Oct 28

Collaborative Filtering (Netflix)

Each user ≡ a ranking of movies/shows on Netflix

Hypothesis: User A is "~~colose~~" to user B if their rankings are "close"

Assumption: Each user ranks ALL movies/shows on Netflix

User 1	User 2	User 3
1 Maya & the 3	3	1 $= a_1$
2 Great British Baking Show	2	3 $= a_2$
3 Love is Blind	1	2 $= a_3$

Input: A ranking a_1, a_i, a_j, a_n (permutation $1..n$)

(Implicit assumption: $1, .., n$ is the "true" ranking)

Output: number of inversions

Def: (i,j) is an inversion $i, j \in [n]$ ← $\{1, .., n\}$

(1) $i < j$ (2) $a_i > a_j$

Ex 1: User 2: $(a_1, a_2, a_3) = (\overset{1}{3}, \overset{2}{2}, \overset{3}{1})$

all pairs are invers $(1,2), (1,3), (2,3)$

$\Rightarrow$ # inversions $= 3$.

User 3: $(a_1, a_2, a_3) = (\overset{1}{1}, \overset{2}{3}, \overset{3}{2})$

$(2,3)$ is the only invers # inversions $= 1$

Ex 2: $a = 1 ... n$ # inversions $= 0$

(Ex for home) $a_1, .., a_n$ ~~is~~ are sorted in asc. order $\Longleftrightarrow$ # inversions $= 0$

Ex 3: $a = n, .., 1$ # inversions $=$ # pairs $= \frac{n(n-1)}{2} = \binom{n}{2}$

$0 \leq$ # inversions $\leq \binom{n}{2}$

↑ (Ex at home)