Conversion of Information Diagram into Numerical form

Keywords: Numerical forms, Metrics Method

There are four methods

- The process matrix method
- The stream connection matrix method
- The incidence matrix method
- The adjacency matrix method

The process matrix:

Each unit in the information flow diagram is given one row of the process matrix.

The contents of that row are the number of the particular unit, the name of the unit computation representing the unit and the input stream number (as positive numbers) followed by the output streams numbered (as negative numbers). The process of matrix of Fig 1 &3 are

Table 2.1: Process Metric of information flow diagram figure 1.5

Unit	Unit computation name	Associated streams numbers		
1	MIXER	1	7	-2
2	DISTL	2	-8	-3
3	REACT	3	-4	
4	DISTL	4	-5	-9
5	DISTL	5	-7	-6

The order of the input and output stream number in a row of the process matrix is important for the transfer of information in to the unit computation. Ex. in a heat exchanger the first input and output may be the process fluid and the second input and output the service fluid or in the distillation calculation. The first output is overhead and second the bottoms. Thus the process matrix encodes the entire structure of the information diag.

It reveals the following:

- What stream links what units
- the name of the unit computation represents each unit
- The order of the input and output streams of a unit.

The real advantage of the process matrix is that the engineer can readily identify and read it.

The stream connection matrix

The stream connection matrix is an array with these entries per row.

The first entry is the stream number and the second and third are the numbers of the equipment units from which that stream comes and to which it goes, respectively. The stream connection matrix of fig 3 is given in table 2.2.

Table 2.2: Stream connection metrics of information flow diagram of figure 1.5.

Stream number	From unit number	to unit number
1	0	1
2	1	2
3	2	3
4	3	4
5	4	5
6	5	0
7	5	1
8	2	0
9	4	0

It can be seen that of the three items of information is the process matrix only the first is retained the stream connection matrix. thus there is neither indication of the type of unit computation nor of the order of input and output streams of a unit.

The incidence matrix method:

The incidence metrics of the same example is given in table 2.3.

Table 2.3: Incidence metrics for information flow diagram of figure 1.5.

Unit no.	stream number								
	1	2	3	4	5	6	7	8	9
1	1	-1					1	-1	
2		1	-1						
3			1	-1					-1
4				1	-1				
5					1	-1	-1		
sum	**1**	**0**	**0**	**0**	**0**	**-1**	**0**	**-1**	**-1**

Table 3

The left column contains the equipment number and the remaining columns correspond to stream numbers. A sybmbol “+1” shows that the stream number given by the row. A symbol “-1” indicates conversely shows that the stream leaves the equipment.

a Blank or zero shows that the stream does not connect to that equipment. Thus stream number 4 leaves unit no 3 and enters unit no 4 the column for stream has “-1” in row 3 and “+1” in row 4.

If the sum of a column is zero the stream connects two units. if the sum is +1 the stream is a feed and if it is -1 the stream is a product. recycle in the process can be detected immediately in the incidence matrix. if no rearrangement of rows would put the -1 above the +1 in each column having a zero sum. Thus stream 7 in the following table shows that there is recycle.

The incidence matrix contains the same information as the stream connection and thus has less information than the process matrix.

The Adjacency Metrics Method:

		To unit no.				
		1	**2**	**3**	**4**	**5**
From unit No.	**1**		**1**			
	2			**1**		
	3				**1**	
	4					**1**
	5	**1**				

Table 2.4: Adjacency Metrics of Information Flow diagram of figure 1.5.

Source:
http://nptel.ac.in/courses/103107096/2