Contemporary Data Processing Technology (CCOD)

Lab 10(29.10.2016)

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In this work I took the english alphabet: {a, b , c , d , e , f , g , h , i , j , k , l , m , n , o , p ,q , r , s , t , u , v , w , x , y , z }

Table of similarity percentage of letters:

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
a	1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
b	0.1	1	0.2	0.9	0.1	0.1	0.2	0.7	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.8	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
c	0.2	0.2	1	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.1	0.1	0.5	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1
d	0.1	0.9	0.1	1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.5	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
e	0.2	0.1	0.4	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
f	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.4	0.6	0.1	0.7	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.7	0.1	0.1	0.1	0.1	0.1	0.1
g	0.2	0.2	0.1	0.3	0.1	0.1	1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.7	0.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
h	0.1	0.7	0.1	0.2	0.1	0.1	0.2	1	0.1	0.1	0.2	0.1	0.1	0.5	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
i	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.1	1	0.8	0.1	0.9	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
j	0.1	0.1	0.1	0.1	0.1	0.6	0.1	0.1	0.8	1	0.1	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1
k	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	1	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1
l	0.1	0.1	0.1	0.1	0.1	0.7	0.1	0.1	0.9	0.6	0.2	1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1
m	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.7	0.1	0.1	0.1	0.3	0.1	0.1	0.2	0.1	0.4	0.1	0.1	0.1
n	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.7	1	0.4	0.3	0.3	0.7	0.1	0.1	0.8	0.1	0.1	0.1	0.1	0.1
o	0.4	0.2	0.6	0.3	0.5	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.4	1	0.5	0.5	0.3	0.1	0.1	0.5	0.2	0.1	0.1	0.1	0.1
p	0.2	0.8	0.1	0.5	0.1	0.1	0.7	0.2	0.1	0.1	0.2	0.2	0.1	0.3	0.5	1	0.8	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
q	0.2	0.6	0.1	0.6	0.1	0.1	0.9	0.2	0.1	0.1	0.1	0.2	0.1	0.3	0.5	0.8	1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1
r	0.1	0.1	0.5	0.1	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.3	0.7	0.3	0.2	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
s	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2
t	0.1	0.1	0.1	0.1	0.1	0.7	0.1	0.1	0.2	0.3	0.2	0.5	0.1	0.1	0.1	0.2	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1
u	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.8	0.5	0.2	0.2	0.1	0.1	0.1	1	0.7	0.2	0.1	0.5	0.1
v	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.7	1	0.7	0.3	0.8	0.1
w	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.7	1	0.2	0.2	0.1
x	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.2	1	0.3	0.1	
y	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.5	0.8	0.2	0.3	1	0.1
z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1

In the final table, where all values less than α and main diagonalwill become zeros.

Final table:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0.9	0	0	0.8	0.7	0	0	0	0	0	0	0	0.8	0.8	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0
4	0	0.9	0	0	0	0	0.8	0.7	0	0	0	0	0	0	0	0.8	0.8	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0.7	0.7	0	0.7	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
7	0	0.8	0	0.8	0	0	0	0.7	0	0	0	0	0	0	0	0.8	0.9	0	0	0	0	0	0	0	0	0
8	0	0.7	0	0.7	0	0	0.7	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0.7	0	0	0	0.8	0	0.9	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
10	0	0	0	0	0	0.7	0	0	0.8	0	0	0.8	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0.7	0	0	0.9	0.8	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0.7	0	0	0.7	0.7	0.7	0	0.7	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0.7	0	0	0.8	0.7	0.7	0	0.7	0
15	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0.8	0	0.8	0	0	0.8	0.7	0	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0
17	0	0.8	0	0.8	0	0	0.9	0.7	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0	0	0.7	0.7	0.7	0	0.7	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0.7	0	0	0.7	0.7	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.8	0	0	0	0.7	0	0	0	0.7	0.7	0	0.7	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0.7	0	0	0.7	0	0.7	0	0.8	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0.7	0	0	0.7	0.7	0	0	0.7	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0.7	0	0	0.7	0.8	0.7	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1) I = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26}

