

# *Handheld Terminal Course Answering System Based on Artificial Intelligence*

**Tianjiao Guo\***

*Jilin Engineering Normal University, Changchun 130000, Jilin, China*

*51466823@qq.com*

*\*corresponding author*

**Keywords:** Artificial Intelligence, Handheld Terminal, Course Answering Questions, System Design

**Abstract:** Answering questions is an important part of online learning for students. By answering questions, students can better understand what they have learned. The purpose of this paper is to study the design of a question answering system for handheld terminal courses based on artificial intelligence. This paper analyzes the research status and development trend of the technology used in the question answering system at home and abroad, analyzes the application and development trend of the question answering system in the education industry, and introduces the key technologies and corresponding theoretical knowledge used in the question answering system. Chinese word segmentation in natural language processing, etc., introduces common algorithms and word segmentation tools for Chinese word segmentation, word vector, sentence similarity calculation and artificial intelligence. The CBOW model in Word2Vec is introduced to train word vectors; the use of convolutional neural networks to extract feature similarity is introduced to achieve the purpose of obtaining sentence similarity. The actual operation of the system is investigated. Experiments show that the average answering accuracy of the artificial intelligence answering system is 90.3%, and the real-time performance can basically meet the needs of students to answer questions online.

## **1. Introduction**

Answering questions is not only a student-centered education, but also an important way for students to improve their knowledge. Regardless of the type of learning content, question answering is important and crucial to education [1-2]. Getting good answers to questions is an essential requirement for students to learn remotely. By recording and analyzing the questions raised by students, we can find out the weak links of common problems, so that students can understand and analyze [3-4]. Therefore, the intelligent question answering system has the incomparable advantages of the traditional question answering method, and has a broad development prospect. However, the current question answering system cannot meet the needs of large-scale online

students, nor can it achieve real interaction with students [5-6].

With the development of society and technology, the Internet and smart devices have an increasingly far-reaching impact on life education. Karpagam K proposed a mobile-based question answering system that acts as a personalized learning assistant that communicates through natural language and provides users with information about computers and software. It is analyzed and matched with the information stored in the knowledge base and the optimization results are displayed. Sentiment analysis is used to reduce the lexical gap between user queries and retrieved candidate answer solutions [7]. Moholkar K proposed a new question answering system that starts with word merging. From the embedded results, some features are extracted and then ranked using a deep belief network (DBN) with hybrid optimization enabled [8]. The research on the question answering system of course is of great significance to the development and promotion of auxiliary teaching.

This article understands that mobile learning will become a trend and trend, and is a form of learning that adapts to the development of the times, and then analyzes the use of today's handheld terminal operating systems and technical characteristics, and determines the use of the Android system as a course answering system. Implementation platform. According to the characteristics of the Android system, the overall design of the terminal platform and the design of each functional module are completed, and each functional module is described in detail, and the usability of the question answering system of the course is verified in the simulation environment.

## **2. Research on the Design of Answering System for Handheld Terminal Course Based on Artificial Intelligence**

### **2.1 Artificial Intelligence**

The value of artificial intelligence research lies in the fact that complex scientific and technological calculations are generated by the human brain [9]. Then the concept of IT as "a project that needs human understanding", it seems that the definition of the maximum function will change with time and technological progress, of course, the specific field of AI technology will also change with time. Computers need to continuously learn from the experience and accumulate new experience when faced with problems similar to ordinary people [10-11].

### **2.2 Chinese Word Segmentation**

(1) Word segmentation method of word segmentation, is the oldest word segmentation algorithm. Strings are words, and the dictionary does not contain much information about the language itself, such as morphological, semantic and syntactic knowledge. The number of entries in the dictionary and the selection of the entry directly affect the final word segmentation result [12]. According to the different scanning directions of strings, it can be divided into forward and reverse mapping; according to the priority mapping of different lengths, it can be divided into maximum (longer) and minimum (shorter) mapping. Compatible with the speech tagging process, combined can be divided into pure tokenization and full tokenization [13].

### **2.3 Smart Handheld Terminals**

Since the number of mobile learners is so large, software solutions are used in this paper: the development of mobile operating systems, the integration of sites from the bottom of the system, or

the completion of software development on a standard machine with the help of a boundary machine with strong cross-border capabilities [14-15].

In Android, can use popular tools such as: Qt, Mono, etc. have also begun to support Android, and even in MonoDroid, developers can also use C# as a programming tool to develop applications language.

## 2.4 System Design Goals

For online education other than classroom teaching, due to the relative separation, there is a lack of face-to-face explanation and the teacher-centered teaching model has received more and more attention in online education. On the basis of a comprehensive survey and summary of the existing network training response system and related theoretical and technical research, this paper believes that the needs of modern intelligent network response systems are as follows:

(1) Answer questions anytime, anywhere. Facing problems, they can solve learning problems in time. It can maintain enthusiasm for learning and enhance learning confidence [16].

(2) Easy question-and-answer knowledge exchange, avoiding repeated course resource construction when different teachers teach comprehensive courses, which is conducive to extensive course knowledge exchange [17].

(3) The response process is more intelligent the response system is more intelligent, allowing students to have a better experience. It also helps to solve the situation of relatively insufficient teacher resources in colleges and universities, so that teachers can be freed from the tedious work of answering questions and do more work that is conducive to teaching [18].

(4) Accurate and complete use of a variety of answering techniques.

