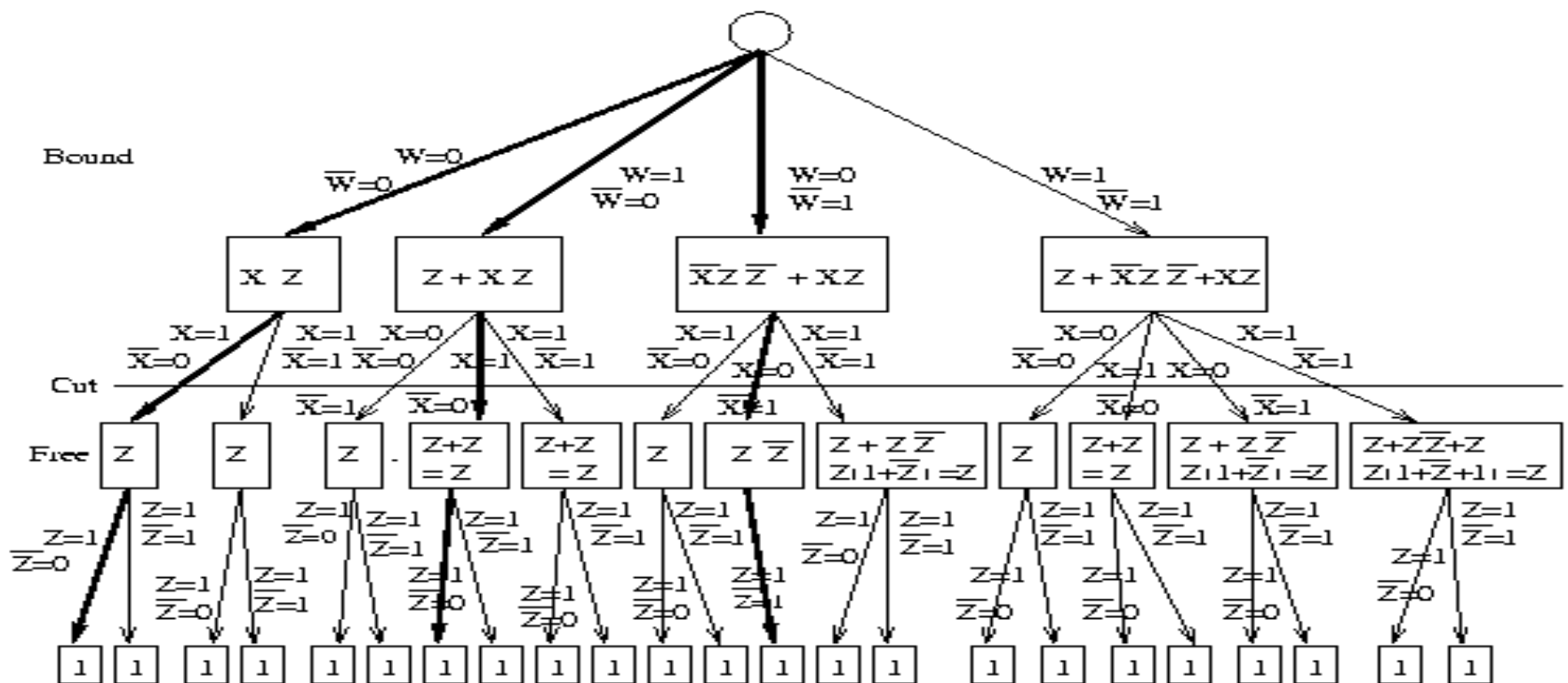


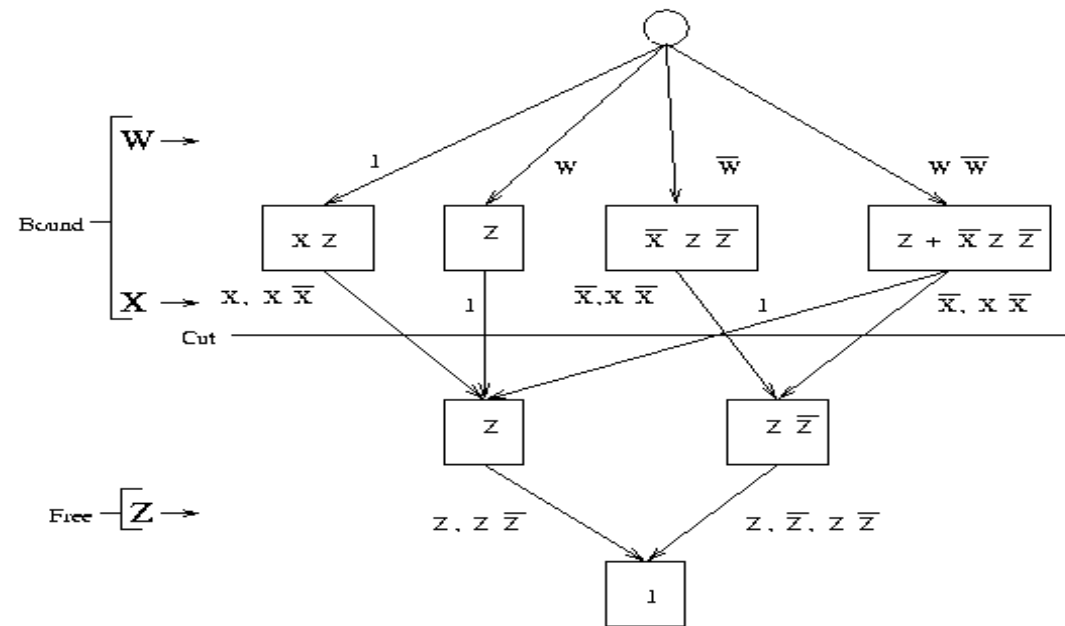
APPROACHES TO FUZZY LOGIC DECOMPOSITION

- Graphical Representations
- Kandel's and Francioni's Approach
- Fuzzy to Multiple-valued Function Conversion Approach
- ➔ Fuzzy Logic Decision Diagrams Approach
- Fuzzy Logic Multiplexer