$C_1 = \{\}$

$a_{24} = a_{42} = 0.9 C_1 = \{2, 4\}$

$\text{Max sum}_7 \rightarrow C_1 = \{2, 4, 7\}$

$\text{Max sum}_{17} \rightarrow C_1 = \{2, 4, 7, 17\}$

$\text{Max sum}_{16} \rightarrow C_1 = \{2, 4, 7, 17,16\}$

$\text{Max sum}_8 \rightarrow C_1 = \{2, 4, 7, 17, 16, 8\}$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0.9	0	0	0.8	0.7	0	0	0	0	0	0	0	0.8	0.8	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0
4	0	0.9	0	0	0	0	0.8	0.7	0	0	0	0	0	0	0	0.8	0.8	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0.7	0.7	0	0.7	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
7	0	0.8	0	0.8	0	0	0	0.7	0	0	0	0	0	0	0	0.8	0.9	0	0	0	0	0	0	0	0	0
8	0	0.7	0	0.7	0	0	0.7	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0.7	0	0	0	0.8	0	0.9	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
10	0	0	0	0	0	0.7	0	0	0.8	0	0	0.8	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0.7	0	0	0.9	0.8	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0.7	0	0	0.7	0.7	0.7	0	0.7	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0.7	0	0	0.8	0.7	0.7	0	0.7	0
15	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0.8	0	0.8	0	0	0.8	0.7	0	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0
17	0	0.8	0	0.8	0	0	0.9	0.7	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0	0	0	0.7	0.7	0.7	0	0.7	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0.7	0	0	0.7	0.7	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.8	0	0	0	0.7	0	0	0	0.7	0.7	0	0.7	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0.7	0	0	0.7	0	0.7	0	0.8	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0.7	0	0	0.7	0.7	0	0	0.7	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0.7	0	0	0.7	0.8	0.7	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2) I = {1, 3, 5, 6, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26}

C_2 = {}

$a_{12\,9} = a_{9\,12} = 0.9C_2$ = {12, 9}

Max $sum_{10} \rightarrow C_2$ = {12, 9, 10}

Max $sum_6 \rightarrow C_2$ = {12, 9, 10, 6}

Max $sum_{20} \rightarrow C_2$ = {12, 9, 10, 6 , 20}

	1	3	5	6	9	10	11	12	13	14	15	18	19	20	21	22	23	24	25	26
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0.7	0.7	0	0.7	0	0	0	0	0	0.7	0	0	0	0	0	0
9	0	0	0	0.7	0	0.8	0	0.9	0	0	0	0	0	0.7	0	0	0	0	0	0
10	0	0	0	0.7	0.8	0	0	0.8	0	0	0	0	0	0.7	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0.7	0.9	0.8	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0.7	0	0.7	0	0	0.7	0.7	0.7	0	0.7	0
14	0	0	0	0	0	0	0	0	0.7	0	0	0.7	0	0	0.8	0.7	0.7	0	0.7	0
15	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0.7	0.7	0	0	0	0	0.7	0.7	0.7	0	0.7	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0.7	0.7	0.7	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0.7	0.8	0	0.7	0	0	0	0.7	0.7	0	0.7	0
22	0	0	0	0	0	0	0	0	0.7	0.7	0	0.7	0	0	0.7	0	0.7	0	0.8	0
23	0	0	0	0	0	0	0	0	0.7	0.7	0	0.7	0	0	0.7	0.7	0	0	0.7	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0.7	0.7	0	0.7	0	0	0.7	0.8	0.7	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3) I = {1, 3, 5, 11, 13, 14, 15, 18, 19, 21, 22, 23, 24, 25, 26}

C_3 = {}

$a_{21\,14} = a_{14\,21} = 0.8C_3$ = {21, 14}

Max $sum_{13} \rightarrow C_3$ = {21, 14, 13}

Max $sum_{18} \rightarrow C_3$ = {21, 14, 13, 18}

Max $sum_{22} \rightarrow C_3$ = {21, 14, 13, 18, 22}

Max $sum_{25} \rightarrow C_3$ = {21, 14, 13, 18, 22, 25}

Max $sum_{23} \rightarrow C_3$ = {21, 14, 13, 18, 22, 25, 23}

	1	3	5	11	13	14	15	18	19	21	22	23	24	25	26
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0.7	0	0.7	0	0.7	0.7	0.7	0	0.7	0
14	0	0	0	0	0.7	0	0	0.7	0	0.8	0.7	0.7	0	0.7	0
15	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0.7	0.7	0	0	0	0.7	0.7	0.7	0	0.7	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0.7	0.8	0	0.7	0	0	0.7	0.7	0	0.7	0
22	0	0	0	0	0.7	0.7	0	0.7	0	0.7	0	0.7	0	0.8	0
23	0	0	0	0	0.7	0.7	0	0.7	0	0.7	0.7	0	0	0.7	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0.7	0.7	0	0.7	0	0.7	0.8	0.7	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4) I = {1, 3, 5, 11, 15, 19, 24, 26}

C_4 = {}

$a_{15\,3} = a_{315} = 0.6C_4$ = {15, 3}

	1	3	5	11	15	19	24	26
1	0	0	0	0	0	0	0	0
3	0	0	0	0	0.6	0	0	0
5	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
15	0	0.6	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0

5) I = {1, 5, 11, 19, 24, 26}C_5 = {}

Matrix contain only 0, we can decide that these two letters belong to different classes.

C_5 = {1}

C_6 = {5}

C_7 = {11}

C_8 = {19}

C_9 = {24}

C_{10} = {26}

C = {{2, 4 , 7 , 17 , 16 , 8},{12, 9 , 10 , 6 ,20},{21, 14 , 13 , 18 , 22 , 25, 23},{15, 3},{1},{5},{11},{19},{24},{26}}

OR

C = {{b, d , g , p ,q , h}, {l , i , j , f , t}, {u, m , n , r , v , w , y}, {o , c}, {a}, {e}, {k}, {s}, {x}, {z}}