

Arc Consistency Algorithm Method

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- **INPUT:** A CSP with constraint C and domain D_1
- **OUTPUT:** Returns a domain D_2 such that the CSP with constraint C and domain D_2 is node consistent and is equivalent to the input CSP
- **METHOD:** The algorithm is shown in the next page

```
1  x, y are variables;
2  C is a constraint;
3  D is a domain;
4   $c_1, \dots, c_n$  are primitive constraints;
5  d is a domain value.
6
7  arc_consistent(C, D)
8      let C be of the form  $c_1 \wedge \dots \wedge c_n$ 
9      repeat
10         D_prev := D                // Store current domain before update
11         for i := 1 to n do
12             D := arc_consistent_primitive( $c_i$ , D)
13         endfor
14     until D == D_prev              // Stop when domain no longer changes
15     return D
16
17
18 arc_consistent_primitive(c, D)
19     if |vars(c)| = 2 then
20         let {x, y} = vars(c)
21
22         // Update D(x): only keep values that have a supporting value in D(y)
23         D(x) := { dx  $\in$  D(x) |  $\exists$  dy  $\in$  D(y) such that {x  $\rightarrow$  dx, y  $\rightarrow$  dy} satisfies c }
24
25         // Update D(y): only keep values that have a supporting value in D(x)
26         D(y) := { dy  $\in$  D(y) |  $\exists$  dx  $\in$  D(x) such that {x  $\rightarrow$  dx, y  $\rightarrow$  dy} satisfies c }
27     endif
28     return D
```