Personalized Training with the Help of Automation and Assistant Based on Artificial Intelligence

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Abstract

Modern students like to communicate with bots, are ready to share their thoughts with them, listen to their advice, even more than the advice of teachers and parents. Therefore, we offer to personalize training with the help of automation and an assistant based on artificial intelligence. An important starting point for a student's education is determining the student's level of knowledge and motivation. This is the first task for automation - to determine the point of entry of the student into the study program. During training, support and motivation are important. And this is the second task for our assistant - to support and motivate this particular student, this is where artificial intelligence will be needed. When students have received individual support and completed training at exactly the level and at the pace they need, then it is important to consolidate what they have learned and take part in competitions with other students of the same level.

The main task is to understand the purpose of the student and create a truly smart chatbot. The proposed model is implemented to understand intentions. Recently, various ML and NLP methods have been used to understand the classification of text entered in a chatbot dialog. The structure performs the classification of data from the student to data entry in several stages: data collection, preprocessing and classification of the received data.

Depending on the request, the chatbot may not save the correct response to the request, in such cases it is necessary to use: predefined text; text extracted from a knowledge base containing multiple responses; some of the information is provided in context and based on the student's data; data is stored in the corporate system.

The previous analysis highlights the importance of input processing for faster request initialization and response. The task of the classifier is to extract features based on aspects and classify them.

Based on the data presented, a quiz chatbot was created using artificial intelligence to evaluate the results of user testing. For implementation, the Telegram platform was chosen as the Python programming language.

Index Terms

Industry 4.0, telegram-bot, chatbot, telegram, artificial intelligence, research, NLP, identification, program code, analysis.

1. INTRODUCTION

With the beginning of the industrial revolution Industry 4.0, many areas have changed the vector of their activities. The education system has acquired a modern look, and the use of a chatbot has become an important introduction to educational activities. Many prestigious educational institutions have implemented full-fledged training on platforms with the help of chatbots. Students received not only tasks, but also a schedule, information from the management of the educational institution,

A chatbot is an AI-based agent that facilitates interaction between people and computer systems through natural language. The same purpose is served by a variety of mobile messaging applications, blogs, and smartphones that have been recently introduced. AI has been in use for many years, and a chatbot is one of the most promising means of interaction between humans and machines. Although a chatbot has the potential to be transformed into something much more sophisticated, it is still essentially a client computer that responds to input from a web interface.

Traditionally, trade and trading methods have operated and expanded their impact on trade by automating exchange rates. With the emergence of changes and trends in Industry 4.0, trade has also evolved to enhance exchange rates.

Analysis of modern machine learning methods with automatic learning libraries [2], the potential of placing chatbots [3-4], the basics of interaction between the core and the interface [4], the basics of neural network architecture [1], learning process [5-7].

Through manual tuning and testing, a study was conducted based on the fundamental architecture of machine learning.

2. GUIDELINES FOR MANUSCRIPT PREPARATION

Chatbot applications are technological tools that facilitate communication between individuals and service providers, while also providing businesses with a cost-effective alternative to traditional customer service. The chart in Figure 1 illustrates the function of chatbots.

