

of the predicted intent and asks the user whether it is a correct understanding or not. If the user answers "yes", the response attached to the detected intent is given. If the answer is "no", the system enters the next stage,

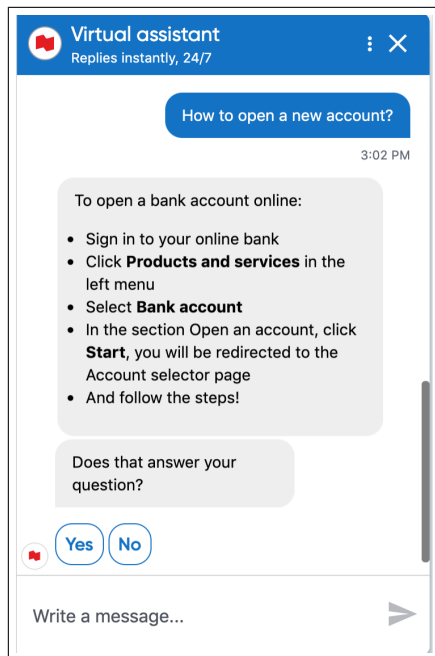
Stage 2 - Suggestions: here the dialogue systems displays several suggestions (up to six in our deployed systems) based on keywords appearing in the user query. The user can either choose one of the suggested canonical forms of the possible intents, otherwise can choose "none of the above". In the former case, the related response is given, in the latter, the dialogue system enters Stage 3.

The keywords represent topics of interest related to intents. These topics typically represent products and services such as credit card, saving account, e-transfer, among many others. During training, each keyword, or combination of keywords, is linked to intents whose canonical formulations contain at least one of those keyword. These intents' canonical formulations represent the suggestions in this stage.

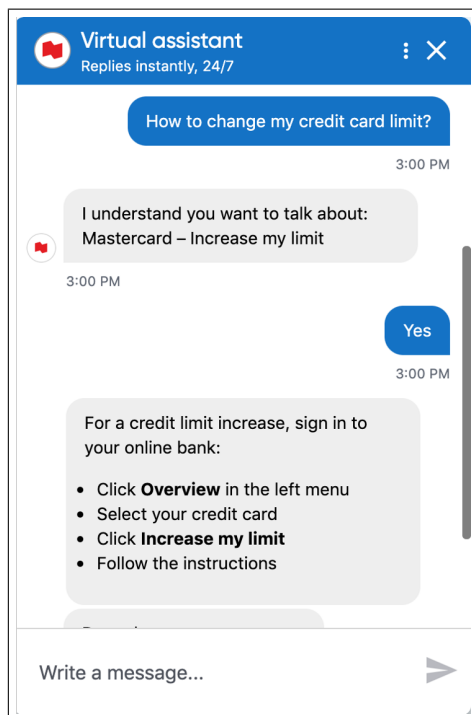
Stage 3 - Frequently Asked Question (FAQ): this is the last stage in the pipeline which provides the user with general, query-independent, recurrent questions and answers. This serves as a fallback procedure that offers helpful questions in a dynamic manner as it allows the user to navigate topics in breadth and in depth.

Figure 1 illustrates the different stages of our dialogue system with examples from the HOUSE corpus in English.

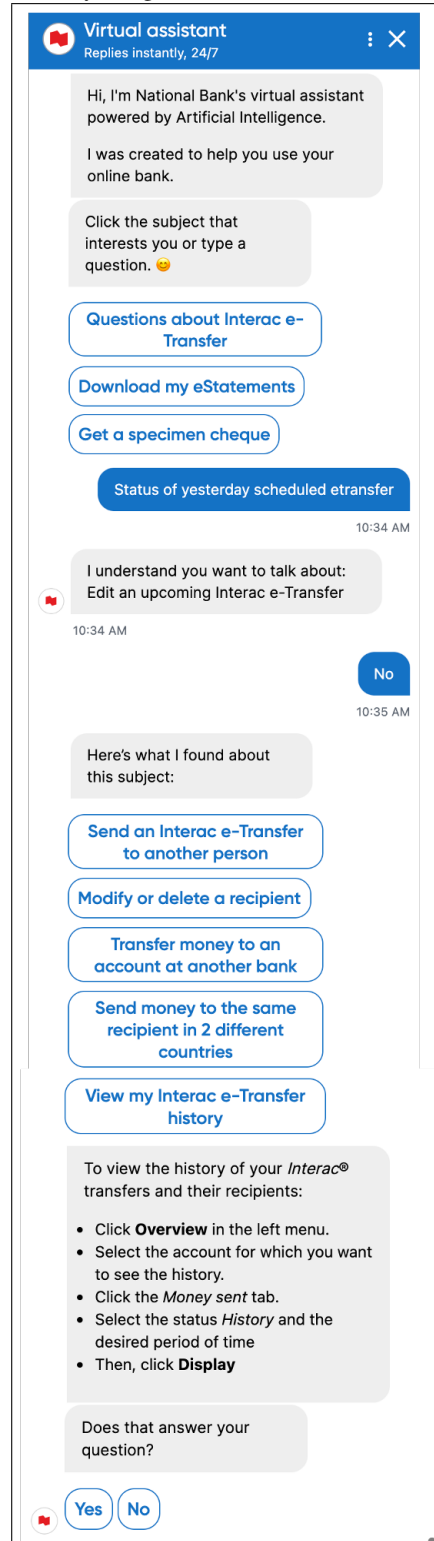
Figure 1: Our proposed multi-stage clarification framework with examples showing the four distinct stages: Stage 0) Direct answer, Stage 1) Confirmation, Stage 2) Suggestions and, finally, Stage 3) General FAQ.