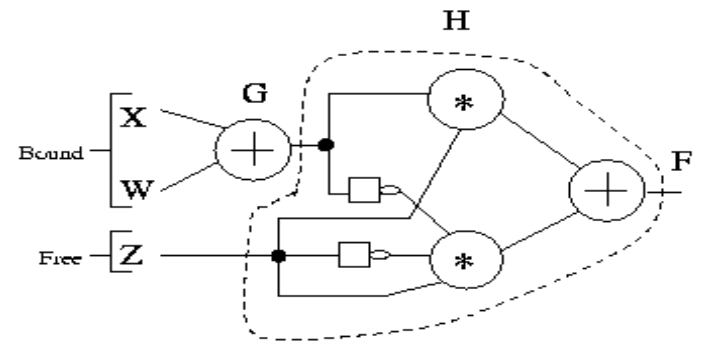
Fuzzy Logic Decision Diagrams Approach



Result of Example using (FLDD)



(a)

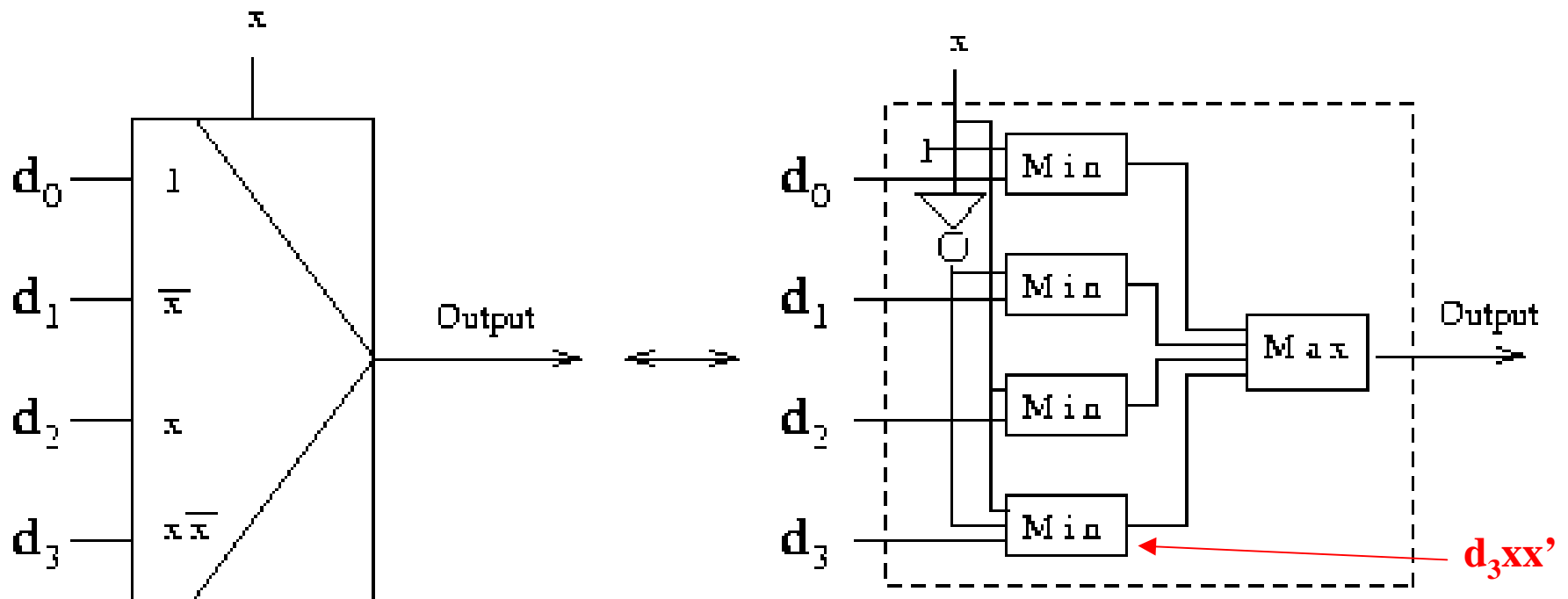


(b)

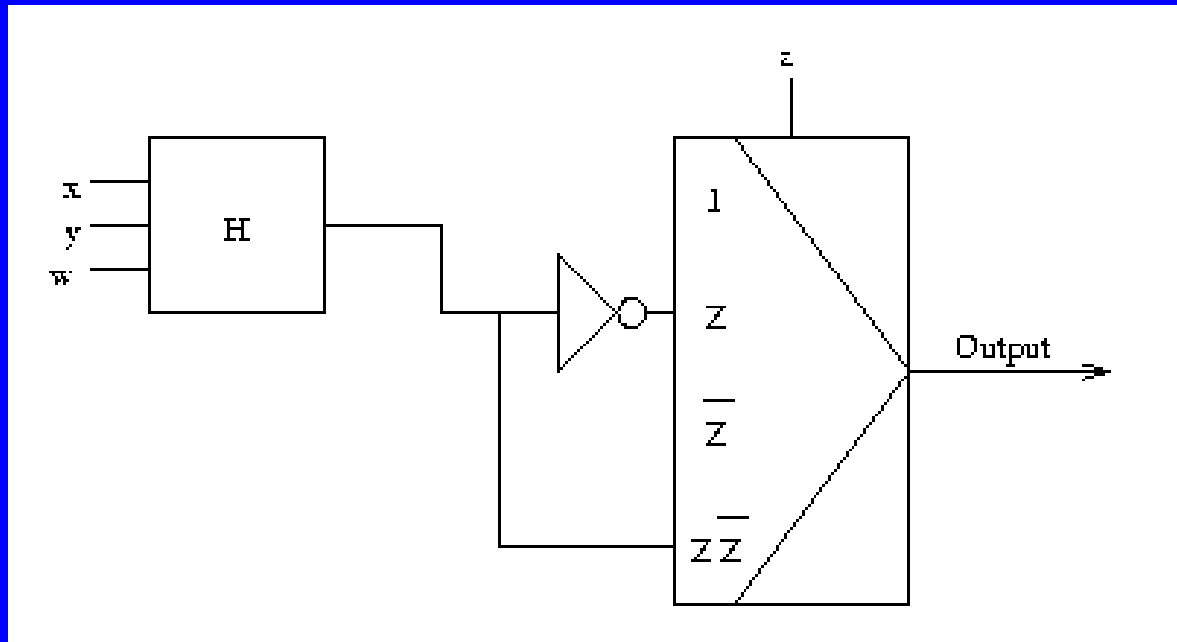
APPROACHES TO FUZZY LOGIC DECOMPOSITION

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Fuzzy Logic Multiplexer



Fuzzy Logic Circuit Implemented using Multiplexers



Contents

- Fuzzy logic
- Fuzzy logic systems applications
- Approaches to fuzzy logic decomposition
 - ➔ Decomposition program
- Conclusion