As a result, this strengthens the process of customer interaction and enhances operational efficiency. A chatbot should be capable of both tasks, such as answering inquiries and communicating with users effectively [4]. However, human support is essential in setting up, training, and optimizing chatbot systems across different platforms. Chatbots serve as a kind of semi-intelligent management tool that enables users to engage with an interactive platform for answering their questions. A user-friendly chatbot can significantly boost productivity. Due to its ability to provide customer service without requiring additional staff, the chatbot has gained popularity across various business domains.
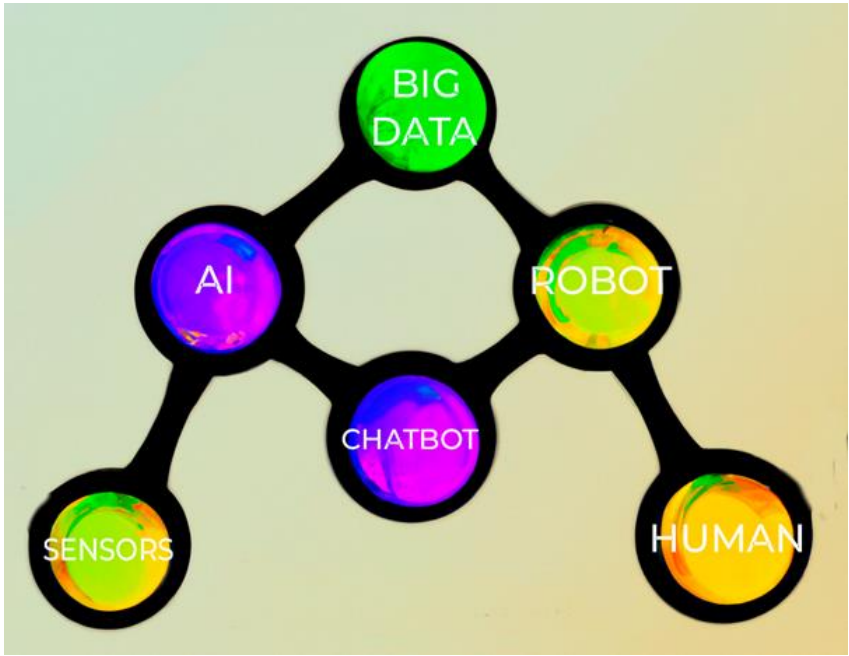
Figure 1: The new role of chatbots.

Some of the benefits of chatbots include:
• Ease of use. Chatbots are designed for convenient interaction with people.
• Round-the-clock availability. Chatbots are automated so they are available 24/7 to meet customer requirements.
• Individual experience. Chatbots provide users with a personalized experience. In many e-commerce industries, chatbots act as individual advertising agents.
• Continuous improvement. Thanks to the technologies of artificial intelligence, in accordance with the current demand of users, chatbots are constantly being improved. Chatbots use artificial intelligence algorithms for processing questions. First, the algorithm checks the last customer-initiated chat transaction and then acts to resolve the current issue. AI, ML and NLP [6] contribute to the creation of user-friendly solutions.

In certain situations, an NLP chatbot can suggest a more effective approach to interacting with its users. These NLP systems take a user's problem, label it, and use machine learning techniques to generate a formal description of the problem. The chatbot is trained on multiple examples by this NLP system, which results in better and more useful outcomes for users. The chatbot must be trained for numerous different scenarios. Chatbots should maintain a formal approach to keep users engaged in the conversation. There is no universal method for asking a question. If a user asks a particular question in a specific manner, the chatbot is expected to respond accordingly. NLP applications can be used to build chatbots that comprehend human interactions and respond based on the user's behavior and attitude.

NLP consists of three main areas:

1. The unit of nature. The languages we use for everyday communication are highly adaptable. However, before we can implement them on a larger scale, we must perform logical operations that enable regular computer algorithms to comprehend our everyday language, which is known as Natural Language Understanding (NLU).

2. Natural language generation (NLG). When the accountant of the company being analyzed employs this procedure, the accounting system undergoes automatic verification and processing. The NLG module produces language that sounds natural.

3. Natural language interaction (NLI). After passing the NLU and NLG, based on the client's requirements, bot interaction training is carried out through the NLI.

Scripted chatbots are built using programming languages and rely on pre-written scripts to respond to user input, whereas AI chatbots are able to adapt their responses based on the information they receive from users. Scripted chatbots are limited in their ability to respond to specific user queries, but they can understand the general context of a conversation. In contrast, AI chatbots are developed using natural language processing (NLP) techniques and can learn from past interactions with users to improve their responses. Currently, both scripted and AI chatbots can communicate with customers using either voice or text.

