

Section-3

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1 CSP Air Traffic Control

1. Variables: $\{A, B, C, D, E\}$ with Domain: $\{i, d\} \times \{1, 2, 3, 4\}$ where "i" and "d" stand for the international and domestic runways. i and d must be included as part of domain along with their availability so we took a cross product. Constraints:

$$D(B) = \{(i, 1), (d, 1)\}$$

$$D(D) = \{(i, 3), (d, 3)\}$$

$$D(A) = \{(i, 1), (d, 1), (i, 2), (d, 2)\}$$

$$D(C) = \{(i, 4), (d, 4)\}$$

$$A \neq B \neq C \neq D \neq E$$

2.1. Changes from part 1. $D(B) = \{(i, 1)\}$, $D(D) = \{(d, 3)\}$, $D(C) = \{(i, 4)\}$, $D(A) = \{(i, 2)\}$, $D(E) = \{(d, 1), (d, 2), (d, 4)\}$

2.2. A:2, B:1, C:4, D:3, E:1, 2, 3, 4.

2.3. (B, 1), (A, 2), (D, 3), (C, 3), (C, 4), (E, 2)

3. $O(nd^2)$ but since there is a solution, domain must be n.

2 Games

1. Lower nodes from left to right: 3, 2, 4. Top node: 4

2. The 2nd node can be pruned. The max-node already has a better minimax value when the min node discovers 2 in its sub tree and the remaining values will not be explored.

3. Lower nodes from left to right: 7, 8, 5. Top node: 8

4. No pruning can take place. It is not possible to ascertain if there is no leaf with a very high value in the sub tree of a node with otherwise low expected value.

3 Non-Zero Sum Games

1. Lower nodes: $(10, 1)$, $(15, 9)$, $(6, 5)$ Top node: $(15, 9)$

2. No pruning can take place. Both agents have different utilities and can behave cooperatively