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From Eliza to Xiaolce: challenges and opportunities with social chatbots

Key words: Conversational system; Social Chatbot; Intelligent personal assistant; Artificial intelligence; Xiaolce

Corresponding author: Heung-yeung SHUM

E-mail: hshum@microsoft.com

 ORCID: <http://orcid.org/0000-0002-4684-911X>

Motivation

1. One of the fundamental challenges in artificial intelligence (AI) is endowing the machine with the ability to converse with humans using natural language.
2. Social chatbots' appeal lies in not only their ability to respond to users' diverse requests, but also in being able to establish an emotional connection with users.

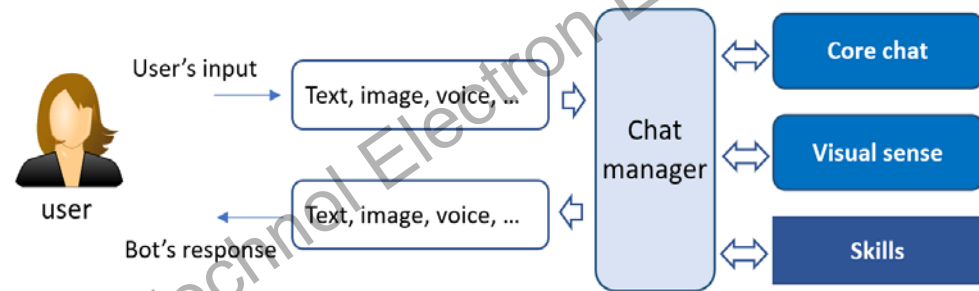
Main idea

1. The primary goal of social chatbots is to be AI companions to humans with an emotional connection.
2. Social chatbots are created to serve users' needs for communication, affection, and social belonging.
3. The design of social chatbots must focus on user engagement and take both intellectual quotient (IQ) and emotional quotient (EQ) into account.
4. Users should want to engage with the social chatbot; as such, we define the success metric for social chatbots as conversation-turns per session (CPS).

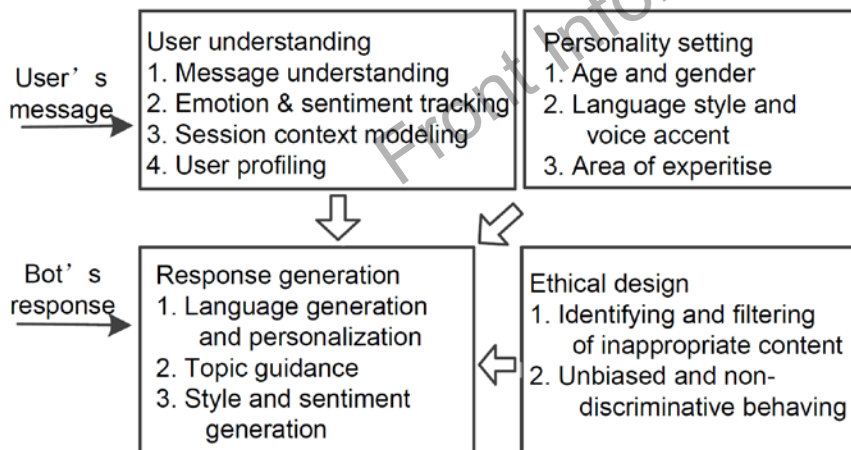
Method

Social chatbot needs to develop the following capabilities: empathy, social skills, personality and integration of EQ and IQ.

Architecture of a social chatbot



Architecture of the core-chat module



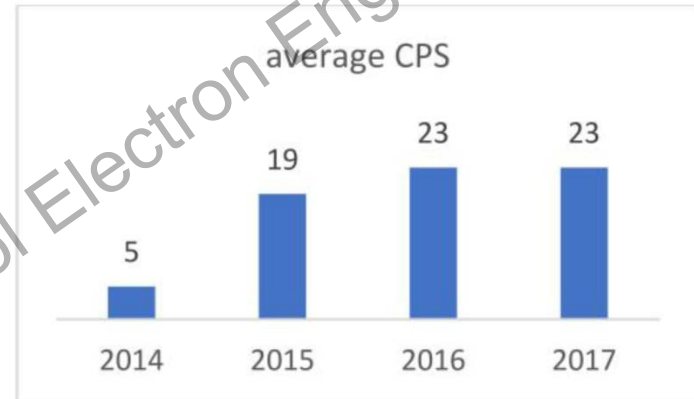
Expected conversation-turns per session (CPS) for different types of conversational systems

System [↗]	Expected CPS [↗]
Web search [↗]	1 [↗]
Personal assistant [↗]	1–3 [↗]
Task-completion [↗]	3–7 [↗]
Social chatbot [↗]	10+ [↗]

Major Results

Average CPS improvement over year of Xiaolce in China

Since 2016, on average each session lasts 23 conversation turns between Xiaolce and a human user



- Social chatbots become more popular in Japan, US, India, and Indonesia.
- Since its release in 2014 in China, Xiaolce has become the first widely deployed social chatbot with millions of users.
- Xiaolce has more than 100 million unique users worldwide and has chatted with human users for more 30 billion conversation turns.
- (Xiaolce) has also become an Internet celebrity, appearing as a weather and news anchor, hosting TV programs, and working as a newspaper reporter.

Conclusions

1. We discuss the tremendous opportunities social chatbots will make possible, and their potential impact on society as AI becomes an integral part of our lives.
2. As AI companions, social chatbots such as Xiaolce also enable new scenarios that are of significant commercial value.
3. Despite recent progress of social chatbots such as Xiaolce, the fundamental mechanism of human-level intelligence is still to be fully understood.
4. As AI becomes more pervasive in our lives, it is imperative to establish ethical guidelines for designing and implementing such AI systems.