

## Exercise 12

The following are real user sessions:

S1: <P1,P2,P5>

S2: <P1,P2,P7,P3>

S3: <P1,P4,P5,P1,P6,P7>

S4: <P1,P6,P1,P4,P5,P4,P1,P6,P7>

S5: <P5,P3,P1,P2,P7,P3>

S6: <P2,P7>

S7: <P1,P2,P4,P1,P2,P6,P7,P3>

The following are reconstructed sessions from Exercise 3:

S1: <P1,P2,P5,P2,P7,P3>

S2: <P1,P4,P5,P1,P6,P7>

S3: <P1,P6,P1,P4>

S4: <P5,P4,P1,P6,P7>

S5: <P5,P3>

S6: <P1,P2,P7,P3>

S7: <P2,P7>

S8: <P1,P2,P4,P1,P2,P6,P7,P3>

A real session is completely reconstructed if all its elements are contained in the same constructed session.

To determine whether a real session is contained in a constructed session keep in mind that “being contained in” maintains order and adjacency. Also all elements of the real session must be present in the constructed session. So for example a real session cannot be contained in a constructed session if the real session is longer than the constructed session.

Real session S1 is contained in the constructed session S1

Real session S2 is contained in constructed session S6

Real session S3 is contained in constructed session S2

Real session S4 cannot be contained in any of the constructed sessions because it longer than all of them. (Its length is 9, and longest constructed session is 8)

Real session S5 is not contained in any of the constructed sessions

Real session S6 in contained session S7

Real session S7 is contained in constructed session S8

### M\_cr

The number of completely reconstructed sessions divided by the total number of real sessions:

In total, 5 real sessions(S1, S2, S3, S6, and S7) are contained in a constructed session

So  $M_{cr} = 5 / 7 = .71$

### M\_crs

The number of completely reconstructed sessions whose first element is also the first element of the constructed session divided by the total number of real sessions:

All of the real sessions contained in a constructed session share the first element with the constructed session

$$\text{So } M_{\text{crs}} = 5 / 7 = .71$$

### M\_cre

The number of completely reconstructed sessions whose last element is also the last element of the constructed session divided by the total number of real sessions:

Of these 5 real sessions only S2, S3, S6, and S7 share the last element with the constructed session

$$\text{So } M_{\text{cre}} = 4 / 7 = .57$$

### M\_crse

The number of identically reconstructed sessions divided by the total number of real sessions:

Of these 5 sessions only S2, S3, S6, and S7 share the first and last element with the constructed session

$$\text{So } M_{\text{crse}} = 4 / 7 = .57$$

### M\_o

First compute the degree of overlap between each real session and the 8 constructed sessions. This is computed by dividing the largest continuous intersection by the number of elements of the real session. LCI can be determined the same way as “contained in” except that not all elements from the real session must be in the reconstructed session:

S1: <P1,P2,P5>

$$\text{deg}(r, c) = 3/3, 1/3, 1/3, 1/3, 1/3, 2/3, 1/3, 2/3 \quad (\text{max} = 1)$$

S2: <P1,P2,P7,P3>

$$\text{deg}(r, c) = 3/4, 1/4, 1/4, 1/4, 1/4, 4/4, 2/4, 4/4 \quad (\text{max} = 1)$$

S3: <P1,P4,P5,P1,P6,P7>

$$\text{deg}(r, c) = 1/6, 6/6, 2/6, 3/6, 1/6, 1/6, 1/6, 2/6 \quad (\text{max} = 1)$$

S4: <P1,P6,P1,P4,P5,P4,P1,P6,P7>

$$\text{deg}(r, c) = 1/9, 3/9, 4/9, 5/9, 1/9, 1/9, 1/9, 2/9 \quad (\text{max} = 5/9)$$

S5: <P5,P3,P1,P2,P7,P3>

$$\text{deg}(r, c) = 3/6, 1/6, 1/6, 1/6, 2/6, 4/6, 2/6, 2/6 \quad (\text{max} = 4/6)$$

S6: <P2, P7>

$$\text{deg}(r, c) = 2/2, 1/2, 0/2, 1/2, 0/2, 2/2, 2/2 \quad (\text{max} = 1)$$

S7: <P1,P2,P4,P1,P2,P6,P7,P3>

$$\text{deg}(r, c) = 2/7, 1/7, 1/7, 2/7, 1/7, 2/7, 1/7, 7/7 \quad (\text{max} = 1)$$

Finally to compute  $M_o$  take the average of the max values:

$$M_o = \text{avg} = 1 + 1 + 1 + 5/9 + 4/6 + 1 + 1 / 7 = .89$$

### M\_s

First compute the degree of similarity between each real session and the 8 constructed sessions. This is computed by dividing the largest continuous intersection by the number of elements of the real session and constructed session.

S1: <P1,P2,P5>

$$\text{deg}(r, c) = 3/9, 1/9, 1/7, 1/8, 1/5, 2/7, 1/5, 2/11 \quad (\text{max} = 3/9)$$

S2: <P1,P2,P7,P3>

$$\text{deg}(r, c) = 3/10, 1/10, 1/8, 1/9, 1/6, 4/8, 2/6, 4/12 \quad (\text{max} = 4/8)$$

S3: <P1,P4,P5,P1,P6,P7>

$$\text{deg}(r, c) = 1/12, 6/12, 2/10, 3/11, 1/8, 1/10, 1/8, 2/14 \quad (\text{max} = 6/12)$$

S4: <P1,P6,P1,P4,P5,P4,P1,P6,P7>

$$\text{deg}(r, c) = 1/15, 3/15, 4/13, 5/14, 1/11, 1/13, 1/11, 2/17 \quad (\text{max} = 5/14)$$

S5: <P5,P3,P1,P2,P7,P3>

$$\text{deg}(r, c) = 3/12, 1/12, 1/10, 1/11, 2/8, 4/10, 2/8, 2/14 \quad (\text{max} = 4/10)$$

S6: <P2, P7>

$$\text{deg}(r, c) = 2/8, 1/8, 0/6, 1/7, 0/4, 2/6, 2/4, 1/10 \quad (\text{max} = 2/4)$$

S7: <P1,P2,P4,P1,P2,P6,P7,P3>

$$\text{deg}(r, c) = 2/14, 1/14, 1/12, 2/13, 1/10, 2/12, 1/10, 7/16 \quad (\text{max} = 7/16)$$

Finally to compute  $M_s$  take the average of the max values:

$$M_s = \text{avg} = 3/9 + 4/8 + 6/12 + 5/14 + 4/10 + 2/4 + 7/16 / 7 = .43$$