The Design and Implementation of XiaoIce, an Empathetic Social Chatbot

L, Zhou et al., 2019

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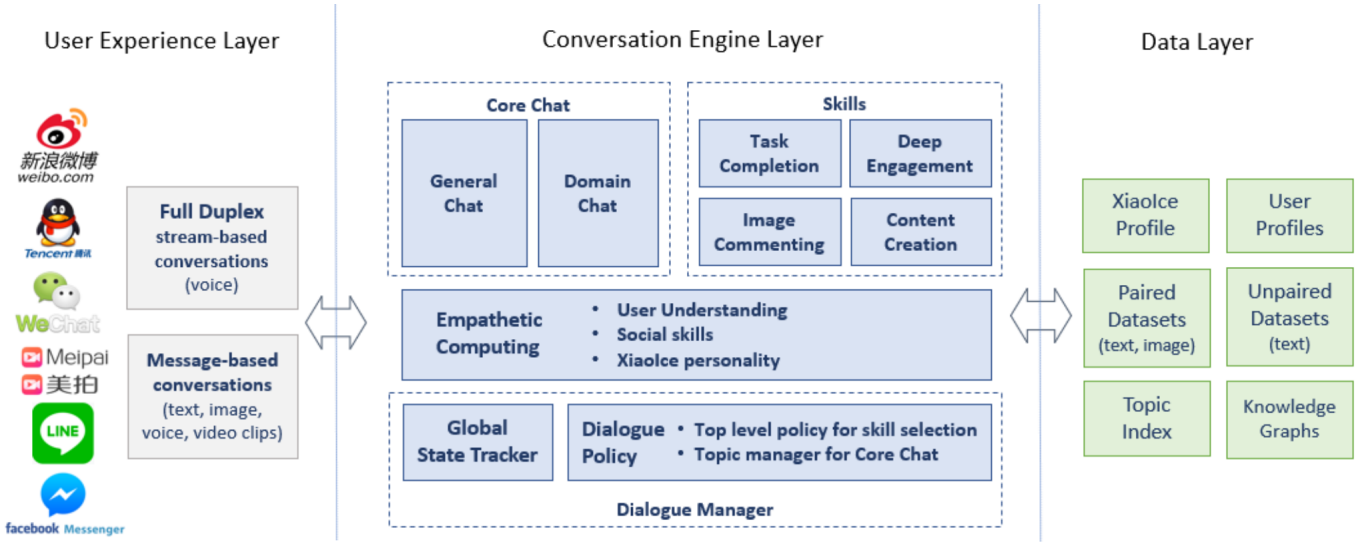
1 Summary

One of the fundamental challenges in artificial intelligence is developing machines that are capable of conversing with humans using natural language. XiaoIce, is by far the most popular chatbot in the world, regarded as an AI companion that can engage in empathetic conversations effectively. While designing XiaoIce, both IQ(knowledge modelling, natural language understanding and reasoning) and EQ capacities(empathy and social skills) along with her personality were considered. The conversation engine is modular in nature (fig 1). The Core Chat component(incl.chatting in general as well as within specific domains) makes uses of **retrieved-based generaror with paired/unpaired data**,**neural response generator**. Responses generated are subsequently ranked based on (semantically) level of sympathy. When evaluating the effectiveness of social chatbots, both **conversation-turns per session** and **number of active users** are used as the success metric. The principle of 'high EQ' lies in XiaoIce's ability to control the follow of user conversations by keeping track of dialogue states and changing topics. Dialogue skills that XiaoIce are capable of include **image commenting** empathetically using both retrieved-based and generation-based approach(i.e. convolutional neural network), **content creation** i.e. poem, song creation, **deep engagement** with users and **task completion** like other popular personal assistants (e.g. Siri, Alexa). The empathetic computing module consists of a set of classifiers to generate empathetic responses, which substantially strengthen XiaoIce's emotional connections to human users. Ethics concerns are also discussed. The current 6th gen of XiaoIce has an average CPS of 23(a score better than that of other chatbots and even human conversations) with 660 million users which proves the success and efficiency of XiaoIce as an empathetic social chatbot. Future works might be done on unifying XiaoIce's framework which could optimize the incorporation of empathetic computing and reinforcement learning. Additionally, more goal-oriented interactions are desired e.g. by providing services.

2 System Architecture



3 Discussion Qs

3.1 What are some of the capabilities of future social chatbots do you expect?

3.2 How is a modular development framework worse than a unified one?

3.3 Any other possible metrics to measure the efficiency of an empathetic conversation?