

A Succinct Representation Scheme for Cooperative Games under Uncertainty

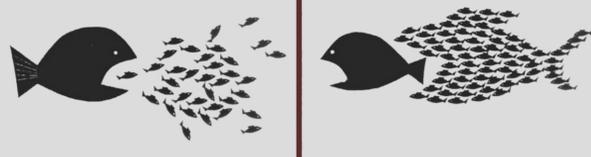
Errikos Streviniotis¹, Athina Georgara², Georgios Chalkiadakis¹

¹Technical University of Crete, Chania, Greece

²IIIA-CSIC, Barcelona, Spain

Introduction

In a large open environment, fully representing all the possible collaborations among the different agents becomes exponential on the number of agents.



Contributions

- ✓ We respond to challenges specified in the original MC-nets paper [1]
- ✓ **Merging technique** that can lead to a **compact representation** for cooperative games.
- ✓ Rules that include **sets of agents, instead of just individuals**.
- ✓ **Theoretical guarantees** regarding information loss.

Our Approach

- Representation scheme for *large partially observed* cooperative games
 - MC-net rules[1] with prior beliefs.
- Exploits *estimates* over marginal contributions → form **compact rules**.
- Algorithm that produces such representation.
- *Theoretical bounds* on loss of information that is placed upon our initial estimates.

You can find a long version of our paper containing new results at:
<http://www.intelligence.tuc.gr/~estreviniotis/eMCnets.pdf>

Ongoing and Future work

- Study algorithm's computational complexity.
- Extension encompassing equivalence classes of agents:
 - 👉 Compress the representation even more.
 - 👉 Discover new, previously unknown collaborations.

Merging Technique

MC nets representation

$r_1: 1 \wedge 2 \rightarrow 5; r_2: 3 \wedge 4 \rightarrow 6;$
 $r_3: 1 \wedge 4 \rightarrow 7; r_4: 3 \wedge \rightarrow 16;$
 $r_5: 4 \wedge 5 \rightarrow 7$

$\varepsilon = 1$

ε -MC nets representation

$r_1: 1 \wedge 2 \rightarrow 5; r_4: 3 \wedge \rightarrow 16;$
 $r_6: 4 \wedge \{1,3,5\} \rightarrow 6,677$

References:

[1] Ieong, Samuel & Shoham, Yoav. Marginal contribution nets: A compact representation scheme for coalitional games. In ACM Conference (2005)

Contact Information:

E. Streviniotis: estreviniotis@isc.tuc.gr
A. Georgara: ageorg@iia.csic.es
G. Chalkiadakis: gehalk@intelligence.tuc.gr