

CLIVE – An Artificially Intelligent Chat Robot for Conversational Language Practice

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Abstract. This paper presents an artificially intelligent chat robot called CLIVE. The aim of CLIVE is to provide to a useful and engaging method for people learning a foreign language, to practice their conversational skills. Unlike other systems that focus on providing a limited or structured tutoring experience for language learning, CLIVE has the ability of holding open, natural human-like conversations with people on a wide range of topics. This provides users with a life-like experience that is a more natural way of learning a new language. Experiments were conducted between CLIVE and real human users and an analysis of the conversations shows that CLIVE performs with accuracy and is an accepted method of language practice amongst users.

Keywords: Artificial intelligence, chat robot, language, conversation, intelligent interaction, humanized character.

1 Introduction

Human machine conversation is still a relatively developing area of artificial intelligence, even since the invention of ELIZA [1] by Weizenbaum a number of decades ago. ELIZA was presented as a computer program that could perform natural language communication with a human. Real human users could talk to ELIZA, which was initially created to respond like a psychotherapist, and have an engaging and meaningful conversation with her. Since then, artificial intelligent conversational systems, called chat robots or ‘chatbots’, have been used for a range of applications and topic areas including customer service [2], entertainment [3], religion [4] and intelligent tutoring [5]. Education is an important area in which chat robots have and can make significant contributions to learning [6]. In particular, people learning a new language are faced with challenges in improving and developing their conversational skills. Not only are language learners required to gain an understanding and familiarity with vocabulary, grammar, pronunciation and comprehension, but they are also required to develop their social and conversational skills. Applications of chat robot technology, such as the Let’s chat system [7], can help people in developing their conversational language skills. Let’s Chat is a prototype chat robot system recently

proposed that simulates a social and conversational environment with a person. The premise is that by conversationally interacting with Let's Chat in a natural and humanized way, people can acquire good new language skills that they can then utilize as confident participants in real life conversation.

Following this notion, CLIVE is proposed as an intelligent chatbot that can hold conversations with people for the purpose of effective, natural language learning. Unlike Let's Talk, that is a prototype with limited interaction capabilities and knowledge areas, CLIVE is presented as a very capable, interesting and engaging chat robot personality that people can naturally interact with for effective for language learning. A key aspect of CLIVE is that ability to chat with foreign speaker who have no or very limited knowledge of the language being learned. This paper presents CLIVE as a capable and new method of language learning.

The remainder of this paper is organized into 4 further sections. The next section describes CLIVE and the methodology used to create him. Section 3 presents the experimental setup. Section 4 presents the results of the experiments and an analytical discussion. In section 5 a conclusion is drawn and an outline for future research is described.

2 CLIVE

CLIVE is an artificially intelligent chatbot that has the ability of holding real conversations with people, via an instant messaging user interface, for the main purpose of conversational language practice.

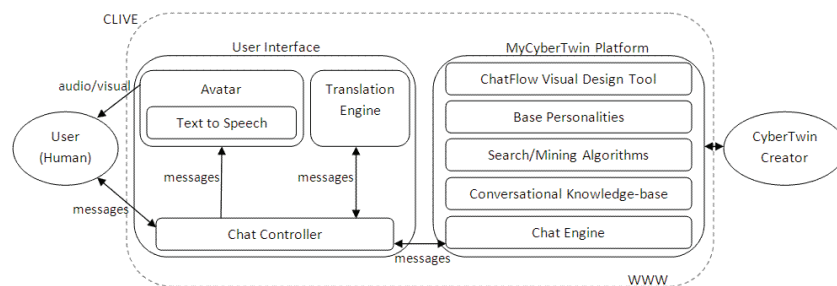


Fig. 1. Overview of the technology architecture for CLIVE

He was created using the artificial intelligence chatbot technology platform MyCyberTwin [8]. MyCyberTwin provides a toolbox of AI features that are essentially responsible for providing CLIVE perceived intelligence and ability to chat. Figure 1 presents an overview of CLIVE's web architecture.

