Moderating Group Conversation Dynamics with Social Robots

Lucrezia Grassi, Carmine Recchiuto, Antonio Sgorbissa

RICE Lab – *University of Genoa, DIBRIS*

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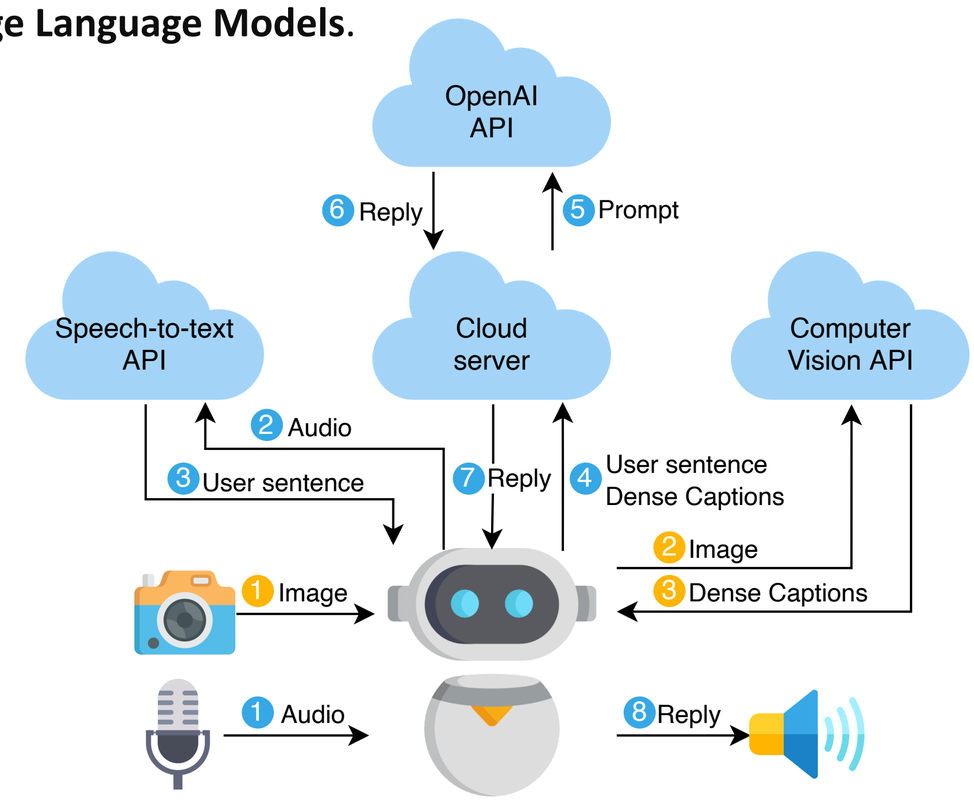
Motivation

Social robotics focuses on creating and applying robots designed to engage with humans in social environments. However, social robots often lack the capabilities to **autonomously** manage multi-party interactions. This research explores whether social robots can **effectively control conversation dynamics** in **multi-party scenarios** by balancing or unbalancing participation and reducing subgroup formation.

System architecture

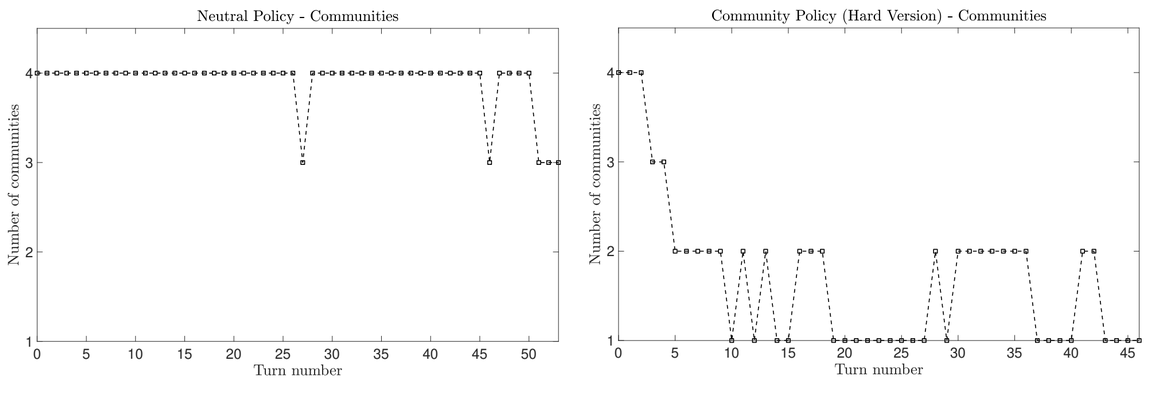
CAIR (Cloud Artificial Intelligence and Robotics) is a **cloud-based** architecture for **autonomous interaction** using an **ontology**-based knowledge representation and exploiting the power of **Large Language Models**.



Balancing and community results

- The **Balancing Policy significantly improved balanced participation** in terms of speaking time and word count.

- The **Community Policy reduced the formation of sub-groups** among participants.



Objective

The goal is to develop **easily implementable solutions** on commercially available robotic platforms to **moderate group interactions without negatively impacting user experience**.

Control policies

- **Balancing Policy:** Ensures equal participation by actively addressing and encouraging less active speakers.
- **Community Policy:** Identifies and maintains cohesive sub-groups within conversations.

Experiments

Experiments were conducted in a middle school with **300 participants** divided into 75 groups of four. Each group interacted with the robot for **15 minutes** using either a **Neutral Policy** (N), a **Balancing Policy** (hard: BH, soft: BS), or a **Community Policy** (hard: CH, soft: CS).

User experience results

Results from the **SASSI questionnaire**, which evaluated the system's *Likeability*, *Cognitive Demand*, and *Annoyance*, showed **consistently positive outcomes** across all conditions. The lack of statistically significant differences between the groups indicates that **the robot's addressing policies did not notably impact user experience**.

	Mean(Std. Deviation)		
	Likeability	Cognitive Demand	Annoyance
N	6.21(0.46)	2.05(0.98)	2.01(0.70)
BH	6.25(0.46)	1.85(0.71)	1.91(0.76)
BS	6.14(0.58)	2.08(0.80)	1.88(0.69)
CH	6.18(0.52)	2.21(0.96)	1.99(0.66)
CS	6.09(0.72)	2.11(0.93)	2.18(0.89)

Upcoming trials

- Engagement with passengers on ferries and cruise ship travellers at the **maritime station**.
- Interaction with elderly people in the **hospital's geriatric ward** to reduce the incidence of delirium.
- Engagement with children in **kindergarten and primary schools** to foster interaction.

Scan the QR code to visit the RICE website - ***rice.dibris.unige.it***

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lucrezia.grassi@edu.unige.it