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ISSUES AND MODERN METHODS OF INTELLECTUAL DATA ANALYSIS IN EDUCATION



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Abstract. Currently, intelligent data analysis is used in many fields. Many methods are used in the intellectual analysis of data. In this article, the intellectual analysis of data in the educational system is considered. Educational data mining combines many methods of data analysis in education sphere. In addition, in this paper the most methods of data analysis are considered. The application of each method in the field of education is considered as well as in the field of education, data is intellectually analyzed and the results are analyzed.

Keywords: Big Data, artificial intelligence, machine learning, artificial neural network, educational data mining

Introduction. As a result of the rapid development of modern information technologies and the penetration of these technologies into all areas of society, a large amount of information (Big Data) has been created. This situation requires new solutions for analyzing large volumes of data, extracting the necessary information from it, and making decisions based on the extracted data. Intelligent data analysis is important in solving complex problems in various fields, based on modern technologies and methods. Technologies such as artificial intelligence (AI), machine learning, artificial neural networks, data science and deep data analysis (deep learning) are the most effective methods used to solve complex problems in this situation.

Intelligent analysis methods allow you to identify hidden relationships between data in a dataset, make predictions, and make decisions. These methods are used to solve problems in many fields, including business, economics, science and other fields. It is also widely used in the field of education. For example, in the field of education, through intellectual analysis, it is possible to analyze the level of knowledge of students, evaluate the academic results of students, organize personalized teaching processes according to the level of knowledge of each student, and predict the level of knowledge of students.

The intellectual analysis of data also has its own disadvantages. The large volume of data, the quality of data, their diversity, and the process of choosing analysis methods are among the problematic issues. This article examines the problems encountered in the field of intellectual analysis, the methods and technologies used to achieve them. Additionally, we will consider the application of these methods to the educational system, their results and prospects.

The importance of intellectual analysis of data is relevant not only in the development of science and technology, but also in all spheres of social life.

Methods of intellectual analyze data. We will consider in detail each of the methods highlighted in the above section and widely used in the field of education. Clustering method. This method is used in machine learning. Clustering divides data into groups based on data similarity. When applying this method to the field of education, it is possible to divide the interests of students and the level of knowledge of students into groups. As a result, it is possible to create customized training programs for groups that are grouped together. The next method is the classification method. Sorts data into predefined classes.

As for its application in the field of education, this method is used in situations such as dividing the knowledge level of students into high, average and low classes, and identifying students at risk of academic failure. Regression methods are used to make predictions based on data. In education, it is used in situations such as determining the aspects that affect the educational results, predicting the academic results in the future.

Association Rule Mining method detects hidden relationships between data. Based on the students' learning process, it is used to recommend suitable educational resources to them, to study the relationship between subjects according to the curriculum. Neural Networks is one of the most widely used methods. It is widely used in evaluating student performance, predicting student success, and classifying students. The key method is the Decision Tree algorithm. With the help of this algorithm, it is used to determine the main factors affecting the results of students' studies, to recommend which subjects students should master successfully. Big Data Analytics is a method of analyzing large amounts of data. It is a method of analyzing the data of a large amount of students related to the educational process. It is used in making strategic decisions for educational institutions. Principal Component Analysis (PCA). It is widely used in the educational system to determine the factors influencing students' mastery of subjects and to optimize educational programs. Machine Learning Algorithms is a component of artificial intelligence. In the field of education, ML algorithms are used to classify students' knowledge levels into classes, and to predict students' knowledge levels. In addition, it is used in the creation of personalized educational systems and the development of interactive educational resources. Similarity Analysis method is widely used in presenting educational materials in accordance with students' interests, and in offering advanced methods for increasing academic potential.

