

Quasigroup Completion Problem (QCP)

An order m quasigroup is a Latin square of size m . That is, a m by m multiplication table in which each element occurs once in every row and column. For example,

1	2	3	4
4	1	2	3
3	4	1	2
2	3	4	1

is an order 4 quasigroup.

Quasigroup Completion Problem asks to complete a quasigroup given some of its entries.

For example, partially specified quasigroup

1			4
		2	
3		1	
	3		

could be completed as the first example above.

Practical application:

Dynamic wavelength routing in Fiber Optic Networks can be directly mapped into the Quasigroup Completion Problem.

Constraint Satisfaction Problems (CSP)

- * How to formulate? V, D, C
- * How to solve? Backtracking algorithms

Solving a CSP

- * Simple Backtracking (BT)
- * Forward Checking (FC)
- * Maintaining Arc Consistency (MAC)

Variable ordering heuristics:

SDF: Smallest Domain First. The variable chosen is the one with the smallest domain.

max-static-degree: The variable chosen is the one with the maximum degree in the original constraint graph.

max-dynamic-degree: The variable chosen is the one with the maximum degree to non-assigned variables. Also, called max-forward-degree.

brelaz: The variable chosen is the one with the smallest domain. Ties are broken by choosing the variable with smallest domain and maximum forward degree.

domdeg: The variable chosen is the one that minimizes the ratio of domain size to degree in the original constraint graph.

domddeg: The variable chosen is the one that minimizes the ratio of domain size to forward degree (i.e. the number of adjacent uninstantiated variables).

random: A random (unassigned or uninstantiated) variable is chosen.

IBS: Impact-Based Heuristic. Selects the variable having the largest impact and the value having the smallest impact.

As performance measures:

- * number of consistency checking

- * number of fails