	-	-	4.5	-
C11	5	-	4	-	2	-	5	-	4	-	2	-	-	-	4

QUESTION 4

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓
- Number of movies (M1 till M15) ≥ 15 ✓

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
C1	2.5	4.5	4	1	2.5	4	2.5	1	4	-	2.5	4	2.5	4.5	4
C2	4	1	5	5	4.5	4	4	1	5	5	4.5	4	1	4.5	5
C3	2.5	4	-	4.5	-	4	2.5	4	-	4.5	-	4	2.5	4	1
C4	-	-	4	4	2.5	-	-	4.5	4	4	2.5	4.5	-	4.5	4
C5	4	4	2	4	2	4	4	4	2	4	2	4	4	4	2
C6	4	4	-	5	-	-	4	4	-	5	4.5	4	4	4	-
C7	-	-	-	-	1	-	-	4.5	-	4	1	-	-	4.5	-
C8	5	-	4	-	2	-	5	-	4	-	2	-	5	-	4
C9	4	4	1	-	-	-	-	-	-	-	-	4	-	4	2
C10	-	-	-	4	-	-	-	4.5	-	4	-	-	-	4.5	-
C11	5	-	4	-	2	-	5	-	4	-	2	-	-	-	4

QUESTION 4

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓
- Number of movies (M1 till M15) ≥ 15 ✓
- 30% ≤ Missing data in total ≤ 50% ✓

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
C1	2.5	4.5	4	1	2.5	4	2.5	1	4	X	2.5	4	2.5	4.5	4
C2	4	1	5	5	4.5	4	4	1	5	5	4.5	4	1	4.5	5
C3	2.5	4	X	4.5	X	4	2.5	4	X	4.5	X	4	2.5	4	1
C4	X	X	4	4	2.5	X	X	4.5	4	4	2.5	4.5	X	4.5	4
C5	4	4	2	4	2	4	4	4	2	4	2	4	4	4	2
C6	4	4	X	5	X	X	4	4	X	5	4.5	4	4	4	X
C7	X	X	X	X	1	X	X	4.5	X	4	1	X	X	4.5	X
C8	5	X	4	X	2	X	5	X	4	X	2	X	5	X	4
C9	4	4	1	X	X	X	X	X	X	X	X	4	X	4	2
C10	X	X	X	4	X	X	X	4.5	X	4	X	X	X	4.5	X
C11	5	X	4	X	2	X	5	X	4	X	2	X	X	X	4
X's	3	+ 5	+ 4	+ 4	+ 4	+ 7	+ 4	+ 3	+ 5	+ 4	+ 3	+ 4	+ 5	+ 2	+ 3 = 60

function check_missing_data_percentage

- $Total\ cells = critics(n) \times movies\ (m) = 11 \times 15 = 165$
- $Empty\ cells = 60$
- $\%\ empty\ cells = \frac{Empty\ cells}{Total\ cells} \times 100 = \frac{60}{165} \times 100 = 36.36\%$

$(30\% \leq 36.36\% \leq 50\%)$

Thus, the condition is satisfied.

QUESTION 4

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓
- Number of movies (M1 till M15) ≥ 15 ✓
- 30% ≤ Missing data in total ≤ 50% ✓
- Chosen critic to recommend (movies seen) ≤ 50% ✓

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
C1	2.5	4.5	4	1	2.5	4	2.5	1	4	-	2.5	4	2.5	4.5	4
C2	4	1	5	5	4.5	4	4	1	5	5	4.5	4	1	4.5	5
C3	2.5	4	-	4.5	-	4	2.5	4	-	4.5	-	4	2.5	4	1
C4	-	-	4	4	2.5	-	-	4.5	4	4	2.5	4.5	-	4.5	4
C5	4	4	2	4	2	4	4	4	2	4	2	4	4	4	2
C6	4	4	-	5	-	-	4	4	-	5	4.5	4	4	4	-
C7	-	-	-	-	1	-	-	4.5	-	4	1	-	-	4.5	-
C8	5	-	4	-	2	-	5	-	4	-	2	-	5	-	4
C9	**4**	**4**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4**	**-**	**4**	**2**
C10	-	-	-	4	-	-	-	4.5	-	4	-	-	-	4.5	-
C11	5	-	4	-	2	-	5	-	4	-	2	-	-	-	4

function check_chosen_critic

- $Total\ movies = 15$
- $Movies\ seen = 6$
- $\%\ movies\ seen = \frac{Movies\ seen}{Total\ movies} \times 100 = \frac{6}{15} \times 100 = 40\% \leq 50\%$

Thus, the condition is satisfied.

