An Artificially Intelligent Teaching-Agent to Enhance Learning Interactions in Virtual Settings

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Abstract : This paper introduces a concept of an intelligent virtual learning environment that involves communication between learners and an artificially intelligent teaching agent in an attempt to replicate classroom learning interactions. The benefits of this technology over current e-learning practices is that it creates a virtual classroom where real time adaptive learning interactions are made possible. This is a move away from the static learning practices currently being adopted by e-learning systems. Over the years, artificial intelligence has been applied to various fields, including and not limited to medicine, military applications, psychology, marketing etc. The purpose of e-learning applications is to ensure users are able to learn outside of the classroom, but a major limitation has been the inability to fully replicate classroom interactions between teacher and students. This study used comparative surveys to gain information and understanding of the current learning practices in Nigerian universities and how they compare to these practices compare to the use of a developed e-learning system. The study was conducted by attending several lectures and noting the interactions between lecturers and tutors and as an aftermath, a software has been developed that deploys the use of an artificial intelligent teaching-agent alongside an e-learning system to enhance user learning experience and attempt to create the similar learning interactions to those found in classroom and lecture hall settings. Dialogflow has been used to implement a teaching-agent, which has been developed using JSON, which serves as a virtual teacher. Course content has been created using HTML, CSS, PHP and JAVASCRIPT as a web-based application. This technology can run on handheld devices and Google based home technologies to give learners an access to the teaching agent at any time. This technology also implements the use of definite clause grammars and natural language processing to match user inputs and requests with defined rules to replicate learning interactions. This technology developed covers familiar classroom scenarios such as answering users' questions, asking 'do you understand' at regular intervals and answering subsequent requests, taking advanced user queries to give feedbacks at other periods. This software technology uses deep learning techniques to learn user interactions and patterns to subsequently enhance user learning experience. A system testing has been undergone by undergraduate students in the UK and Nigeria on the course 'Introduction to Database Development'. Test results and feedback from users shows that this study and developed software is a significant improvement on existing e-learning systems. Further experiments are to be run using the software with different students and more course contents.
Keywords : virtual learning, natural language processing, definite clause grammars, deep learning, artificial intelligence
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