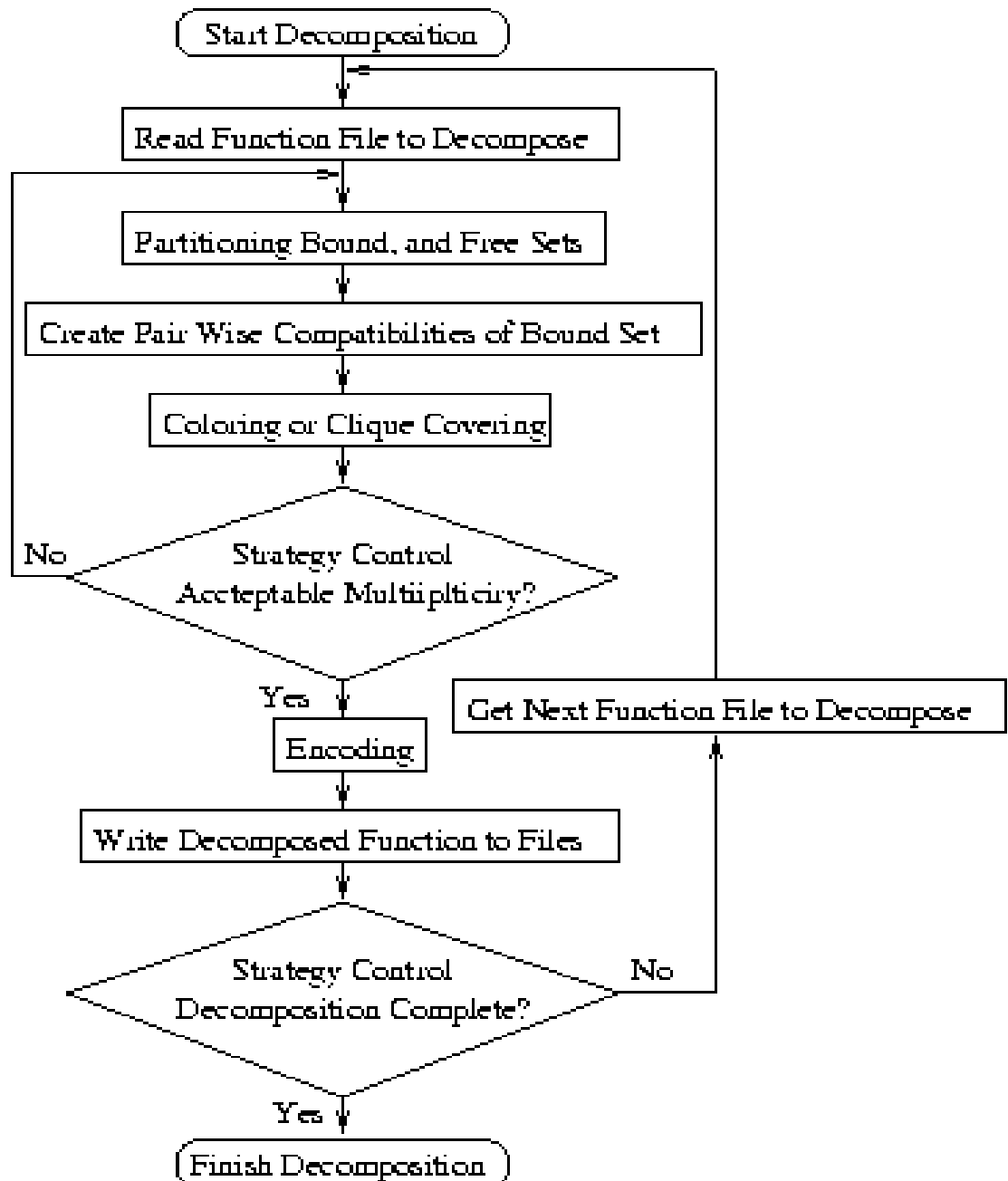
DECOMPOSITION PROGRAM

- Need to Decompose Multiple-valued Functions and Relations
- Decomposition Structure
- Multiple-Valued Cube Diagram Bundles
- Upgrading Generalized Universal Decomposer (GUD) to Multiple-Valued Generalized Universal Decomposer (MVGUD)
- Upgrading MVGUD to Relation Multiple-Valued Generalized Universal Decomposer (RMVGUD)
- Results of Using RMVGUD

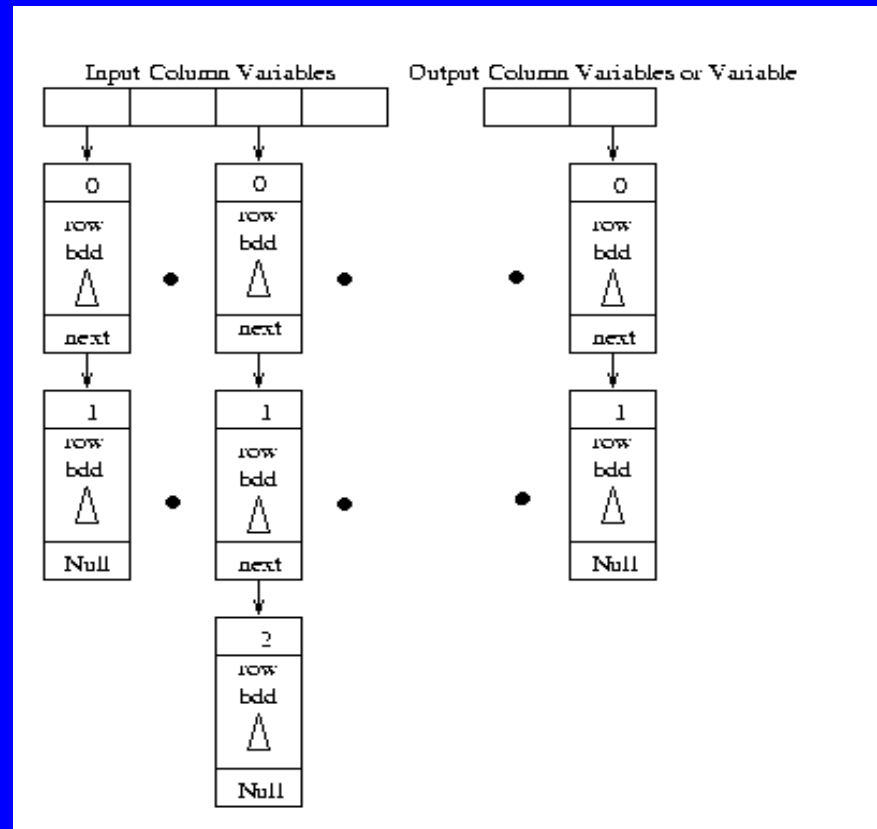
Need to Decompose Multiple-valued Functions and Relations

