OR 3: Lecture 2 - Normal Form Games

Recap

In the previous lecture we discussed:

- Interactive decision making;
- Normal form games;
- Normal form games and representing information sets.

We did this looking at a game called "the battle of the sexes":

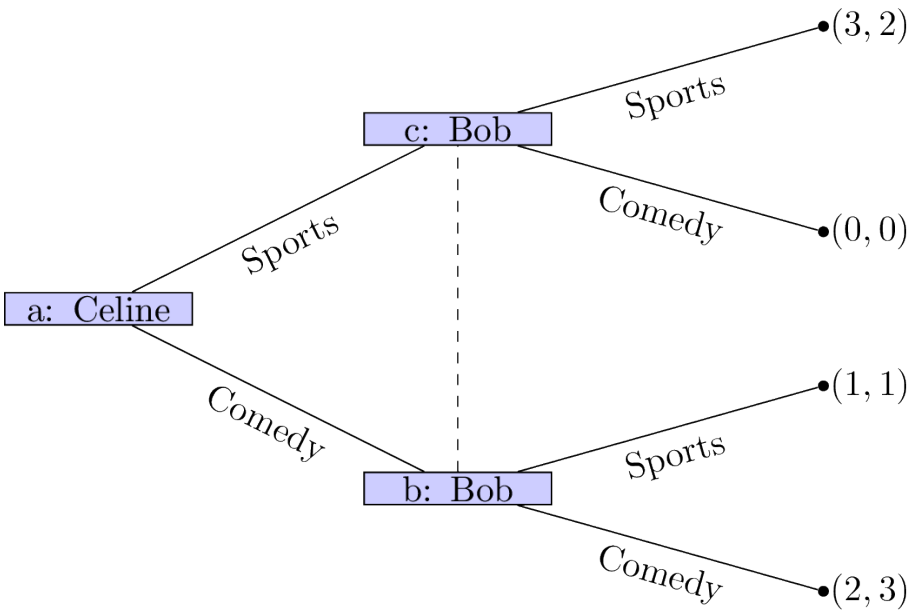

Figure 1: Celine and Bob with Information Set

Can we think of a better way of representing this game?

Normal form games

One other representation for a game is called the **normal form**.

Definition

A n player **normal form game** consists of:

1. A finite set of n players;
2. Strategy spaces for the players: $S_1, S_2, S_3, \ldots S_n$;
3. Payoff functions for the players: $u_i : S_1 \times S_2 \cdots \times S_n \to \mathbb{R}$

A natrual way of representing a two player normal form game is using a **bimatrix**:

$$\begin{pmatrix} (u_1(s_1,r_1),u_2(s_1,r_1)) & (u_1(s_1,r_2),u_2(s_1,r_2)) & \ldots & (u_1(s_1,r_2),u_2(s_1,r_n)) \\ (u_1(s_2,r_1),u_2(s_2,r_1)) & (u_1(s_2,r_2),u_2(s_2,r_2)) & \ldots & (u_1(s_2,r_2),u_2(s_2,r_n)) \\ \vdots & \ldots & \ldots & \vdots \\ (u_1(s_m,r_1),u_2(s_m,r_1)) & (u_1(s_m,r_2),u_2(s_m,r_2)) & \ldots & (u_1(s_m,r_2),u_2(s_m,r_n)) \end{pmatrix}$$