Chatbots that offer information or assistance belong to the information service category. These chatbots can be classified into two main types of conversation models: generative and retrieval-based models, although hybrid models are also possible. A well-trained model takes previous dialogue into consideration and predicts the context for the next response.
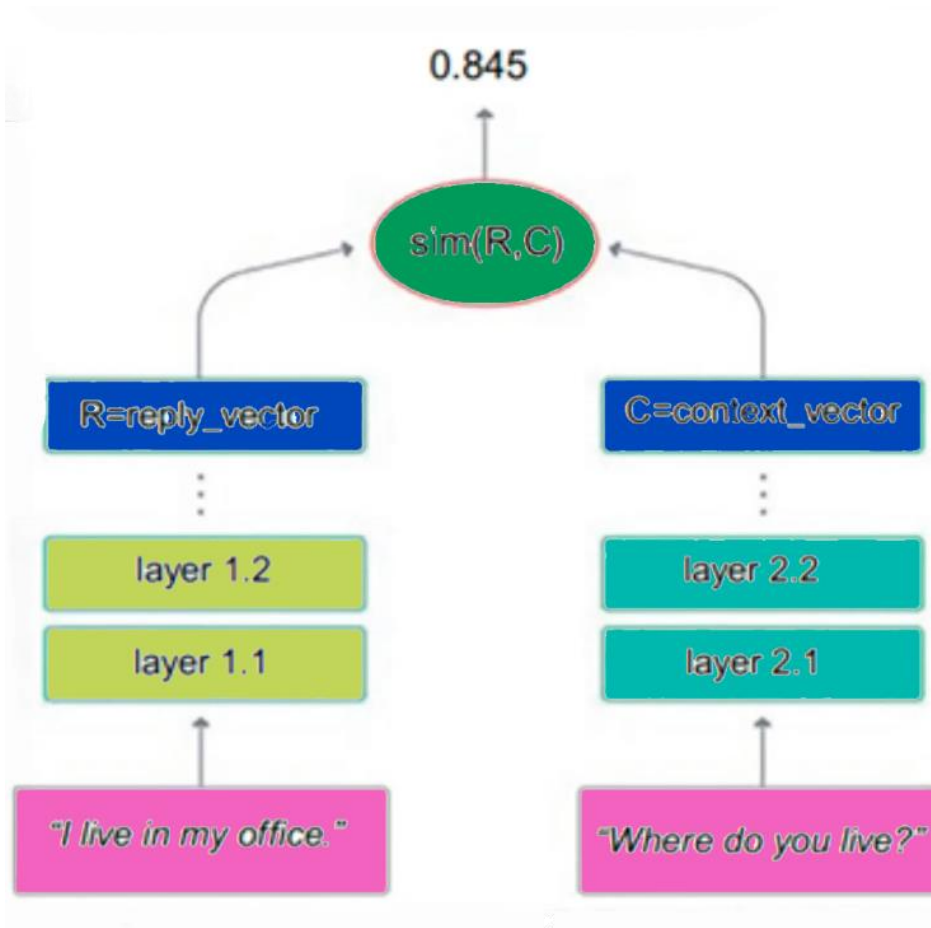
Figure 2: Selective model

The main challenge for any chatbot is to understand the user's intent and decipher the hidden intent of the message and request. The higher the intelligence of a chatbot, the higher its ability to read consumer conversations and reveal their intentions. Message interpretation by today's chatbots is an important value proposition. As a result, chatbot companies are now paying more attention to creating algorithms that are flexible to handle user messages. Given that robots can only respond in relatively specific ways, many chatbots may have difficulty recognizing the intent of a query when it is presented with queries with varying sentence structure, syntax, or word order. Currently, this problem can be creatively solved with the help of modern chatbot algorithms. To better understand the customer's request, today's chatbots compare the request with previous requests and find versions that match the current situation [4]. This can get you a little closer to understanding the customer's intent, even if the chatbot still can't decipher the request.

Finally, when a chatbot leaves the development lab, it needs to be tested before use. Testing chatbots is difficult. As NLP capabilities continue to improve, chatbots are now frequently updated, so a testing engine should be used for each update to test the impact of each value addition. Among chatbot testing methods, the first focuses on automated testing using various automated testing platforms such as testYourBot, Bot Testing, Zypnos, Dimon, and others. These automated testing frameworks can evaluate test results and test script code in various test scenarios. The second method of testing is manual testing of conversational logic. Such tests are usually conducted in a group of testers. Users test the bot in different use cases and contexts and evaluate the results. Creating a more human chatbot.