- Multiple-valued and Inconsistent Data
- Ways to Create Relations
 - Decomposition Process to Create Relations
 - Program to Change Inconsistency data into Relations

Decomposition Structure



Multiple-Valued Cube Diagram Bundles



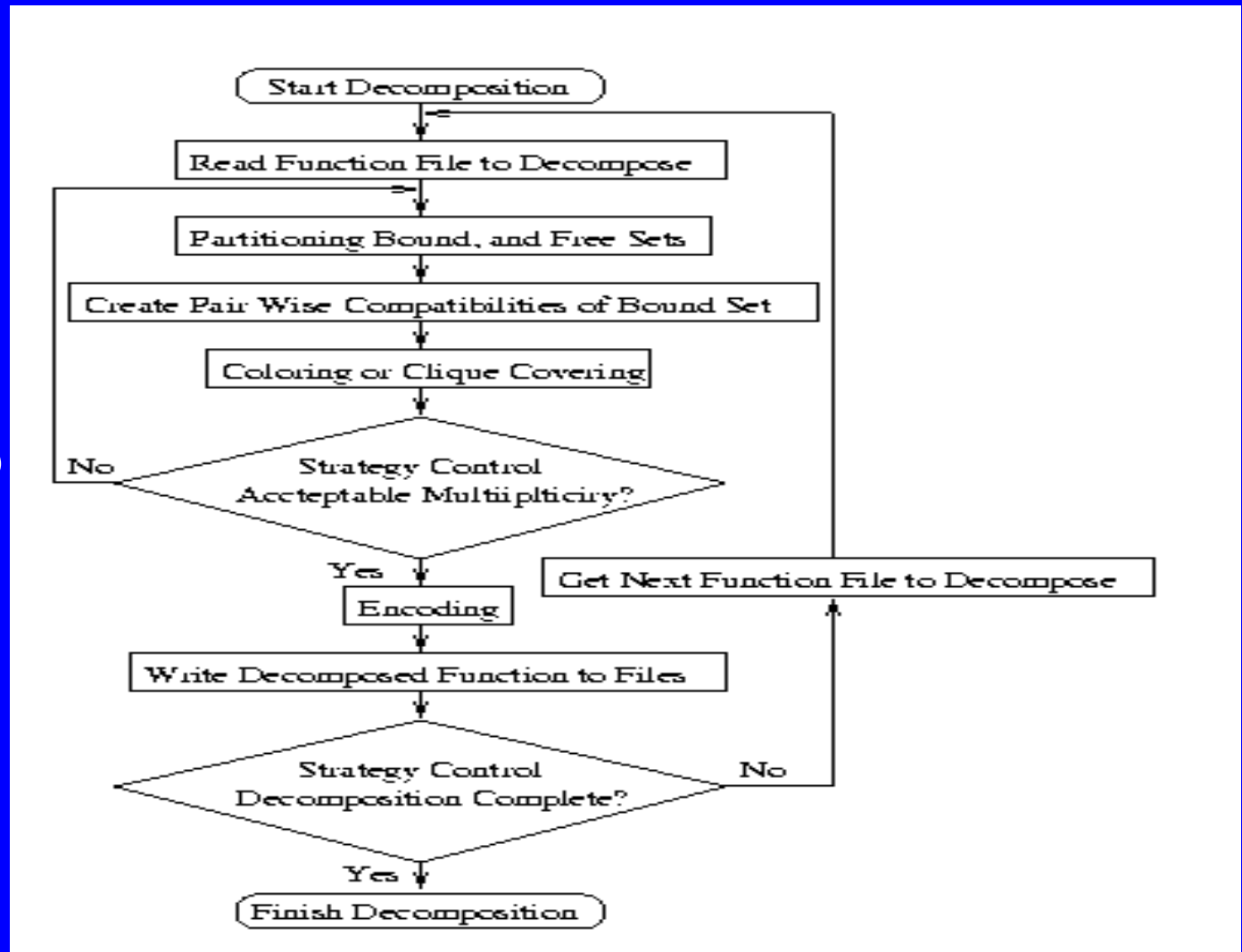
Upgrading GUD to MVGUD

Upgrading MVGUD to RMVGD

- Modify MVGUD to Read Relations
- Compatibility Checking and Correction for Relations Example
- New Data Structure for Writing Decomposed Relations to Files

