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HW1

Q1)
(a)

Movie ID	Corresponding Weight according to w()
03124	0.27103391082217876
14199	0.2711777534611824
06315	0.2710861246194568
07242	0.2712302590154106
17113	0.2712697082686535
10935	0.27122368998682783
11977	0.2712894554827877
03768	0.29119798994551205
02137	0.29113029735230445
06004	0.2911844389469680 5
08191	0.2712960412389864
15267	0.2914293175340726
03276	0.2713553886055061
16944	0.2711188119190368
01292	0.29129302224118986

(b)

Top 5 Similarity Scores		
	User ID	**Score**
1	1037245	2.782277557747669
2	2118461	2.5737639077919106
3	2602249	2.1998370845210404
4	16272	2.162017307044926
5	305344	2.1570261655310237

c)
User ID of the highest score is : **1037245**

The rating side by side is:

Side by side comparison of ratings of the most similar user and the auxiliary data		
Movie ID	Rating of User 1037245	Auxiliary Data Rating
03124	4	4
07242	1	2
17113	3	2
10935	2	4
11977	3	3

03276	3	3
14199	4	2
08191	2	2
06004	2	3
01292	2	2
03768	3	3
02137	2	1

The auxiliary database and user's 1037245 data are very similar. First off, the list of rated movies are exactly the same. In addition, the scores of 6 of the movies are the same. 4 of the scores are only off by 1. Only 2 of the scores are off by 2. No scores differ by greater than 2.

(d)
The difference between the highest and second highest scores is **0.2085136499557585**.

(a) If $\gamma = 0.1$ would you accept the top candidate
No I would not.

(b) If $\gamma = 0.05$ would you accept the top candidate?
Yes I would.

Q2

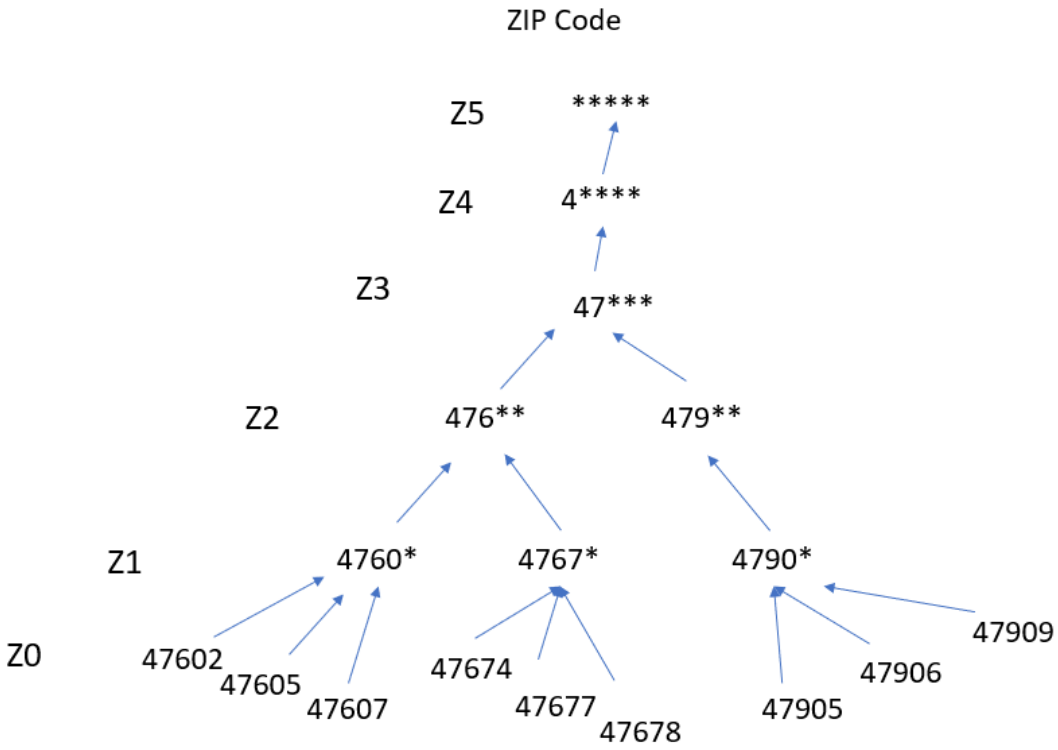
(a)

The quasi-identifiers are ZIP code, and Age.