2.1 User Interaction

Users can chat to CLIVE via an instant messaging interface, sending him textual input messages and receiving text and voice audio responses. CLIVE has the ability to

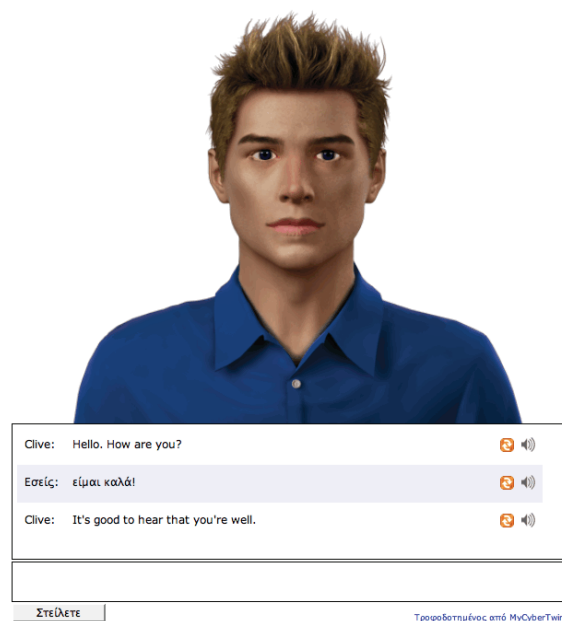


Fig. 2. The user interface to CLIVE for native Greek speakers learning English

understand any of the world's major languages, making his application to international audiences possible. A key feature of CLIVE is his ability to accept an input message in a given language *A* and respond in another language *B*. This makes it possible for native speakers of language *A* to learn language *B*, with limited or no prior knowledge of language *B*.

While CLIVE can be configured to handle any language pairs, the remainder of this section describes the user interface for CLIVE from the perspective of a Greek native chatting to an English speaking CLIVE to practice their English conversational skills. Figure 2 shows how the user interface to CLIVE looks to a native speaker of Greek who is learning English. At the top of the interface, CLIVE is presented as a life-like 3D avatar that blinks, talks and moves his head in a natural way, imitating human form. Below the avatar is the chat history box, that shows the running history of the conversation between CLIVE and the user. Below this is the user input message box, where a user enters the input message to send to CLIVE.

In Figure 2, CLIVE is setup to respond in English to native Greek speakers. This means that a Greek user can send CLIVE a message in either Greek or English during the conversation. If the user's level of English is good, then they may choose to enter English when they are feeling confident and familiar in how to express themselves. Alternatively, they can enter their message to CLIVE in their native language of Greek. Regardless of whether the message is submitted in English or Greek, CLIVE will respond to the user in English but provide a translation of the response in Greek. This Greek translation can be viewed by the user when they clicking on the orange translate button on the right hand side of the line in the chat history. When a user

enters an input message in their native language Greek, the chat controller automatically detects this and makes a request to the translation engine for it to be translated into English, since this is the language that CLIVE is configured in. The English translation is returned to the chat controller and it is then sent to the MyCyberTwin platform that in turn responds with a response in English and it is this message that is shown back to the user as CLIVE's response. CLIVE also provides an audio speech utterance of the response, so the user can hear the pronunciation of the sentence and each of the words within. The combination of this audio utterance along with the English response and its respective Greek translation, provide useful information to the user to learn the English language. Users can have a conversation with CLIVE about anything and everything. If at any stage CLIVE is not confident in responding with a specific relevant response, he will respond with a general comment and try to keep the user engaged and prolong the conversation.

2.2 MyCyberTwin

MyCyberTwin is a commercial artificial intelligence technology platform that gives its users the ability to create compelling chatbots, called CyberTwins, that have the ability to imitate a real human in holding a conversation with particularly good accuracy. The key advantage in using the MyCyberTwin platform over other technology or techniques is that it provides a powerful toolbox approach to creating an artificially intelligent chatbot. MyCyberTwin offers its users easy to use visual tools that allows chat robots to be created easily and effectively. Upon using the MyCyberTwin platform, a creator of a CyberTwin has the core components available to use for building their CyberTwin. These include a ChatFlow visual design tool, base personalities, search/mining algorithms, a conversational knowledge-base dictionary and a chat engine. The combinational use of these core components make MyCyberTwin an ideal platform to use for the creation of an artificial intelligent character such as CLIVE. With MyCyberTwin, CLIVE could be created in a timely manner as the MyCyberTwin toolset made the chat flow design and content submission easy tasks to accomplish. But most importantly, this was because MyCyberTwin's in-built artificial intelligence capabilities removed the need for in-depth, technical design of the chatbot by the creator.

