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Utilizing AI tools for business process automation in modern private educational institutions

Abstract: In the contemporary educational environment, private educational organizations face a range of problems associated with ineffective business process management. One of the main issues is the lack of a systematic and integrated approach to management, leading to delays and inefficient resource utilization. Due to the increasing volume of data stored in educational institutions, manual processing and analysis consume a significant amount of time and are costly. This can result in potential errors and inefficiencies in management. Modern educational institutions are expected to make quick and accurate decisions. However, the volume of data and the complexity of the process cause delays and impact the overall efficiency of educational institutions. Another pressing issue is the necessity for personalizing of education and adapting business processes to the diverse needs of students and teachers. Traditional management systems often do not provide such flexibility. There are also many challenges with automating administrative processes. Numerous routine tasks, such as student accounting and financial reporting, can be optimized using artificial intelligence systems. One of solutions is the utilization of AI and automation tools. The authors describe the integrated system managing concept for all business processes of a private educational institution using artificial intelligence tools. Therefore, here are presented informed decisions for the implementation of all modules of such a system. The proposed management system for an educational institution involves the integration of a series of neural networks.

Keywords: AI (Artificial Intelligence), CRM (Customer Relationship Management), LMS (Learning Management System), bot, automation, neural network.

Introduction

In case of a private educational institution, AI (Artificial Intelligence) can be utilized to optimize business processes such as marketing, sales, and educational monitoring. For instance,

AI can assist educational institutions in identifying the most effective marketing strategies, pinpointing potential students, and providing personalized recommendations to students based on their learning approach. On the other hand, automation tools can help streamline and simplify repetitive tasks, reducing the risk of errors. By using artificial intelligence and automation tools, private educational institutions can enhance their business processes, improve efficiency, and reduce costs.

The work of a modern private educational institution can be divided into several directions. Each direction requires constant analysis of effectiveness and improvement.

This can be achieved with the application of modern AI tools. The main modern private educational institution's occupations are:

- marketing,
- sales (educational services),
- educational programme developing (educational department).

To implement the business processes of each department, specific applications are used

- sales department – a CRM system;
- for the educational department – an LMS (Learning Management System);
- for the marketing department – CRM system.

Additionally, there are interconnected systems between departments, such as the ACS (Access Control System), used for controlling and managing access to company resources. This is a widely accepted set of applications for any modern private educational institution. However, many work tasks cannot be fully addressed with the standard functions of the applications. Numerous tasks remain reliant on personnel, and the efficiency of their implementation is heavily influenced by the human factor.

The most significant challenges are primarily in sales and marketing. Since these types of company occupations mostly contribute to profit, the search for ways to increase decision-making efficiency and optimize employee functionality is relevant. In this article, the functions that can be automated and automation tools will be consider.

The concept of a private educational institution management system based on AI

In the sales department, a CRM system is typically used, which performs formal tasks related to registering the entire life cycle of a lead – a potential client, until it becomes a customer or is removed from the database or archived. Additionally, most CRMs provide some sales analytics, but it only provides quantitative rather than qualitative metrics. However, there are a number of tasks that are not formalized and remain at the discretion of the sales manager or director, such as:

- formation of scripts for working with leads,
- analysis of trends among lead groups based on communication results,
- the second significant structural unit of the educational institution is the marketing department,
- planning marketing strategies,
- development of monthly marketing calendars,
- creation of creatives (advertising materials) – writing posts, photos, videos,

- statistics and analysis of marketing activities and forecasting future marketing activities.

To implement these functions, most companies maintain a staff of marketers. However, the use of modern AI tools will allow reducing the number of marketers due to the automation of the tasks described above. Neural networks are rapidly developing. They are capable of generating text, photos, and videos for posts on a given topic. Additionally, there are tools that enable the automation of creating advertising calendars.

The automation of business processes in a private educational institution involves the implementation of a system that generally comprises two major modules:

- a comprehensive decision support subsystem for employees (sales managers, marketers, directors, and other organizational staff);
- a fully automated subsystem for generating conclusions and performing specific actions based on these conclusions.

The first subsystem involves the presence of a human operator. For example, the creation of scripts for the sales manager, issuing recommendations to the director and educational manager, forming marketing calendars and content for the marketer, and chatbots for students.

The second subsystem, based on the conducted analysis and generated conclusion, automatically performs certain actions. For instance, it creates a list of potential losses and transfers it to a specified LMS page, categorizes leads into lists based on specific criteria, and generates a script for each of them.

