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DEVELOPING AN AI-POWERED CHATBOT TO INCREASE SALES IN SMALL BUSINESS

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Abstract. *In the context of digitalization of the economy, small businesses are increasingly turning to artificial intelligence technologies to improve the efficiency of customer service and optimize business processes. One of the most promising areas is the introduction of intelligent chatbots that can automatically process customer requests, provide advice and support the user at the stage of making a purchase decision. This paper examines the process of designing and implementing a chatbot with elements of natural language processing designed to interact with small business clients. The development stages are described, including domain analysis, formalization of user scenarios, construction of the system architecture, selection of technologies, prototype implementation, and user testing. The results of the pilot implementation showed a high degree of relevance of responses, ease of interaction and the potential for integrating such a solution into the existing business environment. The data obtained confirm the feasibility of using intelligent chatbots in small businesses as a tool for automating primary consulting with limited resources.*

Keywords: *small business, artificial intelligence, chatbot, automation, implementation, sport nutrition, customer service, target audience, online consulting, natural language processing, prototype, user testing.*

КИЧИК БИЗНЕСДА САВДОНИ ОШИРИШ УЧУН СУНЪИЙ ИНТЕЛЛЕКТГА ЭГА ЧАТ-БОТНИ ЯРАТИШ

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Аннотация. *Иқисодиётни рақамлаштириш шароитида кичик корхоналар мижозларга хизмат кўрсатиш самарадорлигини ошириш ва бизнес жараёнларини такомиллаштириш мақсадида сунъий интеллект технологияларидан тобора кенгрок фойдаланмоқда. Энг истиқболли йўналишларидан бири мижозларнинг мурожаатларини автоматик тарзда қайта ишлай оладиган, маслаҳатлар бера оладиган ва харид қилиш ҳақида қарор қабул қилиш жараёнида фойдаланувчига кўмаклаша оладиган интелектуал чат-ботларни жорий этишдир. Ушбу ишда кичик бизнес мижозлари билан мулоқот қилиш учун мўлжалланган табиий тилни қайта ишлаш элементлари бўлган чат-ботни лойиҳалаш ва амалга ошириш жараёни кўриб чиқилади. Предмет соҳасини таҳлил қилиш, фойдаланувчи ценарийларини расмийлаштириш, тизим архитектурасини қуриш, технологияларни танлаш, прототипни амалга ошириш ва фойдаланувчи синовини ўтказишни ўз ичига олган ишлаб чиқиш босқичлари тавсифланган.*

Тажриба-синов натижалари жавобларнинг юқори даражадаги алоқадорлигини, ўзаро таъсирнинг қулайлигини ва бундай ечимни мавжуд бизнес муҳитига интеграция қилиш имкониятини кўрсатди. Олинган маълумотлар кичик бизнесда интеллектуал чат-ботларни чекланган ресурслар шароитида бирламчи маслаҳат беришни автоматлаштириш воситаси сифатида қўллаш мақсадга мувофиқлигини тасдиқлайди.

Калит сўзлар: *кичик бизнес, сунъий интеллект, чат-бот, автоматлаштириш, жорий этиш, спорт овқатланиши, мижозларга хизмат кўрсатиш, мақсадли аудитория, онлайн маслаҳат, табиий тилни қайта ишлаш, прототип, фойдаланувчи тести.*

СОЗДАНИЕ ЧАТ-БОТА С ИСКУССТВЕННЫМ ИНТЕЛЛЕКТОМ ДЛЯ УВЕЛИЧЕНИЯ ПРОДАЖ В МАЛОМ БИЗНЕСЕ

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Аннотация. *В условиях цифровизации экономики малые предприятия всё чаще обращаются к технологиям искусственного интеллекта для повышения эффективности клиентского обслуживания и оптимизации бизнес-процессов. Одним из наиболее перспективных направлений является внедрение интеллектуальных чат-ботов, способных автоматически обрабатывать обращения клиентов, предоставлять консультации и сопровождать пользователя на этапе принятия решения о покупке. В данной работе рассматривается процесс проектирования и реализации чат-бота с элементами обработки естественного языка, предназначенного для взаимодействия с клиентами малого бизнеса. Описаны этапы разработки, включающие анализ предметной области, формализацию пользовательских сценариев, построение архитектуры системы, выбор технологий, реализацию прототипа и проведение пользовательского тестирования. Результаты пилотного внедрения показали высокую степень релевантности ответов, удобство взаимодействия и потенциал интеграции подобного решения в существующую бизнес-среду. Полученные данные подтверждают целесообразность применения интеллектуальных чат-ботов в малом бизнесе как инструмента автоматизации первичного консультирования при ограниченных ресурсах.*

