GAME THEORETIC FOUNDATIONS OF MULTI-AGENT SYSTEMS: ALGORITHMS AND APPLICATIONS

- Introduction to agent and multi-agent systems

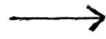AGENTS: independant, self-interested decision makers

INTERACTION: the decisions taken by agent "a" can also impact on another agent "b"

Among the topics standing at the foundations of MAS theory this one:

GIVE A MATHEMATICAL FORMALIZATION OF SUCH INTERACTIVE DECISION PROCESSES:

- Interactive decision theory or GAME THEORY

MODEL DESCRIBING
INTERACTIVE DECISION $\longrightarrow$ UNDERSTAND HOW AGENTS WOULD/SHOULD BEHAVE : twofold objective: prescribe vs describe
MAKING SCENARIOS

Traditionally game theory comes in two flavors

COOPERATIVE GAME THEORY

NON-COOPERATIVE GAME THEORY $\longleftarrow$ We are here

NON-COOPERATIVE does not mean that agents are necessary in competition or conflict
Its main feature is its subject of study: THE INDIVIDUAL

In cooperative game theory we focus more on groups of agents that can form to cooperatively accomplish some task. Such groups are also called coalitions and the discipline is also called COALITIONAL GAME THEORY.

to understand how agents interact we must first understand what agents are.

In particular we must talk about SELF-INTERESTED AGENTS

Game theory operates by defining solution concept:

A solution concept is a theoretical tool that embeds different assumption about agents and how they behave/interact and that provide a description on how the game will be played

WHAT'S THE RESULTING
SITUATION WHEN WE HAVE   ———————>   Solution Concept
MULTIPLE AGENTS INTERACTING?

Why should we bother computing this?

AGENT ⟨ Non Computational

          Computational