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GLOSSARY – 7

1. **Alldiff constraint**: It is defined as a global constraint which imposes a condition that all variables involved in the constraint must have different values. [1] Page: 206
2. **Arc Consistency**: A variable in a CSP is defined as arc consistent if every value in its domain has a supporting value in the other variable's domain with respect to a binary constraint between them. [1] Page: 208
3. **Atmost constraint**: It is defined as a global constraint which states the maximum number of occurrences of a particular value among a list of variables. [2]
4. **Back jumping**: It is defined as a search technique which backtracks to the most recent assignment in the conflict set while checking for the legal values to assign. [1] Page: 219
5. **Backtracking search**: It is defined as a depth-first search technique which chooses values for one variable at a time and backtracks when a variable has no legal values to assign. [1] Page: 218
6. **Binary Constraints**: It is defined as a type of constraint which exists among two variables. It relates two variables by a constraint. [1] Page: 206
7. **Boolean CSPs**: These are defined as the type of CSPs whose domain of all variables consists of only two Boolean values of either true or false. [3] Slide:5
8. **Bounded differences**: It is defined as a type of constraint where the values of a domain are bounded by some values at both ends. Eg: 2<= c-a <= 6. [3] Slide: 11
9. **Bounds Propagation**: It is defined as a technique of reducing the domain size of variables by constraint propagation until a fixed point is reached. [4]
10. **Chronological Backtracking**: It is defined as backtracking technique where the most recent decision point revisited in case of a failure. [1] Page: 218
11. **Conflict set**: It is defined as a set of assignments which are in conflict with some value of a variable. [1] page: 219
12. **Conflict directed back jumping**: It is defined as a back jumping algorithm which used the conflict sets to backtrack to a variable whose assignment is the reason for the failure. [1] Page: 129

13. **Consistent assignment**: It is defined as the assignment of values to variables in a CSP such that no constraint is violated. [1] Page: 203
14. **Constraint arity**: It is defined as the number of variables participating in a constraint. [3] Slide: 14
15. **Constraint graph**: It is defined as a graph which is obtained by representing the variables as nodes and the constraints between variables are their respective edges. [1] page: 203
16. **Constraint Hypergraph**: It is defined as a graph which consists of variables as ordinary nodes and the n-ary constraints among the variables as hyper nodes. [1] page: 206
17. **Constraint Propagation**: It is defined as a step where the number of legal values for a variable is reduced based on the constraints upon it, which in turn can reduce the legal values for another variable and so on. [1] Page: 208
18. **Constraint scope**: It is defined as a set of variables which are involved in a constraint. [5]
19. **Constructive search**: It is defined as a search technique where the solution is obtained from partial assignments. A solution is obtained systematically by assigning values to variables one by one. [5]
20. **Continuous domains**: It is defined as the domains whose values are precise, that is the domain values are not discrete but consists of large number of values which are separated by a negligible difference. [1] Page: 206
21. **Cut-set conditioning:** It is defined as an algorithmic approach which tries to solve a CSP graph by converting it to a tree structure with the help of cycle cut set. [1] page: 225
22. **Cycle cut set:** It is defined as a technique of choosing a subset S from a CSP's variables such that the constraint graph becomes a tree after removal of S. The subset S is called Cycle cut set. [1] Page: 225
23. **Degree:** It is defined as the number of constraints incident on variable in the CSP. [5]
24. **Domain:** It is defined as the set of allowable values for a variable. [1] page: 202
25. **Domain/degree heuristic:** It is defined as a heuristic which is useful for variable ordering. It considers the ratio of domain size to degree of a variable to obtain the heuristic value. [3] Slide: 34
26. **Extension:** It is defined as a representation of constraint where all the allowed tuples consisting of variable values are listed. [3] Slide: 15

27. **Finite Domains:** It is defined as the domains whose size is finite or discrete. The variables in the CSP have finite domain sizes. [1] Page: 205
28. **Function:** It is defined as a relation between a set of inputs and a set of permissible outputs with the property that each input is related to exactly one output. [6]
29. **Forward checking:** It is defined as a technique which establishes arc-consistency among any two variables. If a variable is assigned then the unassigned variables that are connected to it are revised and their domains are updated. [1] Page: 217
30. **Global Constraint:** It is defined as a constraint which involves an arbitrary number of variables. [1] page: 211
31. **Intension:** It is defined as representation of constraint where the constraint is denoted in a mathematical notation which represents all the acceptable tuples regarding a constraint. [3] Slide: 15
32. **Instantiated variable:** It is defined as a variable whose value has been assigned. [5]
33. **K-Consistency:** A CSP is defined as K-consistent if, for any k-1 variables are assigned with consistent values then there exists a consistent value which can be assigned to any kth variable. [1] Page:211
34. **Linear constraints:** It is defined as those constraints where each variable appears in only linear form. [1] page: 205
35. **Linear programming:** It is defined as a method to achieve the best outcome in a mathematical model whose requirements are represented by linear relationships. [7]
36. **Minimum remaining values:** It is defined as a heuristic which chooses the variable with the fewest legal values remaining. It is also called fail-first heuristic. [1] page: 216
37. **Min-conflict heuristic:** It is defined as a value ordering heuristic which selects the value that results in minimum number of conflicts with other variables. [1] page: 220
38. **Node consistency:** A variable is said to be node-consistent if all the values in the variable's domain satisfy the variable's unary constraints. [1] page:208
39. **Path Consistency:** It is defined as a consistency which tightens the binary constraints by using implicit constraints that are obtained by looking at a set of three variables. [1] page: 210

40. **Relation:** It is defined as a collection of ordered pairs containing one object from each set. A relation is allowed to have an object in first set and more than one object on the second set. [8]
41. **Strong k-consistency:** A CSP is said to be strong k-consistent if it is k-1 consistent, k-2 consistent, … all the way down to 1-consistent. [1] page: 211
42. **Ternary constraint:** It is defined as a type of constraint which involves three variables. The arity of the constraint is 3. [5]
43. **Tree decomposition:** It is defined as a technique where the CSP graph is decomposed in to a tree structure, where the nodes of a CSP are clustered into sub problems which are organized in a tree structure. [3] Slide: 46
44. **Tree width:** The width of a tree decomposition is the size of its largest set minus one. The tree width of a graph G is the minimum width among all possible tree decompositions of G. [9]
45. **Unary constraint:** It is defined as a constraint which applies to the domain of a single variable. [1] page: 206
46. **Universal Constraint:** It is defined as a constraint which applies to every variable in a CSP. [5]
47. **Variable:** It is defined as an element that represents a real valued object in a CSP. [5]
48. **Variable ordering heuristic:** It is defined as a technique which obtains the order of variables to be expanded. [5]
49. **Value ordering heuristic:** it is defined as a technique which obtains the ordering of values of a variable to be considered. [5]
50. **Width of a graph:** It is defined as the tree width of a graph G which is the minimum of all possible tree decompositions of G. [9]

References:

[1] Artificial Intelligence, A Modern Approach (AIMA), Third Edition, by Russell & Norvig.
[2] https://glossary.informs.org/ver2/mpgwiki/index.php/Atmost_constraint
[3] Handouts #9 by professor Berthe Choueiry.
[4] The complexity of Integer Bound Propagation, by Lucas Bordeax, George Katsirelos, Nina Narodytska, Moshe Y. vardi.
[5] Class Notes.
[6] https://en.wikipedia.org/wiki/Function_(mathematics)
[7] https://en.wikipedia.org/wiki/Linear_programming
[8] http://mathinsight.org/definition/relation
[9] https://en.wikipedia.org/wiki/Treewidth