3 Experimental Setup

MyCyberTwin was used to create an English speaking CLIVE character. His base personality was set to be warm hearted and intellectual in nature. Content was added to his content profile in the form of questions and answers, statements and utterances on a range of topics. The chat flow design was created to make CLIVE be more responsive in nature rather than controlling. The main aim of experimentation was to: 1) Ascertain whether CLIVE could hold a decent conversation when input messages are given in English. 2) Ascertain whether CLIVE could hold a decent conversation when the input messages are given in Greek. 3) To gain an initial insight from users as to whether CLIVE would make useful language learning tool.

CLIVE was made available to up to 10 Greek and English speaking users via a URL that pointed to a web page that could be accessed with an Internet browser. Users were told that CLIVE is a virtual character created for conversational English practice and asked to engage in natural conversation with him, just as if they were chatting to a real human. The conversations were recorded and analyzed.

4 Results and Analysis

In most English only speaking conversation, CLIVE performed exceptionally well, holding a fairly intelligent, thoughtful and natural conversation. These conversations were considered to be the baseline to assess the quality of the Greek conversations to. Figure 3 shows a resulting conversation between CLIVE and a Greek speaker.

CLIVE: Hi! I have been waiting to chat with you. What have you been doing?	
Human: ήμουνα στην θάλασσά	<i>(I was at the beach)</i>
CLIVE: You were? Why is that?	
Human: μου αρέσει να κολυμπώ	<i>(I like to swim)</i>
CLIVE: It's good to have a clear idea of what you like.	
Human: πες μου κάτι άλλο.. για την οικογένειά σου	<i>(Tell me something else... about your family)</i>
CLIVE: I consider myself family to all the MyCyberTwins alive. Tell me more about your family.	

Fig. 3. Sample of a conversation between CLIVE and a Greek speaking native

In this conversation CLIVE also performed quite well, understanding the human and responding relevantly in the majority of cases. Overall, CLIVE performed exceedingly well, responding relevantly and accurately throughout the majority of conversations. In the English conversations CLIVE responded accurately over 95% of the time. Sometimes, obviously, users input obscure and complicated messages during a conversation and CLIVE is unable to comprehend the meaning.

Analysis of the Greek conversations showed that, although CLIVE performed well, he did not respond with the same level of accuracy. In nearly all of the cases where CLIVE was not accurate in responding, it was because of the lack of quality of the Greek to English translation that is performed internally by the translation engine. Since it is responsibility of the translation engine to accurately convert a Greek input message into a English message before it is sent to the MyCyberTwin chat engine for processing, it plays an important role in ensuring the quality of the chat. The limitations of the quality of translations could be overcome by developing a conversational Greek knowledge-base dictionary in MyCyberTwin. This way the CLIVE user interface can send original Greek input messages to MyCyberTwin for processing rather than relying on sending a translated English form that could be inaccurate. All of the human users commented on how useful they found CLIVE to be as a tool to practice their conversational skills. Greek users would like to see the translations improved.

Although they could understand the English to Greek translations that were not grammatically correct, they felt that accurate translations would be required to make CLIVE a more appreciated and useful system as a reliable tool for language learning.

5 Conclusion

In this paper, an artificially intelligent chatbot called CLIVE has been presented. CLIVE can talk to people and ultimately be provided as an alternative application for conversational language practice. Experimental results show that CLIVE has the ability to hold conversations to a good level of accuracy and prove to be useful and accepted tool for language practice. Future research will be focused on more formal user testing to test CLIVE's applicability and suitability across a wider user demographic and across additional language pairs. More MyCyberTwin knowledge dictionaries will be developed so that the system relies less on the translation engine to convert a message from one language to another. This includes the creation of a Greek conversational knowledge dictionary using the MyCyberTwin platform. This should improve the quality of the conversations and the overall language learning experience.

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