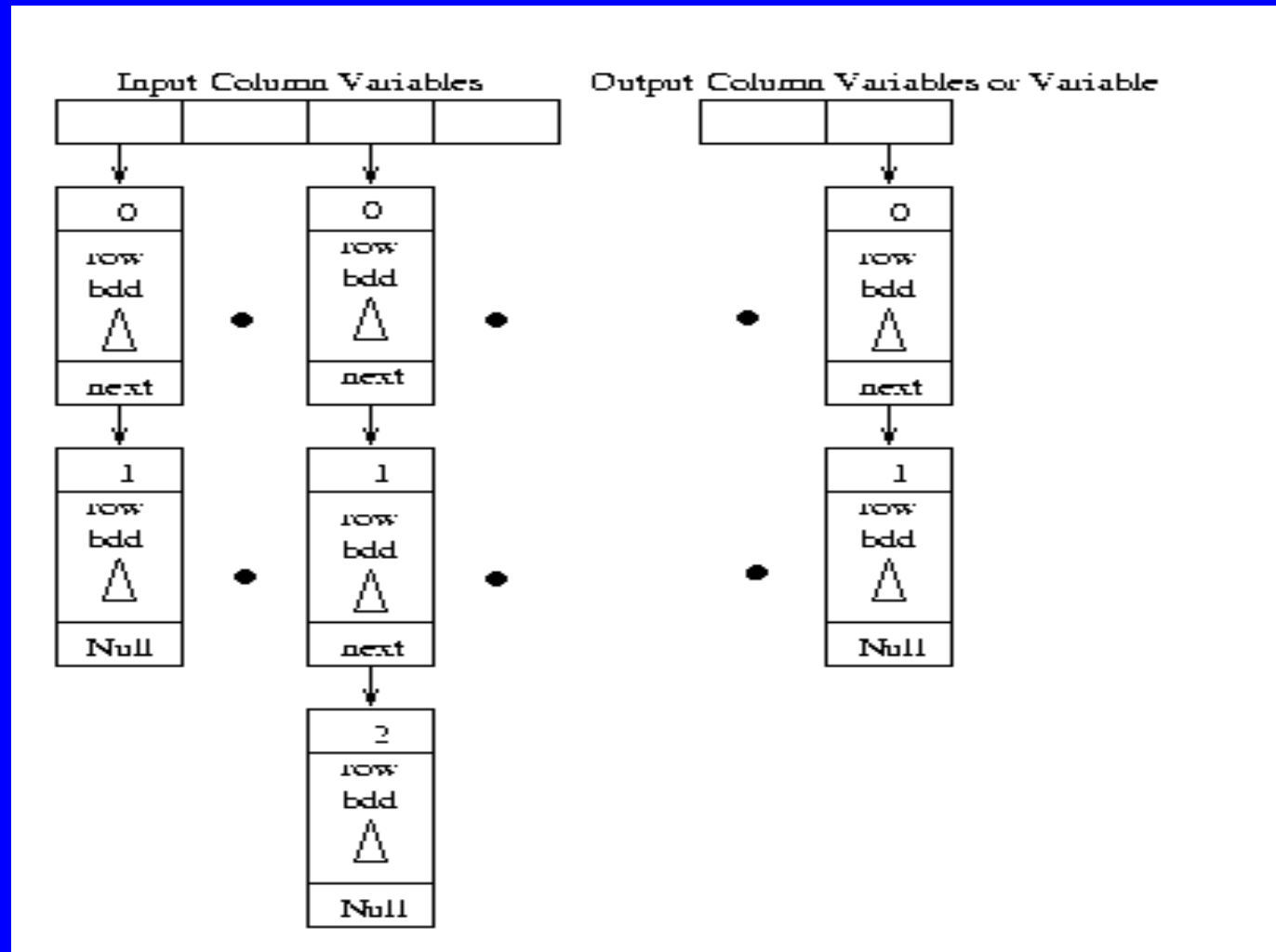
Decomposition Structure

- General flow chart of GUD, MVGUD, and RMVGD Program.



Multiple-Valued Cube Diagram Bundles

- Multiple-Valued Cube Diagram Bundles (MVCDB) internal data structure to hold binary, multiple-valued, and relations.



Upgrading GUD to MVGUD

- Change the reader to read in multiple-valued functions from file.
- Change encoding from binary to multiple-valued.
- Change writer to write out multiple-valued functions to files.
- Need new way of verifying results.

Upgrading MVGUD to RMVGUD

- Modify MVGUD to Read Relations
- Compatibility Checking and Correction for Relations
- New Data Structure for Writing Decomposed Relations to Files

Compatibility Checking and Correction for Relations Example

- Function that needs checked and corrected shown in a decomposition-map.

a b \ c d		00	01	10	11
		00	01	10	11
00	00	0,1	0,3	2,3	1,3
01	00	1,2	—	2,3	0,1
10	00	0,3	0,4	1,4	—
11	00	0	0,3	—	—

Compatibility Graph Show Cliques

- Cliques before checking and correction:

clique 0 = 0 1 2

clique 1 = 0 3

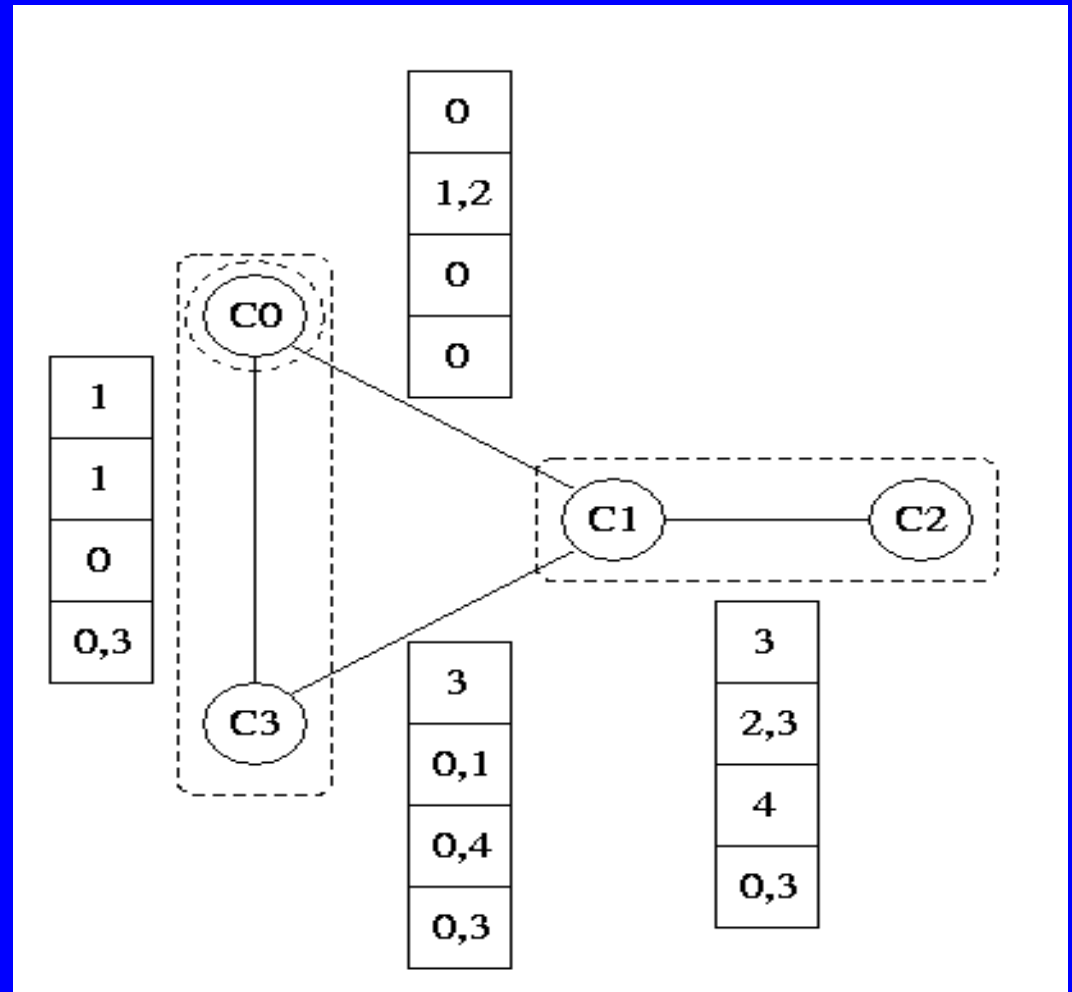
- Cliques after:

