CHATBOT FOR CONTINUOUS MOBILE LEARNING

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Abstract

The paper presents a cloud-based chatbot application for delivering educational content using a continuous mobile learning paradigm. The microlessons can be accessed by the learners in their available time slots, such as breaks or commuting. Another aim of the system is to target a specific group, the so-called “digital illiterates”, that have problems accessing typical e-Learning systems, as web applications. A knowledge base for basic computer access skills was implemented and showcased.

Keywords: e-Learning, chatbot, continuous learning.

1 INTRODUCTION

Lifelong or continuous learning is becoming ever more important for professionals in today’s fast changing economic and technological landscape. It is estimated that most adults will work at a job requiring a different qualification than the one they graduated with from their formal education. Also some of these qualifications did not exist at the time of their tertiary study. Furthermore, the adoption of new technologies based on artificial intelligence, robotics, 3D printers, could displace entire categories of workers. However most adults do not have the time to enroll in full-fledged specialization courses.

We propose a system, ITlearning, based on chatbots for continuous mobile learning. Mobile learning can provide a continuous access [1] to learning material, tailored as microlessons [2], that can be accessed by adults in their available time slots, such as breaks or commuting.

The medium over which content is pushed is also critical for the adoption. Mobile users have developed an “application fatigue”, being more reluctant to install yet another application with separate notifications. Chatbots use existing messaging applications such as Messenger or Skype and provide a natural language interface, easing the acceptance of sent content [3].

Another aim of the system is to target a specific group, the so-called “digital illiterates”, that have problems accessing typical e-Learning systems, as web applications [4]. For them we offer a more familiar format, conversation-based, requiring no complex navigation.

2 DESIGN

ITlearning application was developed with Microsoft Bot Framework, a comprehensive framework that helps implementing conversational AI experiences. Our chatbot e-Learning application is using LUIS cognitive services, a Cloud-based API that uses machine learning intelligence for building a conversational environment.

By using LUIS services in a chatbot application through-out Microsoft’s Bot Framework, it allows the bot in discussion to be more intelligent, helping automating tasks and recognizing intents. The bot can be tested in the Azure Portal or in the Bot Emulator.

The framework offered by Microsoft is an open source SDK which can be used on-premise or directly in the Cloud where the application source code can be developed and tested. By using Cloud services, the security and integrity of the data are enhanced, always keeping the user in control of their data.

There are three main components in LUIS: Intents, Utterances and Entities. Microsoft offers also pre-built intents such as Greetings, but our application is built upon customized intents.
The process behind LUIS is represented through-out the following steps:

- The chatbot sends the user’s utterances (text) to the LUIS endpoint as an HTTP request (Example: “What is the Windows product key?”)
- LUIS uses the learned model to understand the natural language (the text received) and to further process the information providing an intelligent understanding of the input. LUIS sends to the application a response in a JSON format.
- The application uses the JSON response to make a decision about how to respond to the user’s input based on which intent corresponds to the input.

ITlearning bot acts as a virtual assistant that will help each user achieving his/her goal: increasing their Information Technology knowledge.

ITlearning chatbot contains two main scenarios that serve as solutions for the problem identified as the barrier between technology evolution and persons without the required experience:

1. A QnA scenario on the subject of Information Technology
2. A tutorial-training scenario with different Information Technology based chapters

The data that sustain the QnA scenario is represented by knowledge of Information Technology different domains such as Windows operating system most frequently asked questions. Hence, the chatbot developed is a solution accelerator that will play the role of a virtual assistant, offering well structured, relevant answers to users and creating a natural learning experience through a digital format. Users will accommodate in this way with web tools, having a 24/7 provider of knowledge.

For the QnA scenario our application uses QnA Maker service from Azure which represents the data base of questions the bot is trained to recognize and the answers that the bot learned to provide. QnA Maker is a cloud-based API useful for creating the conversational layer of questions and answers over your data.

The most important pillar behind QnA Maker is represented by the knowledge base that you have to build. This is the very first step of the process, constructing a powerful, structure knowledge base consisting of frequently asked questions about Information Technology, about the Operating System or computer functionalities. Based on this knowledge base, the bot uses the QnA Maker to answer the input questions in the conversation by matching with the best possible and most fitting answer in the knowledge base.

There are two main key services that QnA Maker offers for the application data:

- Extraction – extracting structured question-answer data from structured & semi-structured data sources, creating a knowledge database
- Matching – creating an endpoint in the knowledge base that matches the question from the chatbot to the KB.

The user can ask our chatbot a detailed question such as “What is the Windows Product key?” or can simply type an input text made of few words such as “product key”. In both cases, based on our knowledge base in the QnA Maker, the chatbot recognizes the information needed and return the desired answer.

For the first case, receiving a detailed question, the bot is able to provide a complex answer and also offers a further continuation through links where the user can read more on the matter, see Fig 1.
3 RESULTS

To improve the learning experience of users that need to develop their technical skills, ITLearning bot offers a module of tutorials for exploring and practicing new chapters of Information Technology. This is represented by the second scenario of our application, an intent of tutorials of 5 different chapters:

- Learn about the PC’s file system
- Learn about the PC’s settings
- Learn about the Windows Apps
- Dive into your security system
- Find out about Networks & Internet Access

The trainings are easy to follow, offering appealing content through videos. The trainings are built in a user-friendly manner so that a digital illiterate will find it easy to navigate through the tutorials menu, select a chapter and watch a tutorial. For this scenario of our application we used adaptive cards to represent the informational content, see Fig 2.

An adaptive card is JSON object that contains all elements of a card such as images, text, videos, etc. The content can be rendered in the application. The main advantages of adaptive cards in Bot Framework are their portability (can be used in any application and user interface), their high expressiveness (developers can build appealing content easily) and the consistent user experience offered. The cards can be styled in any way, guaranteeing an appealing user experience.
When choosing one chapter, the user will be shown another adaptive card containing information about the selected chapter. The adaptive card contains a video tutorial and a “Learn more” button which redirects the user to a more detailed website on the respective chapter.

4 CONCLUSIONS

We have created a chatbot application for e-learning targeted towards continuous mobile learning. The implementation used new technologies such as Microsoft’s Bot Framework and LUIS cognitive services for returning relevant results based on the learner questions. Another improvement, on the knowledge delivery part, was to use adaptive cards technology, allowing visual navigation inside the chatbot application. Currently the application implemented a knowledge-base for “digital illiterates”, with topics based on frequently asked questions about computer usage fundamentals. In the future, based on feedback gained from deployment, the KB will be refined and further use cases added.

REFERENCES