Ultimately, and just as importantly, the challenge lies in creating a chatbot that gives the user on the other end the impression of a human chat. To be effective, a chatbot must be culturally sensitive, respond to greetings and personal gestures, and put people at ease during conversation [5]. To be successful, a chatbot's personality must appeal to its target audience. Building a better AI chatbot takes time and training. In this way, it can easily identify the correct feelings and emotions of the human voice and respond with the correct tone.

The primary objective is to comprehend the user's intention and create a chatbot that behaves like a human. To achieve

this goal, a suggested model is utilized for understanding user intention. For sentiment analysis in chatbots, machine learning is employed. In recent times, multiple machine learning and natural language processing techniques have been utilized for comprehending and categorizing the text present in dialogue-based chatbots [7].

Text mining refers to the task of finding or extracting the best information from text, and text classification is the task of text mining and the act of dividing a set of text documents into two or more classes, where each text document can be assigned to a specific class.

Relevant work and literature indicate that there is a need for chatbots [3, 5]. As the present time shows, the use of a chatbot increases the comfort and ease of receiving services, information and content from the side of the user and the developer. In the future, chatbots will become an integral part of communication using technology. So, let's understand how a chatbot works. A chatbot has two separate tasks: analyzing a user request and returning a response and returning.

The first stage of interaction with the chatbot is the analysis of the request from the user, from the point of view of the login [1]. First, the chatbot initializes the user's request, and then provides a response. Having collected key data, the chatbot processes the incoming information. An important condition when creating an input window is to limit the number of characters. This is done to prevent overload and increase the duration of the processing process [6].

Depending on the request, the chatbot may not store the correct answer to the request, for such cases it is necessary to use:

- Predefined text
- Text extracted from a knowledge base containing multiple answers.
- A piece of information that is provided in context and based on user data.
- Data stored in corporate systems
- An "ambiguous" request that a chatbot can interpret with a clear understanding of the user's intent.
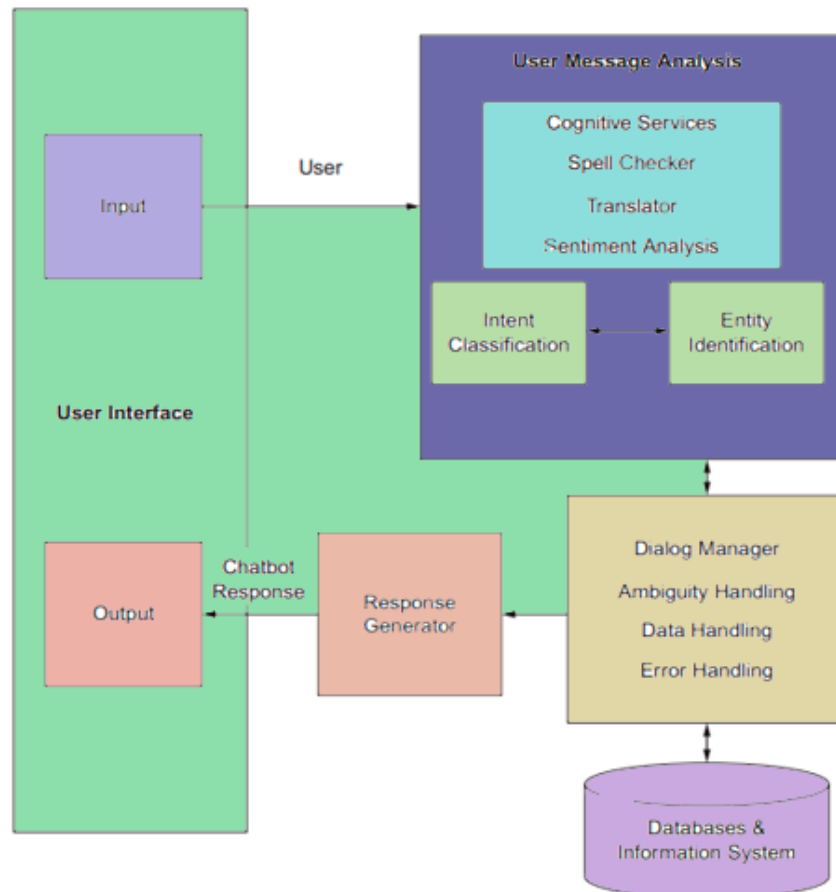

