Devi Intan Nungma Putri

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PR 1.

a. Average Distance

- Jarak antar node :

   0-1 = 1

   0-2 = 2

   0-3 = 2

   1-2 = 1

   1-3 = 1

   2-3 = 1

- Jumlah total jarak = 1+1+2+1+1+1 = 7
- jumlah pasangan = 6
- Average distance = 7/6

                            = 1,17

Komunitas biru

jarak antar node

   4-10 = 1

   4-11 = 2

   4-12 = 2

   4-13 = 2

   10-11 = 1

   10-12 = 1

   10-13 = 1

   11-12 = 1

   11-13 = 2

   12-13 = 1

Jumlah total jarak = 1+2+2+2+1+1+1+1+2+1 = 14

jumlah pasangan = 10

Average distance = 14/10 ~ 1,4

b. Average embeddedness

Komunitas biru

Node 0 = edge internal = 2 , degree total = 2 → 1.0
   1 = edge internal = 3 , degree total = 4 → 3/4 = 0.75
   2 = edge internal = 3 , degree total = 3 → 1.0
   3 = edge internal = 3 , degree total = 3 → 2/3 = 0.67

Average embeddedness = (1.0 + 0.75 + 1.0 + 0.67)/4 = 0.855

Komunitas merah

Node 4 = ed. internal = 1, deg. total = 2 → 0.5
   10 = ed. internal = 4, deg. total = 5 → 4/5 = 0.8
   11 = ed. internal = 2, deg. total = 2 → 1.0
   12 = ed. internal = 3, deg. total = 3 → 1.0
   13 = ed. internal = 2, deg. total = 3 → 2/3 = 0.67

Average embeddedness = (0.5 + 0.8 + 1.0 + 1.0 + 0.67) = 0.794

c. Average internal degree

Komunitas biru

node 0 : 2
   1 : 3
   2 : 3
   3 : 2

Average = (2+3+3+2)/4 = 10/4 = 2,5

Komunitas merah
node 4 : 1   node 12 : 3
   10 : 4   13 : 2
   11 : 2

PR 2

A. M1

hasil deteksi kiri
komunitas $A = \{0,1,2\}$
$B = \{3,4,5\}$

hasil deteksi kanan
Komunitas $X = \{0,1,2,3\}$
$Y = \{4,5\}$

Probabilitas :
total node = 6
$P(A) = 3/6 = 0.5$, $P(B) = 3/6 = 0.5$
$P(X) = 4/6 = 0.667$, $P(Y) = 2/6 = 0.333$
$P(A,X) = 3/6 = 0.5$, $P(A,Y) = 0/6 = 0$
$P(B,X) = 1/6 = 0.167$, $P(B,Y) = 2/6 = 0.333$

Hitung kombinasi
$(A,X) = 0.5 \times \log_2(0.5/(0.5 \times 0.667)) = 0.5 \times \log_2(1.5)$
$= 0.2925$

$(A,Y) = 0$

$(B,X) = 0.167 \times \log_2(0.167/(0.5 \times 0.667) = 0.667 \times \log_2(0.5)$
$= 0.167 \times (-1) = -0.167$

$(B,Y) = 0.333 \times \log_2(0.333/(0.5 \times 0.333)) = 0.333 \times \log_2(2)$
$= 0.333 \times 1 = 0.333$

$\underline{TOTAL\ M1} = 0.2925 + 0 - 0.167 + 0.333$
$= 0.4585$
$= 0.459$

b. NMI

1. entropy $H(x)$ dan $H(y)$

$H(x) = -[0.5\log_2(0.5) + 0.5\log_2(0.5)] = -2 \times 0.5 \times (-1)$
$ = 1$

$H(y) = -[0.667\log_2(0.667) + 0.333\log_2(0.333)]$
$ = -[0.667 \times (-0.585) + 0.333 \times (-1.585)]$
$ = 0.390 + 0.528$
$ = 0.918$

2. NMI Formula

$$\frac{2 \times MI}{H(x) + H(y)} = \frac{2 \times 0.459}{1 + 0.918}$$

$$= \frac{0.918}{1.918}$$

$$= 0.479$$

C. Rand Index

1. Pasangan cocok

tot pasangan node $\binom{6}{2} = 15$

pasangan dalam komunitas sama di kedua deteksi

$(0,1)(0,2)(1,2)(4,5) \rightarrow 4$ pasangan cocok

pasangan beda komunitas di kedua deteksi

$(0,3)(0,4)(0,5)(1,3)(1,4)(1,5)(2,3)(2,4)(2,5)(3,4)(3,5)$

11 pasangan cocok

jml. pasangan cocok $= 4 + 11$
$ = 15$ pasangan cocok

2. Rand Index

$$RI = \frac{Jml.\ Pasangan\ Cocok}{Total\ pasangan} = \frac{15}{15} = 1$$

$$RI = 1.0$$

4. ARI

$$\frac{Index - Expected\ Index}{Max\ Index - Expected}$$

$$= \frac{15}{15}$$

$$= 1.0$$