CSP example

Image: Russell and Norvig
CSP example

\[
\begin{array}{c}
T \ W \ O \\
+ \ T \ W \ O \\
\hline
F \ O \ U \ R
\end{array}
\]
Example of backtracking search
Example of backtracking search

Image: Hwee Tou Ng
Example of backtracking search
Example of backtracking search
function BACKTRACKING-SEARCH(csp) returns a solution, or failure
    return BACKTRACK({}, csp)

function BACKTRACK(assignment, csp) returns a solution, or failure
    if assignment is complete then return assignment
    var ← SELECT-UNASSIGNED-VARIABLE(csp)
    for each value in ORDER-DOMAIN-VALUES(var, assignment, csp) do
        if value is consistent with assignment then
            add {var = value} to assignment
            inferences ← INERENCE(csp, var, value)
            if inferences ≠ failure then
                add inferences to assignment
                result ← BACKTRACK(assignment, csp)
                if result ≠ failure then
                    return result
            remove {var = value} and inferences from assignment
        return failure

Image: Russell and Norvig
Forward checking example

Image: Hwee Tou Ng
Forward checking example
Forward checking example
Forward checking example
function AC-3(csp) returns false if an inconsistency is found and true otherwise
inputs: csp, a binary CSP with components (X, D, C)
local variables: queue, a queue of arcs, initially all the arcs in csp

while queue is not empty do
  (X_i, X_j) ← REMOVE-FIRST(queue)
  if REVISE(csp, X_i, X_j) then
    if size of D_i = 0 then return false
    for each X_k in X_i.NEIGHBORS - {X_j} do
      add (X_k, X_i) to queue
  return true

function REVISE(csp, X_i, X_j) returns true iff we revise the domain of X_i
revised ← false
for each x in D_i do
  if no value y in D_j allows (x, y) to satisfy the constraint between X_i and X_j then
    delete x from D_i
    revised ← true
return revised
MRV heuristic
LCV heuristic

Image: Hwee Tou Ng
Local search: min conflicts

Image: Hwee Tou Ng