clique 0 = 0

clique 1 = 0 3

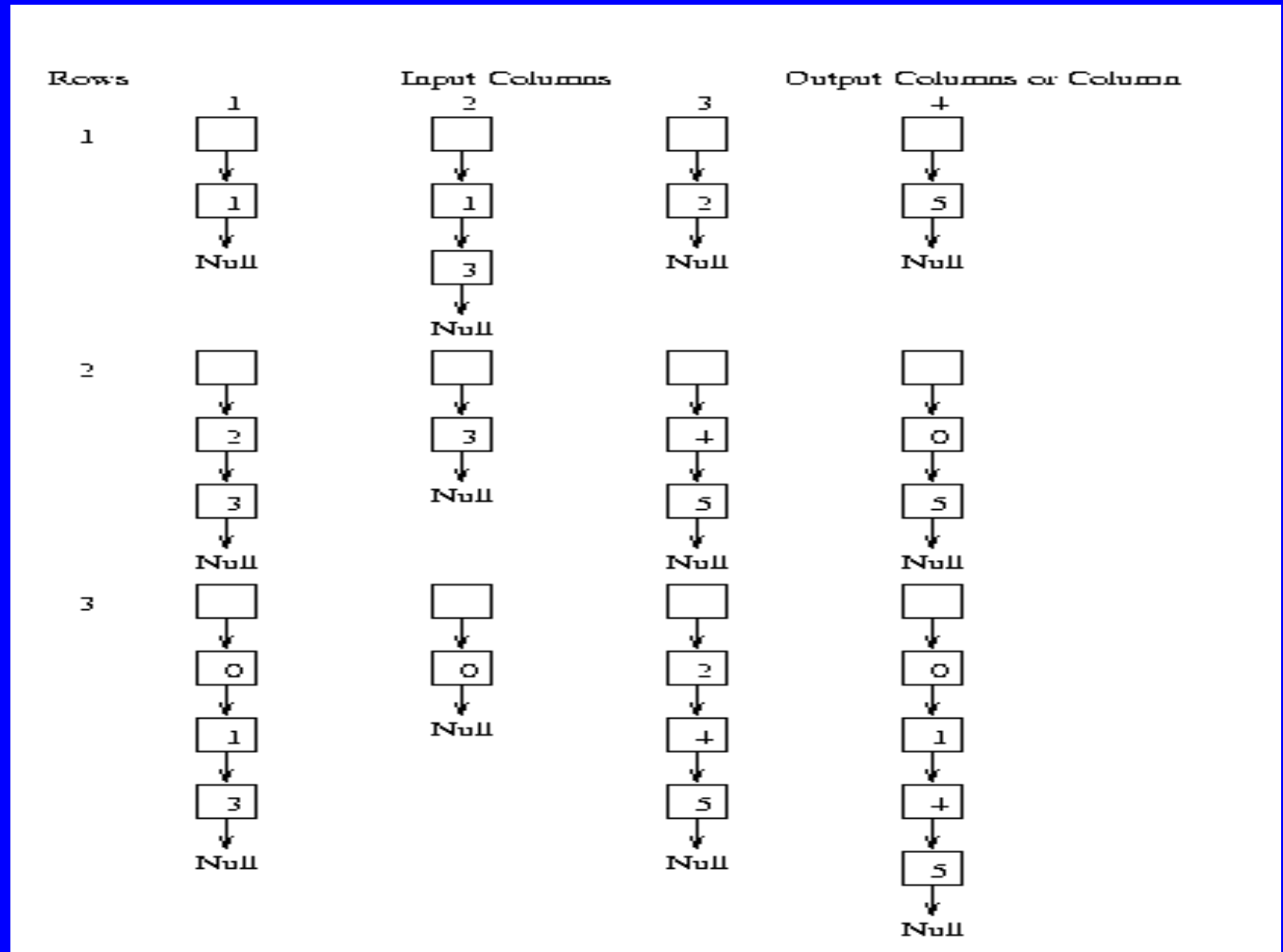
clique 2 = 1 2

- Compatibility graph and corrected cliques shown left



New Data Structure for Writing Decomposed Relations to Files

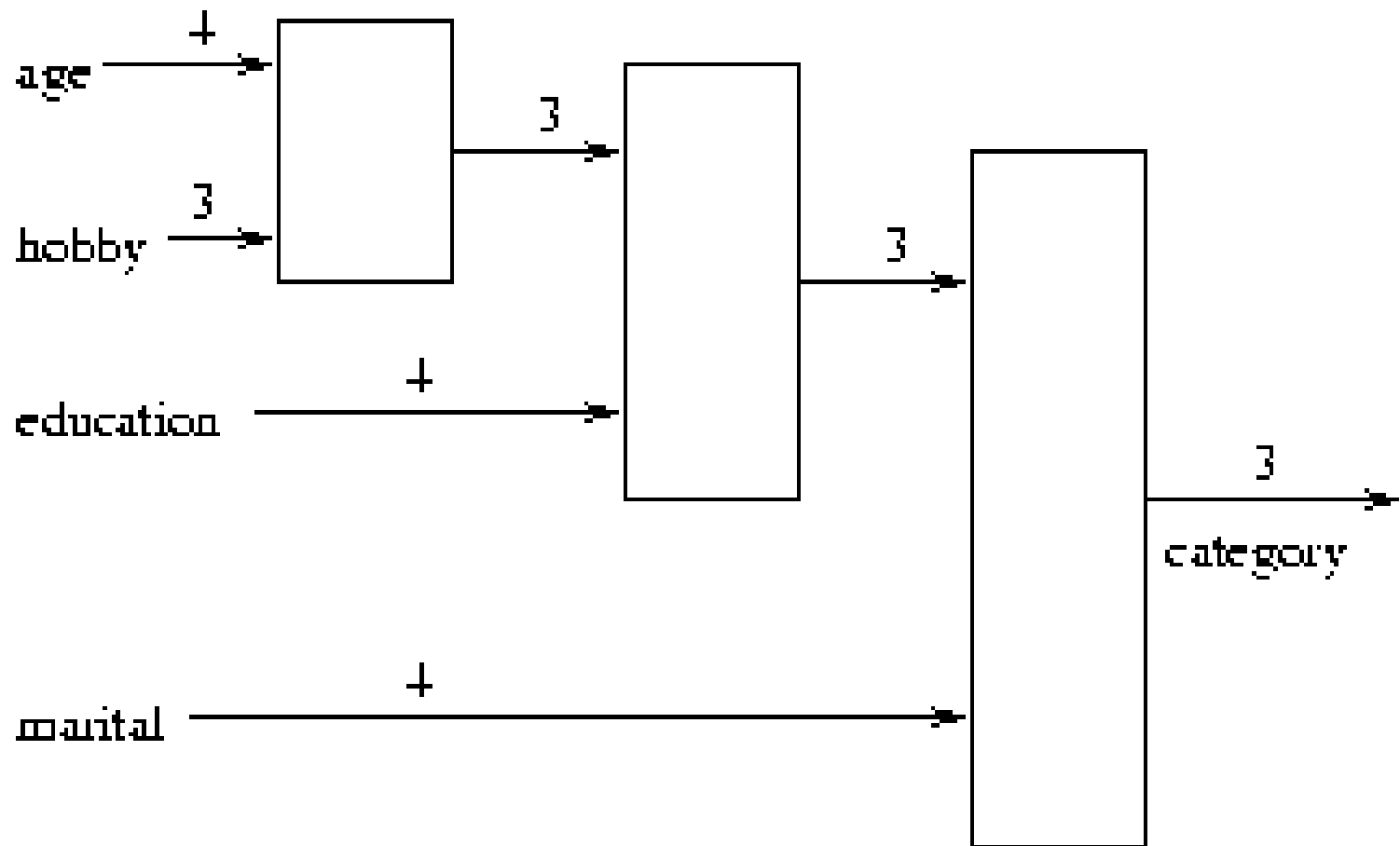
- Data structure to store relations before printing relation to output file
- Matrix of lists
- Efficient when few relations



Results of Relation Decomposition

File	Input File			Output File
	No. of Inputs	No. of Cubes	No. of cubes	No. of Blocks
hayes	4	132	68	3
flare 1	10	323	157	21
flare 2	10	1066	244	18

Hayes Result Block Diagram



CONCLUSION

- Advantages of two new approaches to fuzzy function decomposition
 - Eliminates the need for time-consuming conversion to canonical form
 - Eliminates the use of S-maps
 - Enables decomposition of larger size
- Decomposes relations

Backup

- Uses of Fuzzy Logic Systems
- Fuzzy Logic Systems are Best Used in These Areas
- Where Fuzzy Logic Systems are Not the Best Solution
- Advantage of Fuzzy Logic Control Systems over Traditional or Conventional Control Systems
- Implementation and Future Trend of Fuzzy Logic Systems

