

Course website: <https://cseweb.ucsd.edu/classes/fa20/cse20-a/>

What data should we encode about each Netflix account holder to help us make effective recommendations?

In the table below, each row represents a user's ratings of movies: ✓ (check) indicates the person liked the movie, ✗ (x) that they didn't, and • (dot) that they didn't rate it one way or another.

Person	Fyre	Frozen II	Picard	Ratings written as a 3-tuple
P_1	✗	•	✓	$(-1, 0, 1)$
P_2	✓	✓	✗	$(1, 1, -1)$
P_3	✓	✓	✓	$(1, 1, 1)$
P_4	•	✗	✓	

Which of P_1, P_2, P_3 has movie preferences most similar to P_4 ?

Define the following functions whose inputs are ordered pairs of 3-tuples each of whose components comes from the set $\{-1, 0, 1\}$

$$d_1((x_1, x_2, x_3), (y_1, y_2, y_3)) = \max_{1 \leq i \leq 3} |x_i - y_i|$$

$$d_2((x_1, x_2, x_3), (y_1, y_2, y_3)) = \sqrt{\sum_{i=1}^3 (x_i - y_i)^2}$$

$d_1(P_4, P_1)$	$d_1(P_4, P_2)$	$d_1(P_4, P_3)$
$d_2(P_4, P_1)$	$d_2(P_4, P_2)$	$d_2(P_4, P_3)$

Extra example: A new movie is released, and P_1 and P_2 watch it before P_3 , and give it ratings; P_1 gives ✓ and P_2 gives ✗. Should this movie be recommended to P_3 ? Why or why not?

Extra example: Define the new functions that would be used to compare the 4-tuples of ratings encoding movie preferences now that there are four movies in the database.

This page has some useful notation that will be used throughout the course. Find the definitions for each of these terms by looking in the index of the course textbook.

Term	Notation Example(s)	We say in English
all natural numbers	\mathbb{N}	The (set of all) natural numbers. Note: we use the convention that 0 is a natural number.
all integers	\mathbb{Z}	The (set of all) integers
function definition	$f(x) = x + 4$	Define f of x to be $x + 4$
function application	$f(7)$	f of 7 or f applied to 7 or the image of 7 under f
	$f(z)$	f of z or f applied to z or the image of z under f
	$f(g(z))$	f of g of z or f applied to the result of g applied to z
absolute value	$ -3 $	The absolute value of -3
square root	$\sqrt{9}$	The non-negative square root of 9
quotient, integer division	$n \text{ div } m$	The quotient upon dividing n by m
modulo, remainder	$n \text{ mod } m$	The remainder upon dividing n by m
n -tuple	(x_1, x_2, x_3)	The 3-tuple of x_1 , x_2 , and x_3
	$(3, 4)$	The 2-tuple or ordered pair of 3 and 4
sequence	x_1, \dots, x_n	A sequence x_1 to x_n
	x_1, \dots, x_n where $n = 0$	An empty sequence
	x_1, \dots, x_n where $n = 1$	A sequence containing just x_1
	x_1, \dots, x_n where $n = 2$	A sequence containing just x_1 and x_2 in order
	x_1, x_2	A sequence containing just x_1 and x_2 in order
maximum	$\max(x, y)$	The max of x and y , when they are numbers
	$\max_{1 \leq i \leq n} x_i$	The max of x_1 to x_n , when they are numbers
roster method	$\{43, 7, 9\}$	The set whose elements are 43, 7, and 9
	$\{9, \mathbb{N}\}$	The set whose elements are 9 and \mathbb{N}
set builder notation	$\{x \in \mathbb{Z} \mid x > 0\}$	The set of all x from the integers such that x is greater than 0
	$\{3x \mid x \in \mathbb{Z}\}$	The set of all integer multiples of 3
summation notation	$\sum_{i=1}^n i$	The sum of the integers from 1 to n , inclusive
	$\sum_{i=1}^n i^2 - 1$	The sum of $i^2 - 1$ (i squared minus 1) for each i from 1 to n , inclusive