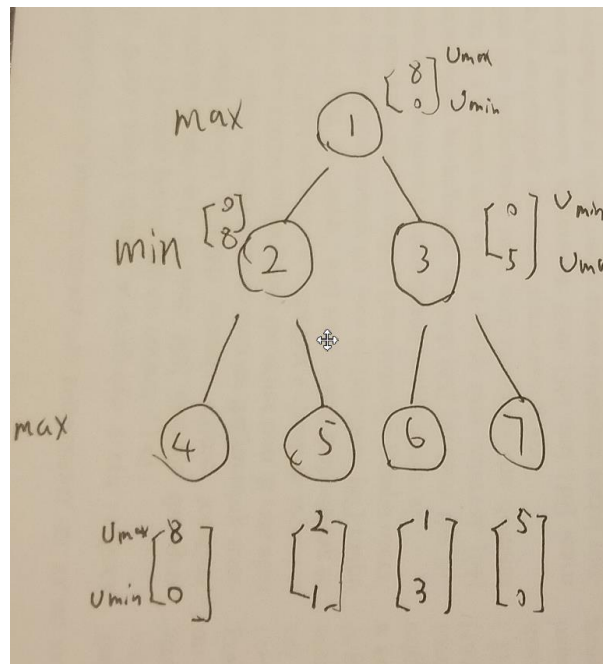


# 1. R&N 5.12

For non-zero-sum game case, the utility will be a vector of evaluations. At each level, the player will choose the best choice for themselves. As is shown in this example, each player will choose the best utility for them, which can also be best for another player.



However, the alpha-beta pruning will not work because this method is based on zero-sum assumption that good for max is bad for min, which enables each player don't need to explore particular paths.

Adding a constant  $k$  does not help because it does not affect the scenario that best for max is also good min.

## 2. R&N 6.8

Variables are A1, A2, A3, A4, H, T, F1, and F2.

Domains are {R, G, B}

Constraints are  $\{(A1 \neq A2), (A2 \neq A3), (A3 \neq A4), (A1 \neq H), (A2 \neq H), (A3 \neq H), (A4 \neq H), (H \neq T), (T \neq F1), (T \neq F2)\}$

Assignment:

A1 = R, H = G, A4 = R, F1 = R, A2 = B, F2 = G

When assigning A3, conflict is detected.

A3: {H = G, A4 = R, A2 = B}

Skip F2

A2: {H = G, A4 = R, A2 = B}  $\vee$  {A1 = R, H = G} - A2 = {H = G, A4 = R, A1 = R}

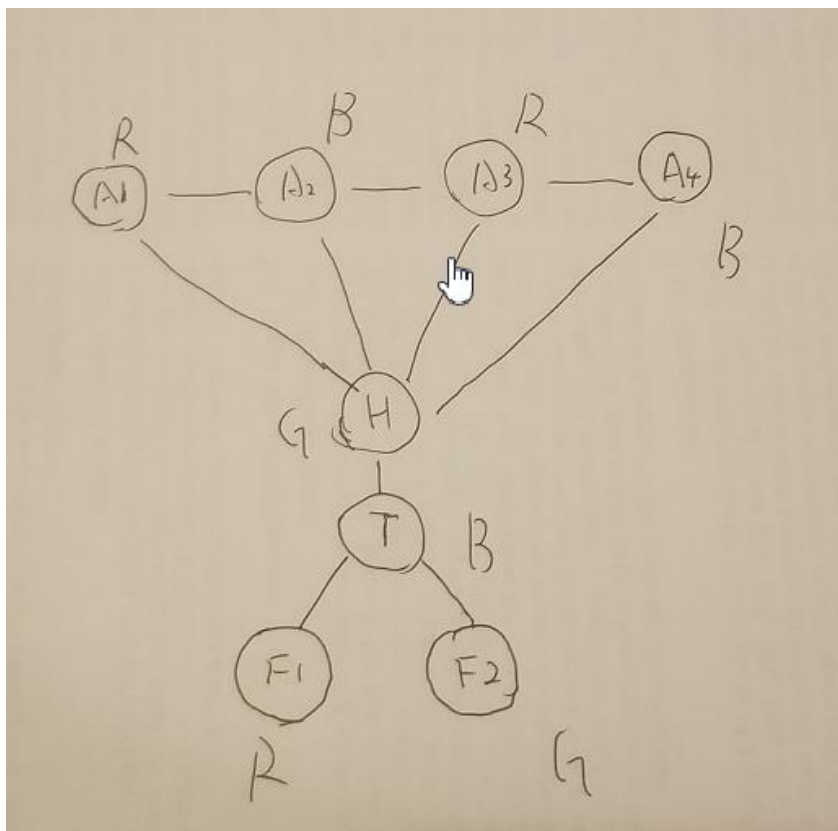
Skip F1

A4: {H = G, A4 = R, A1 = R}  $\vee$  {H = G} - A4 = {H = G, A1 = R}

A4 can be assigned a different value

A1 = R, H = G, A4 = B, F1 = R, A2 = B, F2 = G, A3 = R, T = B

Assignment complete.



### 3. R&N 7.7

a.  $B \vee C$

B	V	$B \vee C$
T	T	T
T	F	T
F	T	T
F	F	F

According to the truth table, there are 3 models.

b.  $\neg A \vee \neg B \vee \neg C \vee \neg D$

A	B	C	D	$\neg A \vee \neg B \vee \neg C \vee \neg D$
T	T	T	T	F
T	T	T	F	T
T	T	F	T	T
T	T	F	F	T
T	F	T	T	T
T	F	T	F	T
T	F	F	T	T
T	F	F	F	T
F	T	T	T	T
F	T	T	F	T
F	T	F	T	T
F	T	F	F	T
F	F	T	T	T
F	F	T	F	T
F	F	F	T	T
F	F	F	F	T

According to the truth table, there are 15 models.

c.  $(A \Rightarrow B) \wedge A \wedge \neg B \wedge C \wedge D$

This sentence can be written as  $(\neg A \vee B) \wedge A \wedge \neg B \wedge C \wedge D$ , which is never True.

Therefore, there are 0 models.

#### 4.R&N 7.14

- a. (ii) is correct. Because (i) means that if and only if the person is conservative, the person is radical and electable. On top of this, (iii) can be written as  $\neg R \vee \neg C \vee \neg E \vee \neg E$ , which is always true.
- b. (i) can be written as  $(\neg R \vee \neg E \vee C) \wedge (\neg C \vee R) \wedge (\neg C \vee E)$
- (ii) can be written as  $(\neg R \vee \neg E \vee C) \wedge (\neg C \vee \neg R \vee E)$
- (iii) can be written as  $\neg R \vee \neg C \vee \neg E \vee \neg E$

All the sentences can be expressed in Horn form.