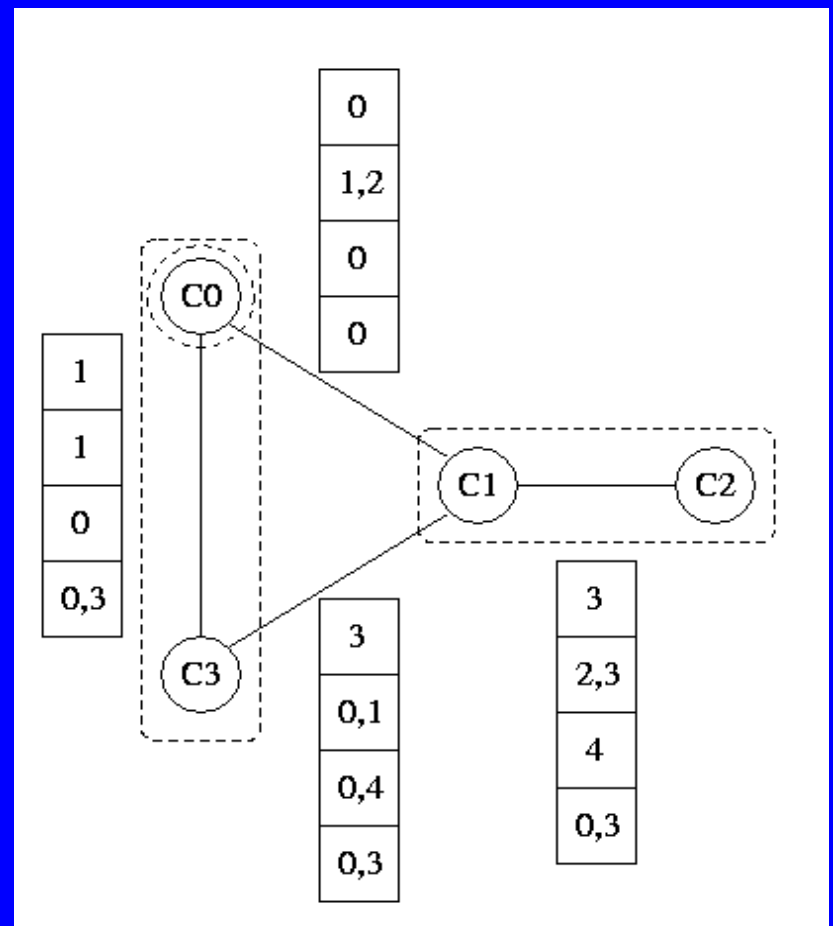
Sources

Paul Burkey

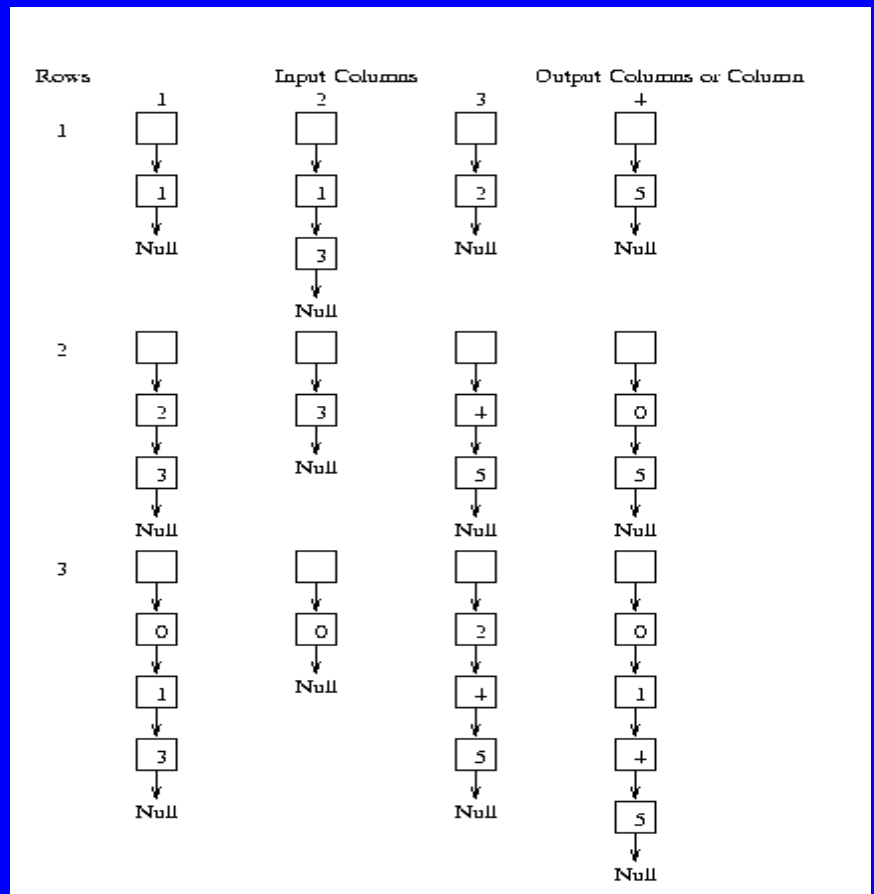
Compatibility Checking and Correction for Relations Example

a b \ c d				
	C0 00	C1 01	C2 10	C3 11
00	0,1	0,3	2,3	1,3
01	1,2	—	2,3	0,1
10	0,3	0,4	1,4	—
11	0	0,3	—	—

Compatibility Graph Show Cliques



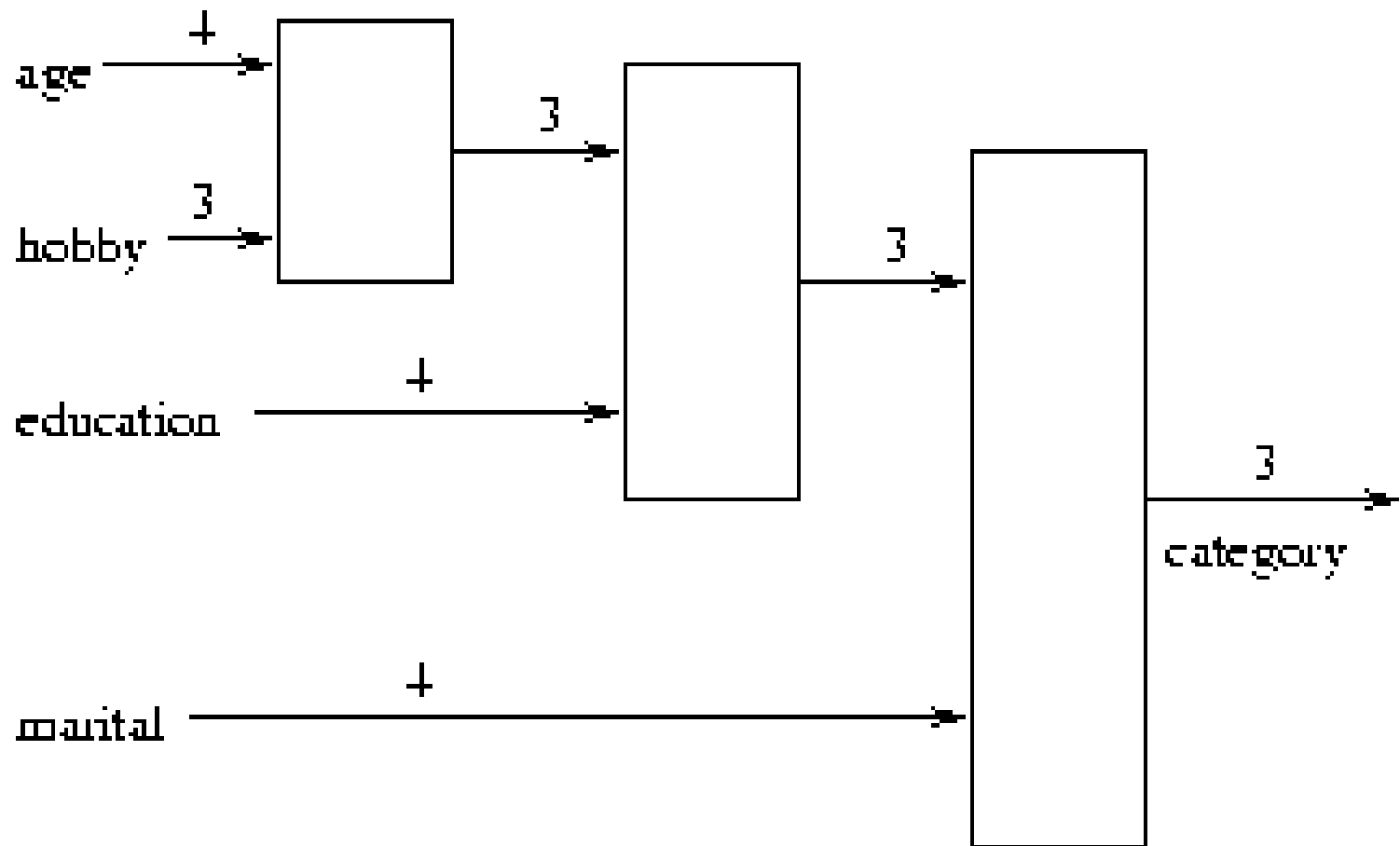
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Additional Topics

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- Fuzzy Logic Systems are Best Used in These Areas
- Where Fuzzy Logic Systems are Not the Best Solution
- Advantage of Fuzzy Logic Control Systems over Traditional or Conventional Control Systems
- Implementation and Future Trend of Fuzzy Logic Systems
 - Fuzzy Logic System Software Tools
 - Fuzzy Logic System Hardware
 - Future Trends of Fuzzy Logic Systems

Sources

- Paul Burkey's M.S. at PSU, 1999