Human Implicit Intention Understanding with Naïve Bayes for Human Augmented Cognition System

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***Abstract*—In this paper, we present a probabilistic human implicit intention understanding with Naïve Bayes for human augmented cognition system. The system tries to compensate the limitations of human brain in cognitive process by providing suitable information according to user's situation. Many researches in psychology realm revealed the cognitive limitations and several marvelous phenomena of the mental system. George A. Miller introduced 'magic number seven' in 1956. In that paper, he proposed that the span of memory of young people was around seven chunks, regardless of the units. Other researcher, Nelson Cowan, has proposed that working memory has a capacity of about four chunks in a young person. Based on those researches, we can infer that the performance of human cognitive process is strongly related to the limited capacity of working memory. In order to alleviate the above limitations of the human brain by technical supports, the human augmented cognition system should try to store all recognized results regardless of user's intention. However, when the system needs to retrieve the appropriate information from the stored data, the system should be able to recognize the user intention. In cognitive psychology, an intention refers to an idea or plan of what we are going to do. According to the theory of mind, human beings have a natural way to predict, represent and interpret user intention reflected implicitly or explicitly. The human augmented cognition system needs to have the function like the human's natural way. According to the researches in psychology, Bayesian models offer explanatory insights into many aspects of human cognition and development. The framework is valuable for defining optimal standards of inference, and for exploring tradeoffs between simplicity and goodness-of-fit that must guide any user's generalizations from observed data. We can realize that the Bayesian model can be adopted to understand the user intention for implementing the human augmented cognition system. Hence, we used the Naïve Bayes classification method which is based on applying Bayes's theorem with strong independence assumption to recognize the user implicit intention by gaze information and recognized object. We have verified the result by experiment. The training data set was obtained from 6 subjects eye-gaze data. The training dataset consists of 4 classes which are 'eat noodle', 'drink coffee','drink beer and 'eat bread', and the experimental image includes 12 objects (noodle, coffee, knife, pot, gas range, beer, electric pot, water, goblet, bread, mug and wine). We ask each participant to look at the objects responding to a given desired intention class. Then we measure the participant's eyegaze data. Consequently, we can see the different fixation length and scan path pattern responding to the specific intention. Therefore, the probabilistic method can be used for user specific intention classification in order to retrieve appropriate information by the human augmented cognition system. The experimental results show a feasibility of this approach.**

***Index Terms*—Augmented Cognition, Human Intention, Naïve Bayes**

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