OPTIMIZATION OF STUDENTS' STUDYING PROCESS USING LEARNING MANAGEMENT STUDENTS BASED ON MULTIAGENT MODELING

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The goal of learning management systems is to improve the efficiency of students' learning process in terms of time and amount of effort spent on each subject. Multi-agent modeling allows you to make forecasts for various scenarios depending on the formation of a situation of almost unlimited complexity. The main elements of agent modelling are agents and the space in which the interact. Thus, multi-agent modeling can be considered as a good basis for modeling the educational process, in which change and uncertainty are always present.

To optimize the learning process using learning management systems (LMS), it is proposed to develop an agent model and software implementation of an information system to provide optimal (in terms of time and total costs) recommendations for learning trajectories for a group of students

The recommender system will be presented as a deep neural network that receives a vector of user characteristics as input and produces a hash of lesson identifiers of the optimal learning path.

To train a deep neural network, it is necessary to have a sufficient amount of data so that the results are acceptable and can be considered valid. To solve this problem, it is planned to use multi-agent modeling.

The main elements of agent modelling are agents and the space in which the interaction between them takes place. Agents are modelled individually. It is necessary to prepare data for each type of agent participating in the modeling. Namely for student agents, software engineer agents and interference agents. As well as data on subjects and lessons for each subject. After preparing the data, it is necessary to run the simulation for each "user – learning path" pair (a set of lessons on a given subject) and save the output data into the training set. The simulation will take place in a two-dimensional environment (X is time, Y is the distance between agents at a time), where each agent can interact with another and transmit or receive a certain amount of knowledge. The closer the agents are to each other, the higher the chances of knowledge transfer or loss. The behavior of the user agent will be modeled as a neural network (trained on data from the LMS).

Further research will be be dedicated to the formation of agents definition, data preparation and implementation of agents model. The developed multi-agent model will help generate the necessary amount of data for training a deep neural network to formulate a recommendation for a rational (close to optimal) learning path.