QUESTION 4

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓
- Number of movies (M1 till M15) ≥ 15 ✓
- 30% ≤ Missing data in total ≤ 50% ✓
- Chosen critic to recommend (movies seen) ≤ 50% ✓
- Recommendation is same for 5 different similarity measures: ✓

1. Manhattan
2. Euclidean
3. Minkowski, with p = 3
4. Pearson
5. Cosine

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
C1	2.5	4.5	4	1	2.5	4	2.5	1	4	-	2.5	4	2.5	4.5	4
C2	4	1	5	5	4.5	4	4	1	5	5	4.5	4	1	4.5	5
C3	2.5	4	-	4.5	-	4	2.5	4	-	4.5	-	4	2.5	4	1
C4	-	-	4	4	2.5	-	-	4.5	4	4	2.5	4.5	-	4.5	4
C5	4	4	2	4	2	4	4	4	2	4	2	4	4	4	2
C6	4	4	-	5	-	-	4	4	-	5	4.5	4	4	4	-
C7	-	-	-	-	1	-	-	4.5	-	4	1	-	-	4.5	-
C8	5	-	4	-	2	-	5	-	4	-	2	-	5	-	4
C9	**4**	**4**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4**	**-**	**4**	**2**
C10	-	-	-	4	-	-	-	4.5	-	4	-	-	-	4.5	-
C11	5	-	4	-	2	-	5	-	4	-	2	-	-	-	4

M4 is recommended by all the similarity measures.

QUESTION 5

Elaborate an example with the following conditions:

- Number of critics ≥ 10
- Number of movies ≥ 15
- 30% ≤ Missing data in total ≤ 50%
- Chosen critic to recommend (movies seen) ≤ 50%
- Recommendation is different for 5 different similarity measures:

1. Manhattan
2. Euclidean
3. Minkowski, with p = 3
4. Pearson
5. Cosine

QUESTION 5

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓

	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
C0	4	-	2	-	2	-	-	-	5	2	-	-	2	-	-
C1	3	3	-	-	-	-	2	-	5	2	-	-	1	2	5
C2	2	4	1	4	-	-	3	1	4	5	-	5	-	1	-
C3	2	5	-	3	-	2	-	4	-	-	5	3	3	2	2
C4	1	4	4	-	4	-	-	1	4	4	5	2	1	1	4
C5	2	3	-	5	3	-	-	-	-	-	3	-	5	4	-
C6	-	1	4	2	2	4	-	1	-	1	5	-	-	3	-
C7	1	-	5	4	-	3	-	5	2	-	4	3	-	-	-
C8	2	3	5	-	1	5	4	-	5	2	-	-	3	2	-
C9	-	-	2	1	-	4	-	-	-	-	4	-	-	5	2

QUESTION 5

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓
- Number of movies (M1 till M15) ≥ 15 ✓

	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
C0	4	-	2	-	2	-	-	-	5	2	-	-	2	-	-
C1	3	3	-	-	-	-	2	-	5	2	-	-	1	2	5
C2	2	4	1	4	-	-	3	1	4	5	-	5	-	1	-
C3	2	5	-	3	-	2	-	4	-	-	5	3	3	2	2
C4	1	4	4	-	4	-	-	1	4	4	5	2	1	1	4
C5	2	3	-	5	3	-	-	-	-	-	3	-	5	4	-
C6	-	1	4	2	2	4	-	1	-	1	5	-	-	3	-
C7	1	-	5	4	-	3	-	5	2	-	4	3	-	-	-
C8	2	3	5	-	1	5	4	-	5	2	-	-	3	2	-
C9	-	-	2	1	-	4	-	-	-	-	4	-	-	5	2

QUESTION 5

Elaborate an example with the following conditions:

