An Adaptive Conversational AI Approach for Self-Learning

Authors : Airy Huang, Fuji Foo, Aries Prasetya Wibowo

Abstract : In recent years, the focus of Natural Language Processing (NLP) development has been gradually shifting from the semantics-based approach to deep learning one, which performs faster with fewer resources. Although it performs well in many applications, the deep learning approach, due to the lack of semantics understanding, has difficulties in noticing and expressing a novel business case with a pre-defined scope. In order to meet the requirements of specific robotic services, deep learning approach is very labor-intensive and time consuming. It is very difficult to improve the capabilities of conversational AI in a short time, and it is even more difficult to self-learn from experiences to deliver the same service in a better way. In this paper, we present an adaptive conversational AI algorithm that combines both semantic knowledge and deep learning to address this issue by learning new business cases through conversations. After self-learning from experience, the robot adapts to the business cases originally out of scope. The idea is to build new or extended robotic services in a systematic and fast-training manner with self-configured programs and constructed dialog flows. For every cycle in which a chat bot (conversational AI) delivers a given set of business cases, it is trapped to self-measure its performance and rethink every unknown dialog flows to improve the service by retraining with those new business cases. If the training process reaches a bottleneck and incurs some difficulties, human personnel will be informed of further instructions. He or she may retrain the chat bot with newly configured programs, or new dialog flows for new services. One approach employs semantics analysis to learn the dialogues for new business cases and then establish the necessary ontology for the new service. With the newly learned programs, it completes the understanding of the reaction behavior and finally uses dialog flows to connect all the understanding results and programs, achieving the goal of self-learning process. We have developed a chat bot service mounted on a kiosk, with a camera for facial recognition and a directional microphone array for voice capture. The chat bot serves as a concierge with polite conversation for visitors. As a proof of concept. We have demonstrated to complete 90% of reception services with limited self-learning capability.

Keywords : conversational AI, chatbot, dialog management, semantic analysis