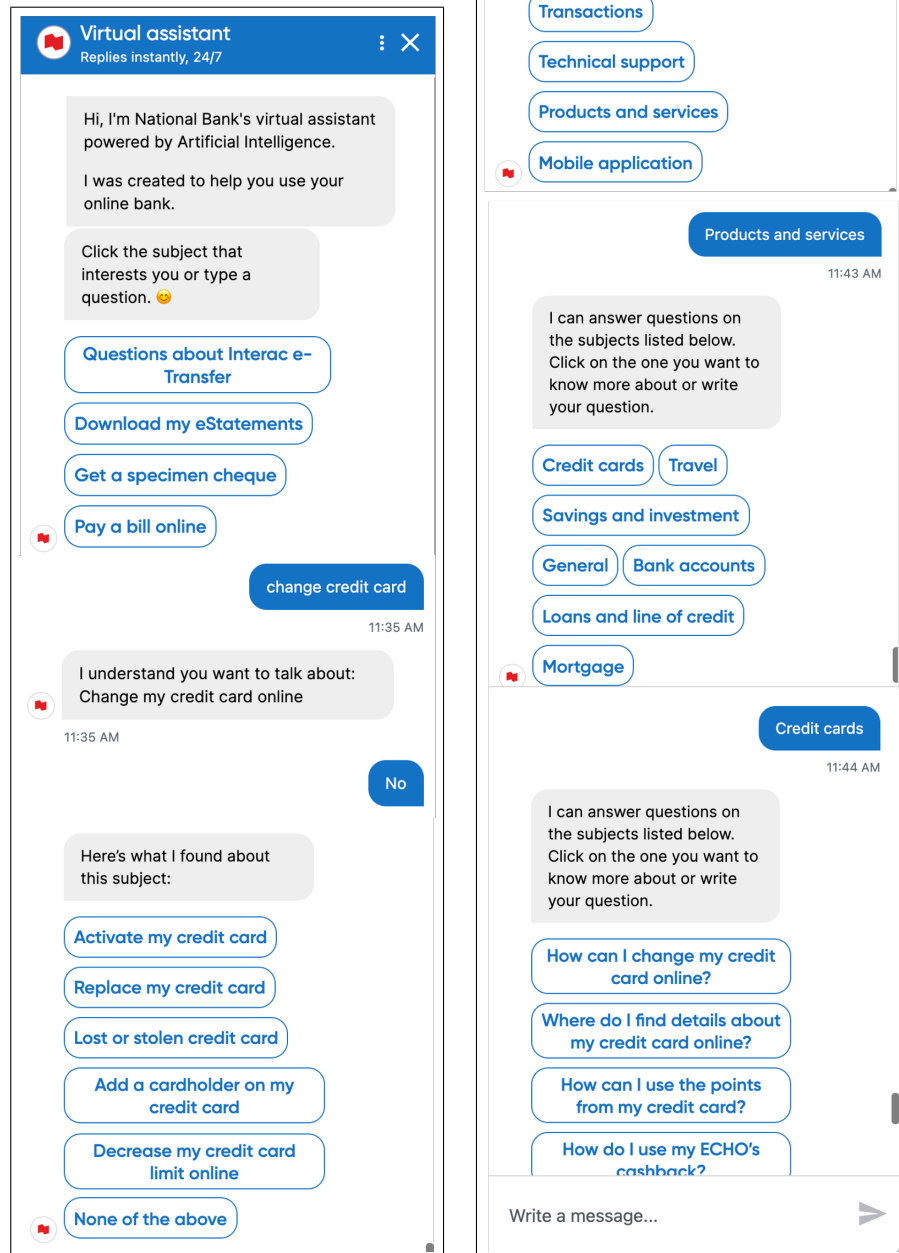
Stage 0) Dialogue system giving a direct answer explaining how to open an account



Stage 1) Dialogue system giving an answer during the Confirmation stage



Stage 2) Dialogue system giving an answer during Suggestions stage. The user chose the 5th suggestion "View my Interac e-Transfer history" and got the corresponding response



Stage 3) None of the suggestions satisfactory, generic topics (FAQ) provided