

The application is a part of the master thesis as a practical implementation of the described ideas at the work “Implementation of machine learning methods into eLearning to ensure personalized education of the student”.

### Abstract

The relevance of the work is grounded by the necessity of the personalized online learning, including the high-quality education providing with better automation and less efforts from moderators` side. The machine learning overspreading makes these goals attainable. Inability of the current systems to open these opportunities for many users leads to the exploration of new approaches.

The aim of the work is based on the improvement of the current methods of the personalized online education by the creation of the program prototype, which combines the technology of the intellectual chatbot, eLearning and data collection.

The subject of the work is the eLearning environment. This thesis considers its modification and the innovative approach implication into it. The object is the development of the application prototype with intellectual chatbot features and the absence of time and attempt limits approach for the assignment integration.

The novelty is based on the embedment of the intellectual chatbot technology into the learning environment and the new approach of the assignments` accomplishment, which inferences the elimination of the time and attempt limits as well as complex tasks on steps segmentation.

The practical relevance is confirmed by the existence of the working prototype and its incorporation into the real life. Eventually the working prototype has been developed and the forecast with the possible business plan has been created.

Due to this solution more users are able to employ the application and distribute the knowledge with improved learning environment. The students get the opportunity to have the support during the educational process any time and their progress is maintained by the data analysis and advanced technologies. The absence of time and attempt limits gives the possibility for the learner to reach the correct answer in more independent way, thereby increasing the engagement and motivation to perceive the difficult topics.

At the developed program the user has possibility to ask questions on the special text field and get the help, that directly related to the solving task without broad definitions, full articles, videos, etc. The answers or the clues will be taken only from the given material.

The main goal of the program is to understand the topic completely. Therefore, it is not enough to finish the assignment only on some amount of points. If the answer is wrong, the users have chance to see only part of the solution, not the whole one. Thus, the program will be useful for those, who would like to conceive and practice hard topics. It means that the prototype centers on the interpretation of complicated terms, causing the confusion for learners.

The result is the application prototype which has following features:

- the user has the access to the chatbot any time of the education session;
- the time and number of attempts have no limits;
- the most difficult tasks are divided on several steps;
- the data need to be collected not violating the students` privacy and only having the goals for study research;
- the application can be independent or be easily integrated into the necessary systems.

### Prototype description

This solution gives the opportunity for the learners to find the correct response and solve the assignment in more independent way. Here the prototype does not restrict the number of attempts to verify the answer. The assignments have also no time limits for the accomplishment. The idea can be considered as the training of difficult topics and can be done before the exam test.

The diversity of the questions and tasks helps to maintain the motivation of the student and see the aspects of the course from different sides. The material depends on the progress of the student and does not increase the anxiety of the bad mark or points, because the main goal is to understand the topic. Thus, the application uses only that material, which moderator has uploaded. Learners will not receive the content, which is hard to cover in short amount of time and from different resources. The opportunity to check the task steps and not to look at the ready entire solution immediately brings the students encouragement that mistakes perhaps are not because of the misunderstanding the topic, but because of arithmetic or typos.

The user has the constant access to the support in the form of chatbot. Here it doesn't have the prewritten answers and questions. It takes the user's text input, which may contain one word or simple phrase connected with the topic. The chatbot response will contain only the information, which is in material. There will be no other links or resources, videos, articles, but the fixed sentences from the course material. Nevertheless, the additional help for better understanding can be provided later. The main point of the chatbot is that usually at online courses platforms the questions can be asked by users at forums or directly to the teacher or the course provider. It takes more time and decrease the learner's engagement.

The application itself has simple structure and can be good automated. It means that the operation of the application is independent. Only initial settings have to be done. The education session may contain as many exercises as the moderator of the course decided to put at the database. The database might have many tables with appropriate information in them. The moderator defines, what kind of questions and how many of them should be at the storage. Also the division of the mandatory

and formed with respect to the student trajectory assignments can be done. Thus, the students who need more practice will receive it.

The course providers, moderators, teachers and others of this category may use this application as the alternative way of online platforms, which have low level of alterations, strict and restricted structure, difficult integration in exist systems. Moreover, this solution can be as additional module at the course and can follow after the given material and simple tests.

The data is collected during the educational session of each user and describes the learner`s behavior. It can be used at the analysis. The most difficult terms, questions will be revealed, the students can be grouped by their behavior and knowledge, more material can be suggested further.

In fact, there is more work for the application improvement, however the created prototype is the significant step towards the evolving of the personalized eLearning.

#### Implementation:

- Programming language: Python;
- NLP library: SpaCy;
- GUI library: PySimpleGUI;
- SQL library: sqlite3;
- Logistic regression library: sklearn.