Accordingly, AI tools can be categorized into two groups:

- those that can be integrated into CRM, LMS software,
- those that are used as standalone products, providing results (text, images) or recommendations that cannot be integrated into the company's products.

Regarding the first category of AI tools, the products used for automating their business processes must have the capability to integrate third-party products. For example, AI implemented in C# or Microsoft Azure should integrate into the CRM and LMS purchased from developers. Typically, such applications are universal and configured for a broad class of businesses, requiring additional customization by the product company's development team.

When developing custom AI modules, it would be advisable to use the following methods.

- The Analytic Hierarchy Process (AHP) can be applied when choosing new CRM functionality or determining priorities in education (*Analytic hierarchy process, 2024*).
- The Analytic Network Process (ANP) can be used in analyzing interactions among different CRM and LMS factors. This allows for considering complex interactions between criteria and making decisions based on analysis (*Analytic network process, 2023*).

However, large network educational companies develop their own versions of CRM and LMS, customized for their specific needs. In this case, the task of integrating AI becomes significantly simplified.

A structural diagram of the proposed system is presented in the Appendix (*Figure 1*).

Below are tools that do not require integration and are used as standalone products. Mostly, these are marketing tools.

2. *Jasper AI* is a large-scale language model (LLM) that can be used for text generation, language translation, creating various types of creative content, and answering marketing-related questions (*Top…, n.d.*).
3. *Midjourney* is an AI tool for transforming text into images, which can be used to create realistic and creative images from textual descriptions. It includes a large language model (LLM) called Bard, which is still in the development stage (*Top…, n.d.*).

Below is a list of tools that require integration through APIs.

1. *UiPath AI Fabric* is a platform for automating processes that specializes in Robotic Process Automation (RPA). RPA is a technology that uses software bots to automate routine and repetitive tasks in work processes (*Contributors…, 2023*). AI Fabric is an application that allows deploying machine learning models, managing them, continuously improving them, and using them in RPA work processes in Studio (*AI…, n.d.*). Implemented in the C# programming language. It supports integration with various programs and systems through APIs.
2. *Microsoft Power Automate* represents a SaaS platform for optimizing and automating work processes and business processes. Power Platform combines four innovative programs: Microsoft Power BI, Microsoft Power Apps, Microsoft Power Automate (Flow), and Power Virtual Agents, which allow real-time analysis, visualization, and automation of data retrieval processes (*Microsoft…, n.d.*).
3. *Implemented primarily in C# and JavaScript* integrates with numerous programs and services, including Microsoft 365, Salesforce, Dropbox, and others, through APIs (*Jopanchal, 2023*).
4. *Salesforce Einstein* is artificial intelligence for CRM. Einstein is originally built into the Salesforce platform and uses data from CRM and external applications to provide analytical information, business forecasts, and content creation in the workflow. Interaction with the Salesforce platform occurs through GraphQL, a standard query language for APIs and an execution environment for executing these queries with given data (*Salesforce…, n.d.*).
5. *Adobe Sensei* is an artificial intelligence and machine learning platform integrated into Adobe's marketing and creative solutions. It provides intelligent automation of marketing campaigns, content personalization, and audience segmentation (*Top…, n.d.*).
6. *Pardot by Salesforce* is a B2B marketing automation platform that enables the creation, deployment, and automation of marketing campaigns. It utilizes artificial intelligence to track the engagement of potential clients, identify their priorities, and provide targeted content for more effective engagement and conversion (*Top…, n.d.*).

For the education department, most AI tools need to be integrated into the Learning Management System (LMS). For example, in test assessments, AI not only checks tests but also generates reports with comprehensive statistics on errors and provides recommendations for adjusting the educational programme.

Virtual assistants and chatbots are used in various educational fields, from general education to professional and technical education. They provide instant answers to students' questions, effectively solve problems related to course content, and reduce the workload on teachers. Chatbots and teacher assistants facilitate learning by offering additional materials and videos and helping students learn new topics effectively.

Course assessment and feedback collection are eased by chatbots, allowing surveys to be conducted at the end of the course to determine students' opinions and the quality of education. Additionally, the organization of assignments and meeting deadlines are simplified as chatbots assist students in planning and tracking their tasks, ensuring timely completion.