Ключевые слова: *малый бизнес, искусственный интеллект, чат-бот, автоматизация, внедрение, спортивное питание, клиентское обслуживание, целевая аудитория, онлайн консультирование, обработка естественного языка, прототип, пользовательское тестирование.*

Introduction.

In recent years, there has been a rapid development of artificial intelligence (AI) technologies, which are being adopted not only by large corporations but also by small businesses. This is especially relevant for areas focused on active interaction with consumers, including online trading, consulting and personalized marketing. One of the promising areas is the use of intelligent chatbots that can automatically process customer requests, provide consultations, and assist users at various stages of the purchasing process.

The object of the research is the process of automating customer consulting in small businesses. The subject of the research is the use of an AI-powered chatbot for selling sports nutrition products. The aim of this work is to develop the concept and prototype of an intelligent chatbot for online customer consulting in an e-commerce store, as well as to analyze the effectiveness of its implementation in the context of small businesses.

Small businesses play an important role in the structure of the national economy, providing market flexibility and adaptability. In the field of e-commerce, small enterprises have

a number of advantages - proximity to the client, a more personalized approach. However, they also face significant limitations: limited budget, shortage of qualified personnel and high competition with large players. One of the key factors in the success of online sales is the quality of customer service. The availability of prompt and meaningful advice is especially important in segments where the consumer needs expert support before purchasing - for example, in the field of sales of sports nutritional supplements.

It is important to understand the target audience and its needs. Knowledge about the customer and their preferences helps save time on market research and in identifying the most in-demand products and services. By understanding the industry and its specifics, businesses can make better offers than their competitors, thereby positioning themselves as market leaders.

The role of a sales consultant in online stores is hard to overestimate. According to marketing research, more than 60% of customers make a purchase only after receiving a recommendation. However, in small businesses, it is not feasible to have a specialist available 24/7, which creates the need for an automated system capable of replacing or supplementing human assistance.

Thus, for an online store to operate effectively, it is essential to implement an intelligent system capable of analyzing inquiries, identifying customer goals, and recommending suitable products. This task is fulfilled by an AI chatbot, based on natural language processing technologies and automated recommendation logic.

Literature review.

Artificial Intelligence (AI) has evolved from a specialized academic discipline to a widely adopted force behind technological advancements, especially in business automation. While small businesses have often faced challenges in implementing advanced technologies due to limited resources, they are now turning to AI to improve customer service, enhance operations, and support strategic decision-making. Among the most practical and influential AI tools available to them are chatbots.

The foundational principles of artificial intelligence are comprehensively covered in *Russell and Norvig (2020),* who present AI as the simulation of intelligent behavior in machines, covering areas such as problem-solving, perception, learning, and language understanding. Their work provides a broad and authoritative framework for understanding how AI can be applied to solve real-world problems, including those faced by small businesses. Similarly, *Luger (2020)* studies thoroughly AI strategies for complex problem solving, emphasizing intelligent agent design and knowledge representation—core components in building effective AI-driven systems like chatbots.

One of the most transformative applications of AI for small businesses lies in natural language processing (NLP), the domain that powers chatbot communication. *Jurafsky and Martin (2021)* provide an extensive overview of NLP technologies, highlighting speech recognition and machine learning as foundational elements for building chatbots capable of understanding and responding to human language. Their insights are critical to designing chatbots that not only interpret the language but also meaningfully increase user participation.

In terms of practical application, *Bui and Park (2021)* investigate the adoption of chatbots in small businesses and their operational impact. Their empirical study reveals that chatbots contribute significantly to customer engagement, reduce human labor costs, and improve response times. Importantly, the authors identify ease of implementation and perceived usefulness as key factors driving chatbot adoption, which are particularly relevant considerations for resource-constrained small businesses.