Figure 3: General chatbot architecture

The proposed chatbot model can be used as an assistant in many areas: education, medicine, support service.

Table 1

AREAS OF APPLICATION OF THE PROPOSED CHATBOT MODEL

Scope of application	Features of application
Education	Thanks to this service, students can benefit from a fast question-and-answer feature that facilitates feedback from teachers, reducing any problems they may encounter. With the recent shift to remote learning, the chatbot can also help to store and distribute current tasks, support the learning of both children and adults, and provide motivation.
Support services	Using the chatbot, users can access a list of services, and the implementation of artificial intelligence enables them to select the most suitable option.
Formation of news	Artificial intelligence enables the automatic detection of censorship. Additionally, for the average user, AI can filter their news feed based on their interests and preferences.
Medicine	The utilization of chatbots powered by AI can aid in scheduling doctor appointments and can be beneficial for ordering prescriptions and checking medication prices.

3. MATH

The use of chatbots offers a time-efficient and structured way to interact with users and provide a curated list of services. They are accessible round the clock, seven days a week, and are always ready to help users solve their problems. This 24/7 availability allows people to use chatbots anytime and anywhere throughout the year.

Based on the presented data, a chatbot quiz was implemented. Figure 4 shows the implementation code of the proposed model in Python.

```
import telebot
from pymongo import MongoClient
class DataBase:
 def __init__(self):
  if user is not None:
   return user
  user = {
   "chat_id": chat_id,
   "is_passing": False,
   "is_passed": False,
   "question_index": None,
   "answers": [] }
  self.users.insert_one(user)
  return user
@bot.message_handler(commands=["start"])
def start(message):
 user = db.get_user(message.chat.id)
 if user["is_passed"]:
  bot.send_message(message.from_user.id, "Sorry, you've already taken this quiz. It is
not possible to pass a second time😌")
  return
 if user["is_passing"]:
  return
 db.set_user(message.chat.id, {"question_index": 0, "is_passing": True})
 user = db.get_user(message.chat.id)
 post = get_question_message(user)
 if post is not None:
  bot.send_message(message.from_user.id, post["text"],
reply_markup=post["keyboard"])
@bot.callback_query_handler(func=lambda query: query.data.startswith("?ans"))
def answered(query):
 user = db.get_user(query.message.chat.id)
 if user["is_passed"] or not user["is_passing"]:
```

```
  return
 user["answers"].append(int(query.data.split("&")[1]))
 db.set_user(query.message.chat.id, {"answers": user["answers"]})
 post = get_answered_message(user)
 if post is not None:
  bot.edit_message_text(post["text"], query.message.chat.id, query.message.id,
   if percents < 40:
  smile = "😞"
 elif percents < 60:
  smile = "😐"
 elif percents < 90:
  smile = "😊"
 else:
  smile = "😎"
 text = f"You answered correctly {percents}% question {smile}"
 db.set_user(user["chat_id"], {"is_passed": True, "is_passing": False})
 return {
  "text": text,
  "keyboard": None }
if question is None:

 return {
  "text": text,
  "keyboard": keyboard }
def get_answered_message(user):
 question = db.get_question(user["question_index"])
 text = f"Question №{user['question_index'] + 1}\n\n{question['text']}\n"
 == question["correct"]:
  text += " ✅ "
 elif answer_index == user["answers"][-1]:
  text += " ❌ "
 keyboard.row(telebot.types.InlineKeyboardButton("Next", callback_data="?next"))
```

Figure 4: Program code

In order for the data to be transferred from the user, an addition in the form of a database is required. The most affordable way is to implement the database on the MongoDB platform.