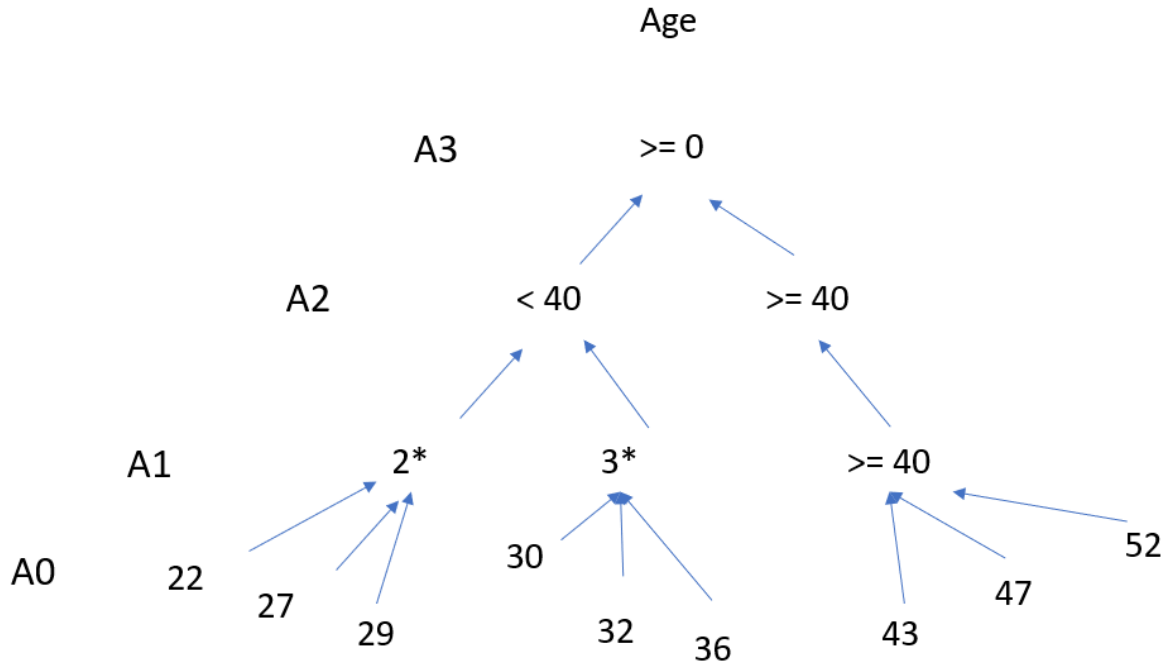
The sensitive attributes are Salary and Disease.

(b)

