



Cooperative Games

Files	Game Theory September 3 2021 (1).pdf
Link	
Status	Done
Type	Lecture

Nucleolus

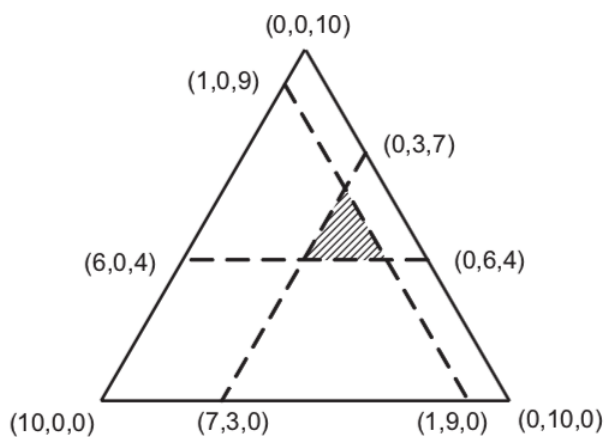
Shapley-value

Nucleolus

Example

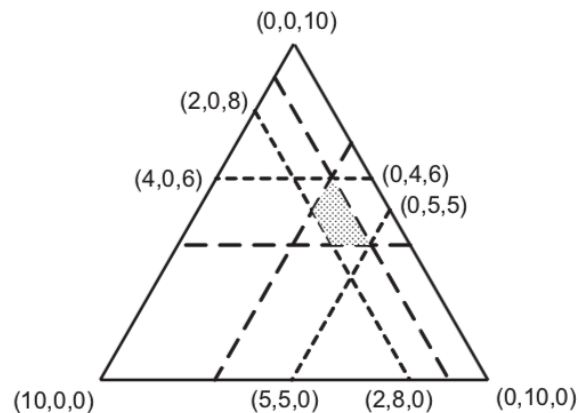
S	$\emptyset$	1	2	3	1, 2	1, 3	2, 3	1, 2, 3
$v(S)$	0	1	3	4	4	5	8	10

Individually rational satisfies each individual's claim.



Coalitional rational satisfies the duos.

$$\begin{aligned} x_1 + x_2 &\geq 4 \quad (\text{or equivalently } x_3 \leq 6) \\ x_1 + x_3 &\geq 5 \quad (\text{or equivalently } x_2 \leq 5) \\ x_2 + x_3 &\geq 8 \quad (\text{or equivalently } x_1 \leq 2). \end{aligned}$$



Core is the shaded part that satisfies all the claims.

Nucleolus is the centre of the core, we arrive at it by moving the lines closer or further apart by the same amount. If moving two coalitions further will lead to an empty core, we freeze them and keep moving the rest, until we have a unique point. He expects us to show the movement in the exam by drawing several iterations.

Sometimes the core will be empty... then you need to move the lines in a similar manner but outwards.

Usually in the exam there is one way to move the lines since he does not like checking multiple versions of correct solutions.

Shapley-value

Properties:

- Anonymity

- Additivity
- Dummy
- Unique

Procedure: take every combination of players entering the coalition, average the marginal gain.

	1	2	3
1 – 2 – 3	1	3	6
1 – 3 – 2	1	5	4
2 – 1 – 3	1	3	6
2 – 3 – 1	2	3	5
3 – 1 – 2	1	5	4
3 – 2 – 1	2	4	4
column sums	8	23	29
ϕ	$\frac{8}{6}$	$\frac{23}{6}$	$\frac{29}{6}$