After creating the database, it is necessary to create two groups. The first group will be responsible for questions and a set of answers, the second for the user's answers. Figure 7-9 shows an example of interaction with a chatbot.
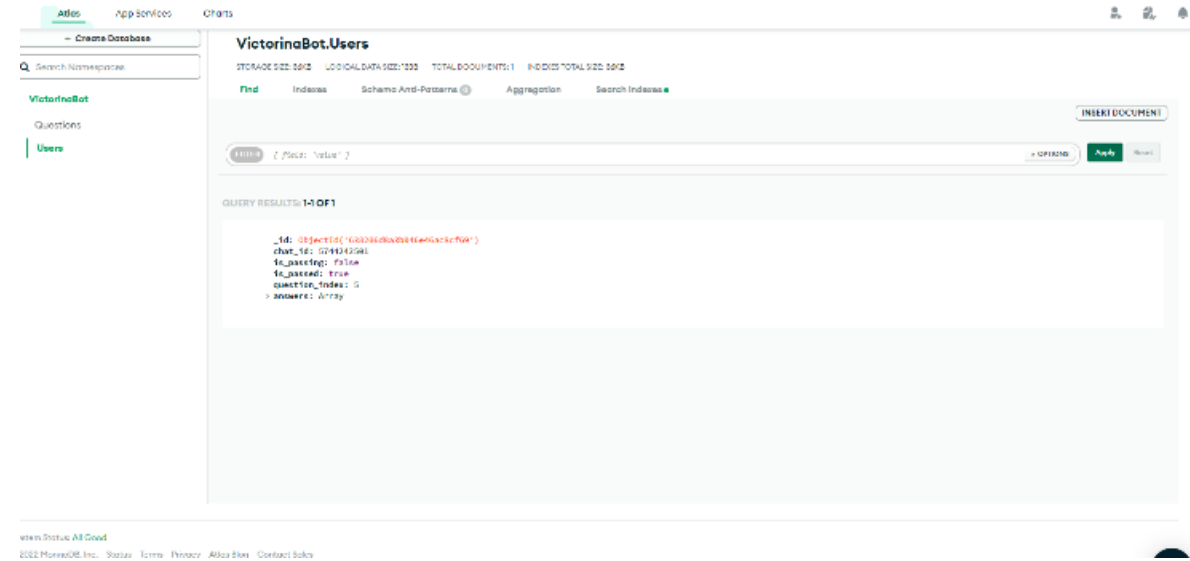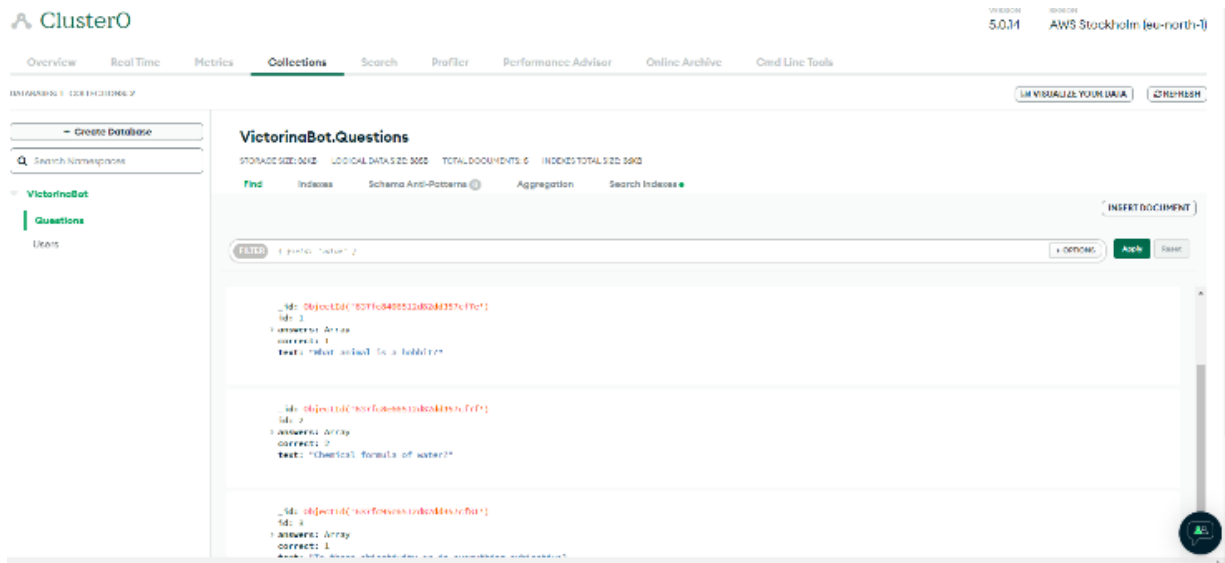

