Жасанды интеллект және машиналық оқыту (деректерді өңдеу, ИИ қолдану) / Искусственный интеллект и машинное обучение / Artificial intelligence and machine learning

CREATION OF AN EDUCATIONAL WEBSITE TO IMPLEMENT PERSONALISED ADAPTIVE LEARNING BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

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Modern education faces the need to individualise the learning process, taking into account the diversity of students' abilities, learning rates and interests. Traditional teaching methods are often unable to meet these needs, resulting in lower motivation and performance. The introduction of artificial intelligence (AI) into the educational process provides an opportunity to create personalised, adaptive learning programmes that can be tailored to each student.

Kazakhstan is actively developing initiatives to integrate AI into education. For example, Nazarbayev Intellectual Schools (NIS) is implementing Beyim.ai, an AI-based platform that offers microlearning, personalised learning trajectories and learning analytics. Experiments are also being conducted in NIS branches to implement personalised adaptive learning using AI technologies, highlighting the drive for innovation in the education system.

According to the 2023 Government AI Readiness Index, Kazakhstan ranks 72nd among 193 countries, indicating significant potential for AI development in various areas, including education.

Global experience demonstrates the successful application of AI in education. Platforms such as Duolingo use AI to tailor learning content to the individual needs of students, thereby enhancing learning. In addition, a study conducted in six leading universities in Kazakhstan showed that 56.2% of students believe that the use of AI technologies can increase individualisation and improve learning outcomes [1].

Examples of AI-assisted learning automation and tools used

1. Beyim.ai: A platform designed for AI-based microlearning provides personalised learning trajectories and learning analytics to facilitate personalisation of the educational process [2].
2. Duolingo: An international language learning platform that uses AI to tailor learning content to each user, providing an effective and personalised learning experience.
3. KAZ-LLM: Kazakh Large Language Model, designed to support local language technologies and foster AI innovation in Kazakhstan [3].

Creating your own educational website using artificial intelligence (AI) is a promising trend that combines modern technology with a personalised approach to learning. Such a site can not only provide access to educational materials, but also adapt to the needs of each user, analysing their progress and offering personalised recommendations. The following describes an example of

such a project implementation using the OpenAI GPT-4 API tool, which became the central part of the platform's intellectual core [4].

Step 1: Planning and structure of the site

The first step was to define the target audience and the goals of the website. It was planned to create a platform for high school students preparing for the UNT and international exams (SAT, IELTS), with a focus on adaptive learning. The structure of the site included the following sections:

- Student's personal account
- Thematic modules (maths, English, history, etc.)
- Interactive tests
- AI-powered chat assistant
- Progress analytics

Step 2: Developing and connecting the GPT-4 API

GPT-4 API from OpenAI was used to realise the intellectual capabilities of the site. This tool allows processing natural language and generating answers, explanations, as well as creating tests and short tutorials on a given topic. The API was connected via a Python backend (using Flask), and integrated into a chatbot on the homepage of each module (Figure 1).

Fig 1: Implementation of the module in Python

So a student could ask a question, such as "Explain the rule of sines and the AI would return a concise and understandable explanation, complete with examples.

Step 3: Adaptability of learning

AI was used not only to assist in teaching, but also to analyse students' answers to tests. Algorithms recorded errors, identified weak topics and automatically formed an individual learning route. For example, if a student made mistakes in function tasks, the system offered additional lessons and explanations on this very topic.

Step 4: Analytics and feedback

The admin and analytics dashboard displayed key metrics: student engagement, average scores by topic, and frequency of AI calls. This allowed teachers to adapt content and respond quickly to knowledge gaps.

Using GPT-4 has made the educational website not just a repository of information, but a full-fledged learning assistant. AI has enhanced engagement, provided flexibility and personalisation - something that is lacking in traditional platforms. This approach can become the basis for new formats of online learning in Kazakhstan and beyond [5].

In conclusion, we would like to note that the introduction of artificial intelligence in personalised adaptive learning is a promising direction for the development of the educational system. Kazakhstan demonstrates activity in this direction by introducing innovative platforms and conducting research in the field of AI. International experience confirms the effectiveness of using AI to individualise learning and improve student performance. Further development and integration of AI in education requires a systematic approach, including training of specialists, developing infrastructure and providing access to modern technologies.

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MODEL THEORY AND MACHINE LEARNING:POINTS OF INTERSECTION

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Annotation

This paper explores the key points of intersection between model theory—a branch of mathematical logic concerned with the interpretation of formal languages—and machine learning techniques. It examines the potential of using tools from model theory to formalize data models and learning algorithms, thereby enabling a deeper understanding of the expressive power and limitations of data-driven models. Particular attention is paid to generalization, formal verification, correctness of inference, as well as the formalization of environments and interaction rules in reinforcement learning tasks. The contribution of model theory to the development of hybrid