- Number of critics (C1 till C11) ≥ 10 ✓
- Number of movies (M1 till M15) ≥ 15 ✓
- 30% ≤ Missing data in total ≤ 50% ✓

	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
C0	4	X	2	X	2	X	X	X	5	2	X	X	2	X	X
C1	3	3	X	X	X	X	2	X	5	2	X	X	1	2	5
C2	2	4	1	4	X	X	3	1	4	5	X	5	X	1	X
C3	2	5	X	3	X	2	X	4	X	X	5	3	3	2	2
C4	1	4	4	X	4	X	X	1	4	4	5	2	1	1	4
C5	2	3	X	5	3	X	X	X	X	X	3	X	5	4	X
C6	X	1	4	2	2	4	X	1	X	1	5	X	X	3	X
C7	1	X	5	4	X	3	X	5	2	X	4	3	X	X	X
C8	2	3	5	X	1	5	4	X	5	2	X	X	3	2	X
C9	X	X	2	1	X	4	X	X	X	X	4	X	X	5	2
Xs	2	+ 3	+ 3	+ 4	+ 5	+ 5	+ 7	+ 5	+ 4	+ 4	+ 4	+ 6	+ 4	+ 2	+ 5 = **64**

Function check_missing_data_percentage

- *Total cells = critics(n) * movies(m) = 10 *15 = 150*
- *Empty cells = 64*
- *% empty cells = (Empty cells / Total cells) * 100 = (64/150) * 100 =* ***42.67%***
- *30% < **42.67%** < 50%*

Thus, the condition ***is satisfied***

QUESTION 5

Elaborate an example with the following conditions:

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- Number of movies (M1 till M15) ≥ 15 ✓
- 30% ≤ Missing data in total ≤ 50% ✓
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	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
C0	4	-	2	-	2	-	-	-	5	2	-	-	2	-	-
C1	3	3	-	-	-	-	2	-	5	2	-	-	1	2	5
C2	2	4	1	4	-	-	3	1	4	5	-	5	-	1	-
C3	2	5	-	3	-	2	-	4	-	-	5	3	3	2	2
C4	1	4	4	-	4	-	-	1	4	4	5	2	1	1	4
C5	2	3	-	5	3	-	-	-	-	-	3	-	5	4	-
C6	-	1	4	2	2	4	-	1	-	1	5	-	-	3	-
C7	1	-	5	4	-	3	-	5	2	-	4	3	-	-	-
C8	2	3	5	-	1	5	4	-	5	2	-	-	3	2	-
C9	-	-	2	1	-	4	-	-	-	-	4	-	-	5	2

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- $Total\ movies = 15$
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- $\%\ movies\ seen = \frac{Movies\ seen}{Total\ movies} \times 100 = \frac{6}{15} \times 100 = 40\% \leq 50\%$

Thus, the condition is satisfied.

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- Number of movies (M1 till M15) ≥ 15 ✓
- 30% ≤ Missing data in total ≤ 50% ✓
- Chosen critic to recommend (movies seen) ≤ 50% ✓
- Recommendation is **different** for 5 similarity measures: ✓

1. Manhattan: **M13 (3.22)**
2. Euclidean: **M11 (3.21)**
3. Minkowski, with p = 3: **M1 (3.22)**
4. Pearson: **M5 (3.3)**
5. Cosine: **M10 (3.32)**

	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
C0	**4**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**5**	**2**	**-**	**-**	**2**	**-**	**-**
C1	3	3	-	-	-	-	2	-	5	2	-	-	1	2	5
C2	2	4	1	4	-	-	3	1	4	5	-	5	-	1	-
C3	2	5	-	3	-	2	-	4	-	-	5	3	3	2	2
C4	1	4	4	-	4	-	-	1	4	4	5	2	1	1	4
C5	2	3	-	5	3	-	-	-	-	-	3	-	5	4	-
C6	-	1	4	2	2	4	-	1	-	1	5	-	-	3	-
C7	1	-	5	4	-	3	-	5	2	-	4	3	-	-	-
C8	2	3	5	-	1	5	4	-	5	2	-	-	3	2	-
C9	-	-	2	1	-	4	-	-	-	-	4	-	-	5	2

THANK YOU

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