Figure 5: Example of a database "Users" group

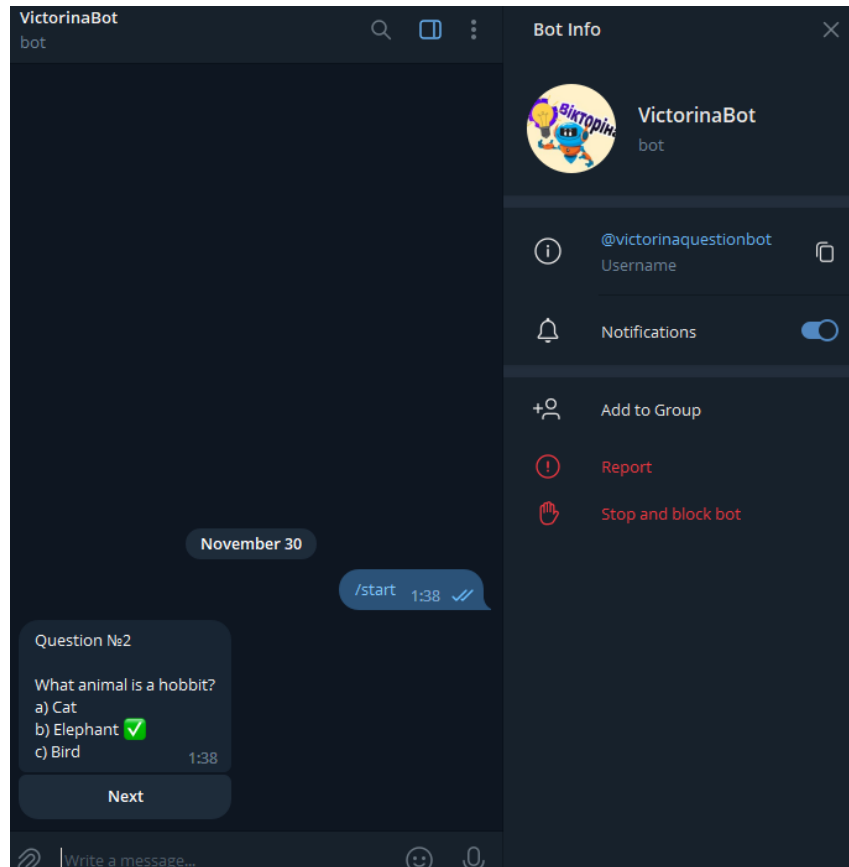**Figure 6**: Example of the "Questions" group database

Figure 7: Chatbot interaction with the user, with an example of questions

4. CONCLUSION

For user testing, a chat quiz model is proposed. An analysis of existing solutions for chatbots was carried out, based on the results of the analysis, a list of requirements for the necessary functions and directions was determined. An analysis of the subject area was carried out, a list of requirements for the functionality of the tool was compiled, a review of the problem that the software application solves, as well as existing ways to overcome it, was carried out.

A software implementation of the chatbot model in the Python language has been developed, capable of evaluating the result, based on artificial intelligence. The article shows the implementation of the @VictorinaBot chatbot for the Telegram platform. This implementation shows the ease of understanding and efficiency of using artificial intelligence in the analysis and processing of information, which helps to reduce hours and increase user comfort.

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