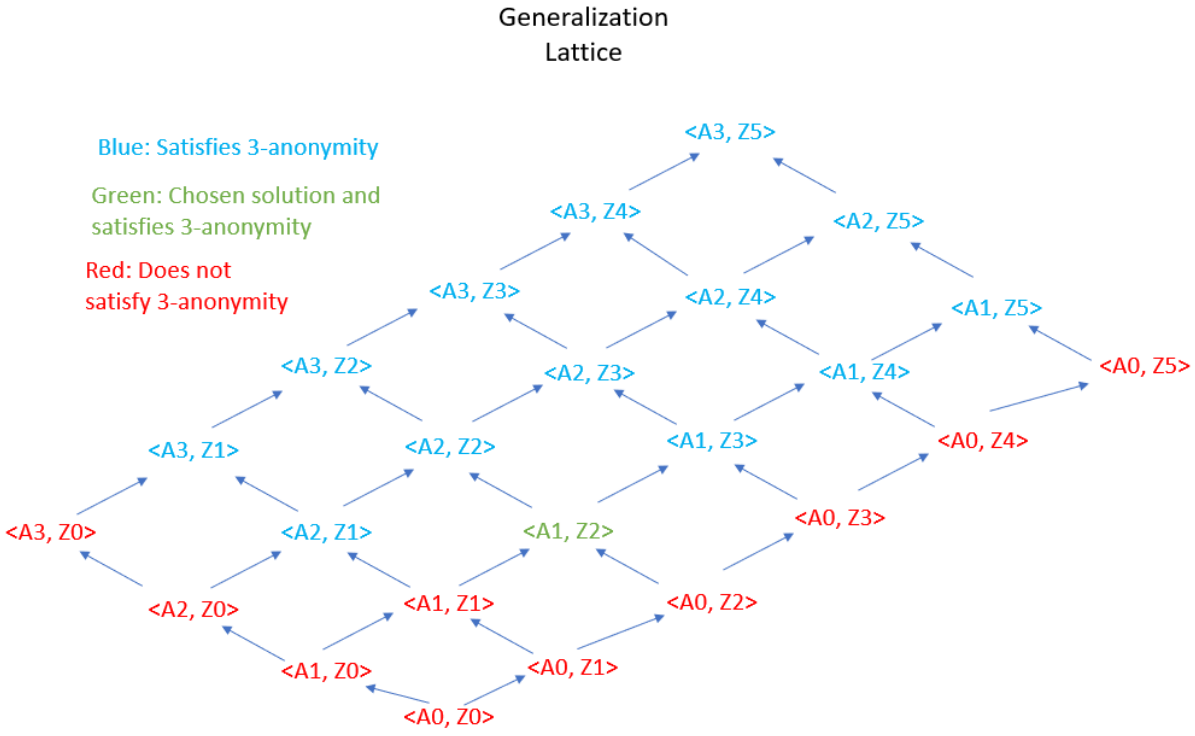
The generalized hierarchy for Zip Code is below. We are suppressing one digit at a time.



The generalization hierarchy for Age is below.



The Generalization lattice based on the generalization hierarchies above.



The final anonymized table is

ID	ZIP code	Age	Salary	Disease
1	476**	2*	3K	Gastric ulcer
2	476**	2*	4K	gastritis
3	476**	2*	5K	Stomach cancer
4	479**	>=40	6K	gastritis
5	476**	3*	7K	flu
6	479**	>=40	8K	bronchitis
7	476**	3*	9K	bronchitis
8	476**	3*	10K	pneumonia
9	479**	>=40	11K	Stomach cancer

(c)
Calculating t-closeness using the Earth Mover's Distance.

Q = {3K, 4K, 5K, 6K, 7K, 8K, 9K, 10K, 11K}
P1 = {3K, 4K, 5K}
P2 = {7K, 9K, 10K}
P3 = {6K, 8K, 11K}

P1.
3K) (1/9) * (3+4)/8
4K) (1/9) * (4+5)/8
5K) (1/9) * (5+6)/8

(7/72) + (9/72) + (11/72) = **27/72 = 0.375**

P2.
7K) (1/9) * (3+4)/8
9K) (1/9) * (3+4)/8
10K) (1/9) * (2+1)/8

(7/72) + (7/72) + (3/72) = **17/72 = 0.2361**

P3.
6K) (1/9) * (3+2)/8
8K) (1/9) * (3+1)/8
11K) (1/9) * (2+1)/8

(5/72) + (4/72) + (3/72) = **12/72 = 0.167**

t is the smallest threshold that is no smaller than the any of the thresholds amongst all of the equivalence classes. Therefore, the value of t is 0.375 for these equivalence classes.

(d)
This solution does not resolve the similarity attack with respect to disease because if one knows a person in their 20s in a zip code resembling 476** that exists in the dataset, then this person has a salary less than or equal to 5K and has a stomach disease.