Augmenting Conversational Environment

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ABSTRACT

People are proficient in collaboratively forming and maintaining gatherings thereby shaping and cultivating collective thoughts through fluent conversational interactions. A big challenge is to develop a technology for augmenting the conversational environment so that people can conduct even better conversational interactions for collective intelligence and creation. Conversational informatics is a field of research that focuses on investigating conversational interactions and designing intelligent artifacts that can augment conversational interactions. The field draws on a foundation provided by artificial intelligence, natural language processing, speech and image processing, cognitive science, and conversation analysis. In this article, the author overviews a methodology for developing augmented conversational environment and major achievements. The author also discusses issues for making agents empathic so that they can induce sustained and constructive engagement with people.

Keywords: Artificial Intelligence, Augmenting Conversational Environments, Cognitive Science, Conversation Analysis, Conversational Interactions, Immersive Collaborative Interaction Environment (ICIE), Natural language Processing

INTRODUCTION

Our life is filled with conversations. The morning starts with conversations with family. In the commuter train, friends are talking with each other. You will be greeted with light conversations with colleagues, followed by some serious conversation for business negotiation or decision making.

Why do people converse with each other? Surely, the participants have good reasons, such as for exchanging information in a dynamic fashion, maintaining social relationship, or simply for the sake of catharsis of mind. Anyway, it is quite likely that people would encounter great difficulty should they have to live without conversation for a long while. Conversation is indispensable for wisdom, creativity and our entire life.

What comprise conversations? Conversation consists of many facets. The central constituent of conversation is speech acts such as {verdictives, exercitives, commissives, expositives, behabitives} (Austin, 1962) or {assertives, directives, commissives, expressives, effectives, and verdictives} (Searle, 1975). Speech acts are implemented by verbal and nonverbal signals,
such as facial expressions, hand gesture, posture, paralinguistic signals, etc. that coordinate with linguistic expressions to make up an utterance in a language. Speech acts are accumulated into social network to create social atmosphere such as conviviality and social structure such as social conventions.

Conversation has a complex structure for coupling participants’ mental processes. According to Clark (1996), conversation is a phenomenon where language use emerges as joint actions, which have a complex structure consisting of levels, layers, and tracks governed by explicitly or tacitly shared conventions for coordinating communicating behaviors among participants.

People are proficient in expressing ideas using not only verbal expressions but also a rich repertoire of para-linguistic or nonverbal expressions (Richmond et al., 1995). They sometimes invent novel expressions quite in an improvisational fashion that may account for the very idea that pops up in the speaker’s thought process. Excellent speakers are good at producing a context that may sustain or even enhance engagement of other participants, as well as using minimal expressions to communicate fairly complex issues to successfully affect the belief of other participants.

People are skillful in interpreting conversations. People read intentions and emotions from various nonverbal expressions the partner exhibits in the conversation. Even from very subtle cues, such as just a tiny inharmony in synchrony of facial expression, body movement and verbal utterances, people detect lie or unfaithful expressions. In contrast, people can even properly construe novel expressions other participants have exhibited for the first time.

A big challenge is to develop a technology for augmenting the conversational environment so that people can conduct even better conversational interactions for collective intelligence and creation. Researchers in ICT have contributed a lot to extending the channel for conversations to be shared beyond spatio-temporal constraints. E-mail, chat, web, etc are classic examples. Researches on computer-supported collaborative work (CSCW) have resulted in tools for group activities such as video conference, tele-meeting, and tele-presence. Technologies for virtual world and virtual game space allow people to find meaning in staying in the virtual world to interact with each other.

Although AI has a great potential to augment conversation much further by introducing intelligent information processing technologies, AI researchers have been rather concentrating on building intelligent agents that might work alone or at most together with other machine agents, not humans, and less on building communicationally intelligent agent for conversation proficiency in human-agent interaction has not been paid much attention until recently. This may be deemed an AI mind that refuses human assistance in order to increase a wow-factor by demonstrating pure machine intelligence which can outperform humans. As the performance of such pure machine intelligence starts to threaten the loftiness of human intelligence, people come to think seriously about the role of AI in the society. Even though realization of machine intelligence that can outperform human intelligence per se might motivate scientific research on looking into the nature of human intelligence, the society expects more direct benefits from AI research. As the computational intelligence engine becomes more powerful, the more sophisticated communication engine, or communicational intelligence, is necessary for transfer problems and knowledge to the problem solving engine, or computational intelligence, as well as the result of intelligent computing may be communicated to people.

There are roughly two ways of introducing communicational intelligence. One is to build an embodied conversational agents, or conversational agents for short. The other is to embed intelligent information processing in the environment surrounding conversation (Weber & Aarts, 2005). Communicational intelligence should be able to capture not only explicit input from people but also various information in the situation, such as physical conditions or social...