

# L06 Faster Constraint Satisfaction

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## 1 running faster

How to make Constraint Satisfaction graph faster? (Midterm q)

1. Variable with fewest possible values left to explore. This is because this cuts down on the number of subtree we will have to explore later on. The fewer subtrees the less work we'll have to do.
2. Pick variable that intervenes in the most active constraints. Do this if there's a tie in the first principle.
3. But what about choosing the value of the variable?
  - (a) Choose value that leaves most choices for neighbors. This increases chance that things will work.

### 1.1 Early search termination

Arc Consistency checking

an arc  $x \rightarrow y$  is consistent if for every possible value in X there is at least one in y that does not break constraints.

### 1.2 Running time

1. General CSP, n variables, domain of size d
$$O(d^n)$$
2. Split problem into n/c subproblems of size C
$$O\left(\frac{n}{c} \times d^c\right)$$
3. If CSP has tree structure (No loops)
$$O(nd^2)$$
4. Suppose I chose C variables whose value I fix
$$O(d^c \times (n - c) \times d^2)$$