Adding to this, *Adamopoulou and Moussiades (2020)* provide a structured overview of chatbot technologies, discussing types (rule-based vs AI-based), development frameworks, and evaluation metrics. They also touch on common challenges in chatbot development, such as

handling uncertainty, maintaining conversational context, and ensuring user satisfaction—all critical issues for small businesses striving to offer professional-grade customer interaction on a limited budget.

AI, and specifically chatbot technology, offers huge potential for small businesses to enhance customer interaction, automate routine tasks, and gain a competitive edge. The literature collectively highlights that while AI principles provide the technical basis, the success of chatbot implementation largely depends on application-oriented approach considering the realities of small businesses.

Research methodology.

An applied research approach is used in this study, combining software system design principles with an assessment of the effectiveness of their implementation in business processes.

This engineering-applied research focuses on the development of a prototype intelligent chatbot and the evaluation of its applicability within the context of small businesses, illustrated by the case of an online sports supplements store.

Analysis and discussion of results.

The development of the intelligent chatbot and the evaluation of its effectiveness in the context of small businesses were carried out in several stages. The work included four main phases: analytical, design, technical, and testing.

1. *Analytical phase*

At the initial stage, an in-depth study was conducted of the specific segment within small business, focusing on the characteristics of customer inquiries and the key tasks typically handled by a sales consultant. Based on the analysis of customer interactions, typical communication scenarios were identified, including the most frequent questions, clarifying dialogues, and common behavioral patterns.

The outcome of this stage was the formalization of requirements for the chatbot's functionality, along with a detailed description of user roles, dialogue logic, and the proposed system architecture.

2. *Design phase*

At the next stage, the logical and technical architecture of the chatbot was developed, including the following key components:

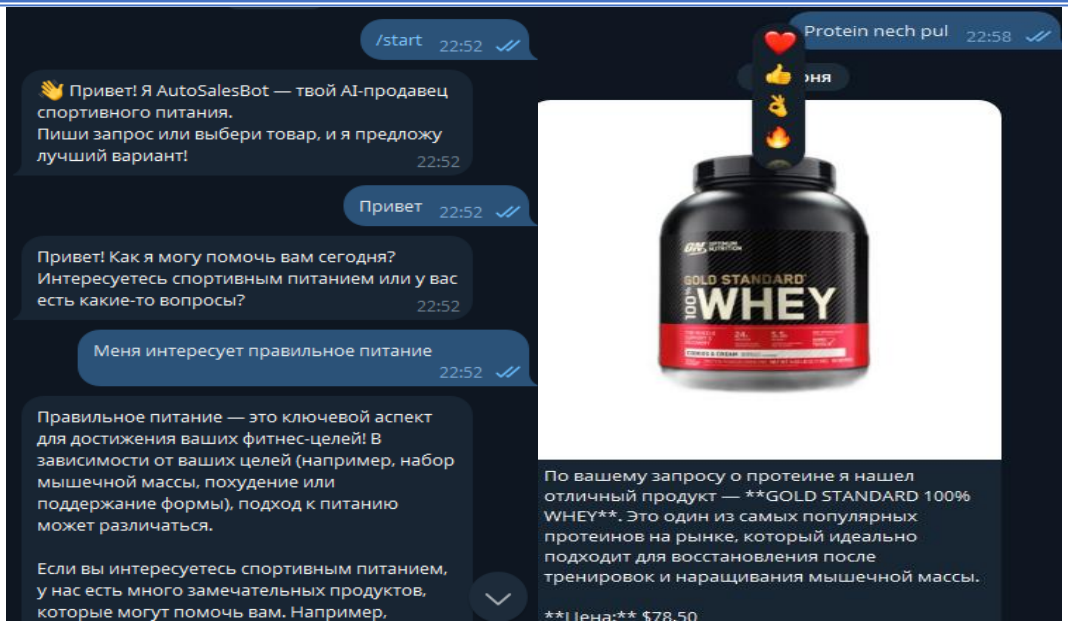
- user interaction interface (web chat);
- natural language processing (NLP) module;
- knowledge base containing descriptions of products;
- logic system for selecting recommendations.

