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Lecture 2:

Title: Computational Social Simulation using E-CARGO

**ABSTRACT**

Humans are social beings and people cannot live alone. Computational social simulation is a way to reproduce a real-world society and study the behavior of people in that society using computer-based systems. Computational social simulation is a long-term, cutting-edge topic in the interdisciplinary field where information technology, computer science, social science, and sociology overlap.

Role-Based Collaboration (RBC) has been proposed as a computational approach to facilitating collaboration. It utilizes roles as underlying mechanisms to support collaboration by taking advantage of roles. It is divided into several phases: role negotiation, role assignment, role execution, and role transfer. RBC and its related components are an abstract model, which is a perfect mapping for social activities, because Social and economic systems are typical collaboration systems.

The Environments – Classes, Agents, Roles, Groups, and Objects (E-CARGO) model, which has been developed into a general model for complex systems, have a good match for the requirements of computational social simulations. In this speech, we establish the fundamental requirements for social simulation and demonstrate that RBC, E-CARGO, Group Role Assignment (GRA), and Adaptive Collaboration (AC) methodologies and models are highly qualified to meet these requirements. Based on RBC, E-CARGO and GRA, we present a new approach to social simulation with E-CARGO related components, models, and algorithms.

This speech also illustrates several interesting case studies of computational social simulations: 1) a comparison between collectivism and individualism; 2) how to acquire the preferred position in a team of collectivism; 3) why the US president opposes globalization; and 4) A social paradox for Pareto 80/20 rule. Through these case studies, E-CARGO has been verified to be a novel promising methodology for social simulation by competing with conventional agent models.

Our continuous research on RBC and E-CARGO inform that social, political and economic phenomena can be explained by GRA, which demonstrates a collective team effort. GRA with constraints and GRA with multiple objectives can be further applied to simulate more complex phenomena in these areas. It is believed that there are numerous opportunities for research along with the presented directions.

**Keywords:** Social Simulation, Modelling Methodology, Complex/Collaboration Systems, E-CARGO, Role-Based Collaboration (RBC).

**Audience**

Decision-makers, researchers, practitioners, graduate and senior students of computer science, computer engineering, information systems, systems engineering, industrial engineering, management, and computational economics and social science.