Furthermore, predictive analytics is crucial for the educational sector, providing:

- operational efficiency,
- personalized support for students

In the development of custom AI modules for integration into CRM and LMS, frameworks and models described below can be utilized. Microsoft Bot Framework is a set of libraries, tools, and services that enable the creation, testing, deployment, and management of intelligent bots. The Bot Framework includes a modular and extensible SDK for creating bots and connecting to artificial intelligence services. With this platform, developers can create bots that use language, understand natural language, answer questions, and much more (*What is the Bot…, 2022*) (*Figure 2*).

Depending on how the bot is configured, interaction can take place in textual or verbal form and may include images and videos. The bot evaluates the entered data and performs corresponding tasks, such as asking the user for additional information. Bot Framework include:

- Bot Framework SDK for developing bots in C#, JavaScript, Python, or Java.
- CLI tools to assist in comprehensive bot development.
- Bot Connector service that passes messages and events between bots and channels.
- Azure resources for managing and configuring bots (*What is the Bot…, 2022*).

Spacy is a free, open-source Python library that provides advanced natural language processing (NLP) capabilities for processing big amounts of text at high speed. It helps create models and programmes that can be the basis for document analysis, chatbot capabilities, and various other forms of text analysis (*What is spaCy, n.d.*).

BERT is a natural language processing model developed by Google AI researchers. It achieved state-of-the-art accuracy in 11 NLP and NLU tasks, including the highly competitive Stanford Question Answering Dataset (SQuAD v1.1), General Language Understanding Evaluation (GLUE), and Situations with Adversarial Generations (SWAG) (*BERT…, 2022*).

Rasa Open Source is an open-source conversational AI platform that allows understanding and maintaining conversations, as well as connecting to messaging channels and third-party systems through a set of APIs. It offers building blocks for creating virtual assistants or chatbots (*Introduction…, 2024*).

Discussion

The unique aspect of a private educational institution operation is the coordinated work of the advertising, sales, and educational departments. Most processes in these departments involve analyzing big amounts of data and analyzing future trends. Automating these processes through artificial intelligence allows companies to increase business forecast accuracy and make more informed decisions.

Success in dealing with this challenge lies in the proper combination of various AI tools, each performing its specific task (lead processing analysis by the operator, creation of marketing

calendars, analysis of student performance), while ensuring the overall goal of improving the institution's efficiency and eliminating the human factor.

Neural networks have been selected as AI tools, which can either be integrated into the company's products through APIs or used as standalone systems that generate conclusions for users.

Conclusions

The authors propose a concept of an automated system for managing sales, marketing, and education processes in a modern private educational institution. The system includes two modules which are functioning with artificial intelligence tools – neural networks. One group of networks acts as standalone applications, forming conclusions or ready-made products for the user, while the other integrates into the company's products, such as CRM and LMS, as modules. A structural diagram of the proposed system is provided, along with specific neural networks suggested to address the tasks described in the article.

Future research directions involve determining ways to integrate AI tools into the institution's applications for sales and educational process management, as well as investigating performance indicators of AI application in the proposed system.

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Appendix

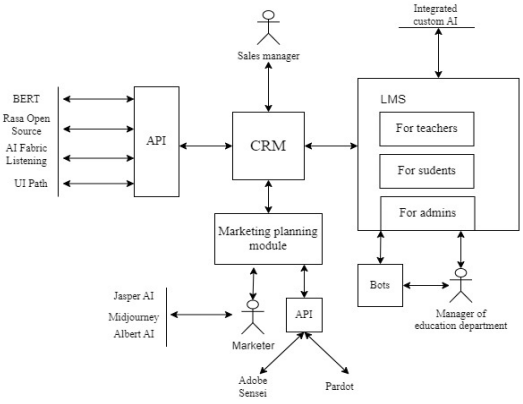

Figure 1. A structural diagram of the proposed system

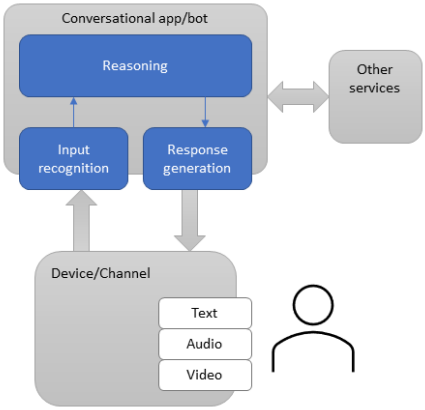

Figure 2. Interaction with the Bot Scheme