Educational Data Mining (EDM) is a branch of computer science focused on analyzing educational data sets, extracting useful knowledge and patterns from them using the methods discussed above. Using modern technologies and methods of intellectual data analysis, EDM provides an opportunity to understand, optimize and personalize the educational process according to the knowledge potential of each student. The main goal of EDM is to monitor and analyze student activity, personalize the learning process, and improve the quality of education. Technologies used in EDM are classification and clustering algorithms, forecasting techniques, association rules, machine learning and artificial intelligence, big data analytics. EDM can be used at all levels of education. EDM is mainly used in education in the following contexts: learning process analysis, personalized learning, academic risk identification, and resource management and optimization.

Through the methods discussed above, we can effectively use information in the educational process, optimize the educational process, and increase the possibilities of personalized education. Figure 1 illustrates educational data mining.

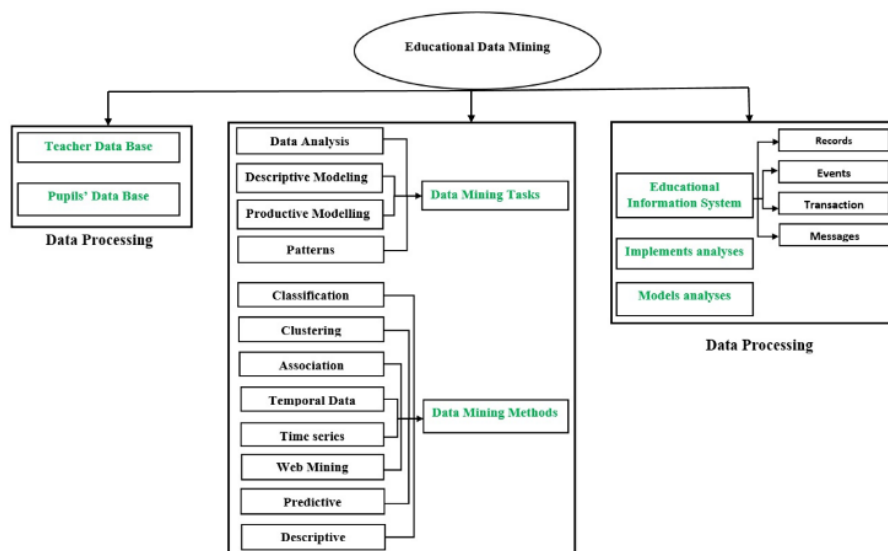


Figure 1. Educational Data Mining

Интеллектуальный анализ данных в образовании. Многие страны выделяют миллионы долларов ежегодно на свои образовательные системы, представляя значительную часть их национальных бюджетов. Статистика показывает, что глобальные расходы на школьное образование являются значительными. Однако, стоимость разработки образовательной платформы с использованием предложенной архитектуры будет в несколько раз ниже, чем годовые расходы традиционного офлайн образования. Заметно, что количество интернет-пользователей по всему миру прогнозируется увеличиться на 47%, с 5,35 миллиарда в 2024 до 7,9 миллиарда в 2029. Этот рост позволяет студентам в интернет-доступных районах использовать такие платформы на основе искусственного интеллекта для обучения. Такие платформы являются высокоадаптивными, что делает их пригодными для всех уровней образования. Образовательная платформа на основе искусственного интеллекта может точно оценивать успеваемость студентов и решать различные образовательные задачи. Кроме того, платформа особенно эффективна во время пандемий.

Вывод. Учитывая вышеизложенные методы, можно прийти к следующему выводу относительно интеллектуального анализа данных в образовании. Интеллектуальный анализ данных в образовании очень важен для управления современными образовательными процессами и дальнейшего развития образовательного процесса, с помощью вышеизложенных методов, возможность предсказания уровня знаний, интересов и успеха студентов и деления их на классы увеличивается. Алгоритмы интеллектуального анализа предоставляют рекомендации по выявлению недостатков студентов в образовательном процессе и устранению выявленных проблем. Существует высокая возможность делать точные прогнозы в образовательном процессе с помощью глубокого обучения и методов машинного обучения.

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Authors' contribution

Erkaboy Samandarov – analysis of the methods of intellectual analysis of data in the field of education, formation of the structure of the paper.