In parallel, the technologies and tools required for the project implementation were selected. **Python** was chosen as the primary programming language, and the API of an existing AI service was selected to handle natural language processing. Additionally, the structure of the knowledge base and a collection of typical dialogue scenarios were developed to facilitate further training of the model.

3. *Technical Implementation*

At this stage, a prototype chatbot with basic functionality was developed: recognizing user queries, clarifying their goals, and recommending appropriate products or services. The implementation was carried out using **Python** and the selected **NLP toolkit**.

The bot was integrated with the chosen user interaction platform **(Telegram**), ensuring quick accessibility and ease of testing. Key logical rules were configured, and basic communication scenarios were thoroughly tested. An example of interaction with the intelligent chatbot is shown below in Figures 1 and 2.



Picture 1. Screenshot of interaction with the AI Telegram chatbot

Picture 2 Example of a dialogue with the AI Telegram chatbot supporting the Uzbek language and providing relevant responses to user queries.

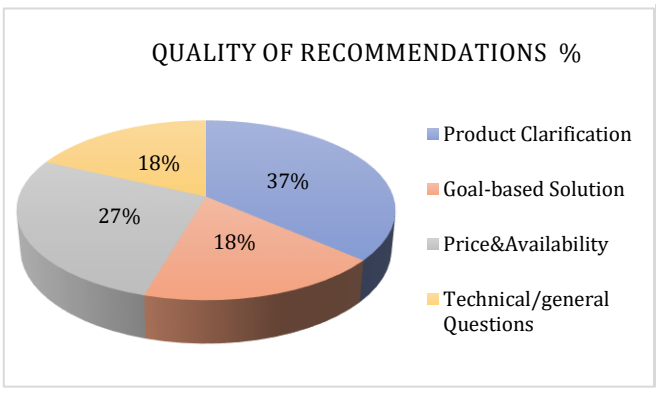
Source: *@aiforsimpletest_bot*

4. Testing and evaluation

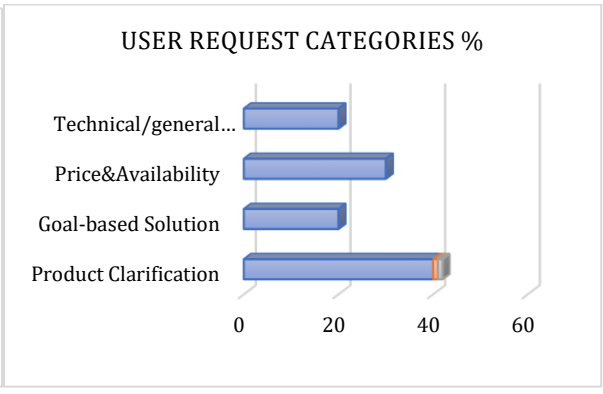
The final stage involved user testing with the target audience (10 participants). Users interacted with the bot in an open-ended manner, simulating real-life business interactions—from receiving consultations to making purchase decisions.

The collected dialogues and user feedback served as the basis for evaluating the chatbot's performance. The analysis was conducted according to the following criteria: accuracy and completeness of responses, response time, ease of interaction, and overall user satisfaction. The gathered data allowed for assessing the chatbot's effectiveness and identifying areas for further improvement.

The results of the chatbot performance evaluation are shown in the **DIAGRAM 1,2** below.



Picture 3. Distribution of recommendation quality by category based on the pilot version made on Excel



Picture 4. Percentage of user request categories made on Excel

Source: *Data provided by the developer of the AI-based Telegram chatbot (personal communication, 2025)*

Conclusion and suggestions.

The evaluation of the pilot version of the AI-based online consultant has demonstrated the high potential of implementing such technologies in the small business sector. The use of an AI chatbot significantly increases sales volumes while reducing the company's resource load and contributing to profit growth. However, to achieve sustainable results, it is essential to ensure the continuous improvement of the chatbot's performance: regular integration with up-to-date databases, timely updates of its functionality, systematic performance evaluation, and collection of user feedback. Only by complying with these principles can AI solutions remain in demand and consistently deliver value to businesses.

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