## 3. Investigation and Research on the Design of Question Answering System for Hand-held Terminal Courses Based on Artificial Intelligence

### 3.1 Configuration of the Environment

The easiest way to develop Android applications is to download the Android SDK and Eclipse IDE. Android development can be done on Microsoft® Windows®, MacOSX or Linux. Android applications are written in Java, but compiled and run on DalvikVM (non-Java virtual machine), and the development environment of the mobile Q&A system is as follows.

Mobile terminal platform: Android virtual machine

Development language: Java

When setting up the environment, first install the latest version of JDK and configure environment variables, download and install Eclipse, and then install the Android SDK. The SDK can be downloaded from the official website. To get the full version of the SDK, you need to import Eclipse and select automatic update. Click the Add button and a dialog box will appear asking for the name and location. For site, type:

<http://dl-ssl.google.com/android/eclipse>.

The system chooses to use the lightweight MySQL database, which can effectively reduce the development cost, and the excellent performance also provides convenience for development.

### 3.2 System Model

In this paper, the CBOW model of Word2Vec is selected for word vector training. In the

convolution layer, the input data needs to be modeled. The set of weights is the convolution kernel, and the feature extraction is realized through the local perception of the convolution kernel. The matrix calculation formula is shown in 1. The input data matrix is Word vectors built using Word2Vec:

$$S(i, j) = (X, Y) * (i, j) = \sum_m \sum_n x(i+m, j+n) y(m, n) \quad (1)$$

This paper uses the Keras framework to write a neural network, the word vector trained by gensim is used for the input layer, and then uses the convolution formula to perform a convolution operation on the matrix loop, and uses max-pooling in the pooling operation to improve local features, and the output value is a sentence Similarity, between 0 and 1, the larger the value, the more similar the features.

In the word segmentation, a custom software testing professional domain dictionary is added, and the accuracy of the added word segmentation is evaluated manually. The accuracy rate is calculated using formula 2:

$$p(A) = \frac{p(C)}{P(Total)} \times 100\% \quad (2)$$

Where p(A) represents the accuracy rate, C represents the correct number of them, and Total represents the total test data.

#### 4. Analysis and Research on the Design of Question Answering System for Handheld Terminal Courses Based on Artificial Intelligence

##### 4.1 Each Functional Module of the System

The structure of each functional module of the system is shown in Figure 1.

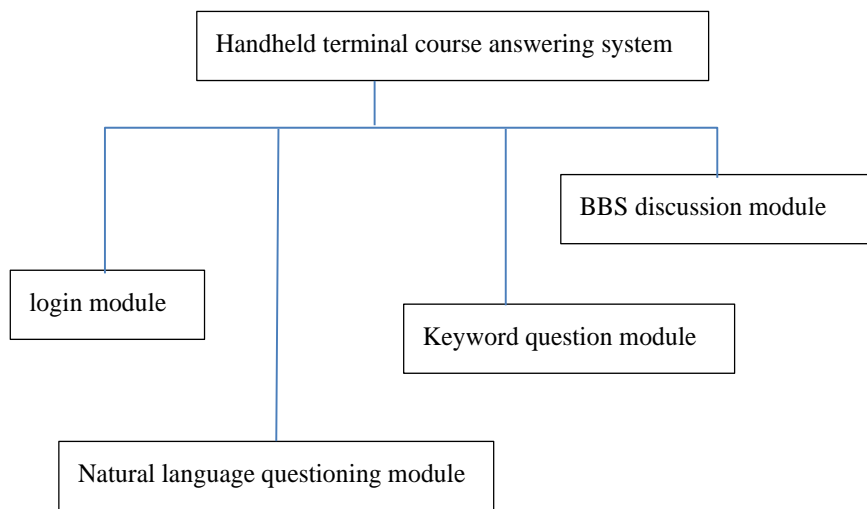


Figure 1: Each functional module of the system

Login module: In the whole system, there are three different types of users: students, teachers, administrators. Students need to register for the first time to log in.

Natural language questioning module: This module is the core functional module of the system.

Its main task is to analyze and process the natural language questions input by students and users, and use latent semantic analysis technology to compare the frequently asked questions database with the questions raised by users. Some questions with the most similar questions and their answers are returned to the user. If no similar questions and answers are found, a prompt message will be returned to suggest that the student user go to the "Leave a Question" module to ask questions and wait for the answer.

Keyword questioning module: This module is a supplement to the natural language questioning module, and is mainly a retrieval module constructed based on keyword matching technology. When the user only inputs a certain word or the input question is too short, the answering accuracy rate based on statistical natural language processing will be very low, and the execution efficiency is likely to overflow when executing the calculation, which is far inferior to the keyword matching technology.

BBS discussion module: The BBS discussion module provides real-time communication between students and teachers and between students and students. After logging in to the system, users can ask and answer questions in the BBS discussion module.

## 4.2 System Test

In the question answering system, the main function is to answer questions raised by students. During the question answering process, if a similar answer can be retrieved in the system, the similar answer will be returned directly. If not, a new question will be submitted and wait for Teacher questions. The use of the intelligent answering system is mainly based on the accuracy and retrieval efficiency of intelligent answering. In the experiment, the knowledge point information proposed in the "Software Engineering" course content in the core course of higher vocational software technology major is used as the knowledge base, and the representative test results of the intelligent answering system are shown in Table 1 below:

*Table 1: System experimental results*

User	Correct rate(%)	Average time(ms)
1	83	103
2	88	120
3	92	97
4	85	104
5	93	117
6	96	137
7	100	68
8	83	88
9	90	105
10	93	112

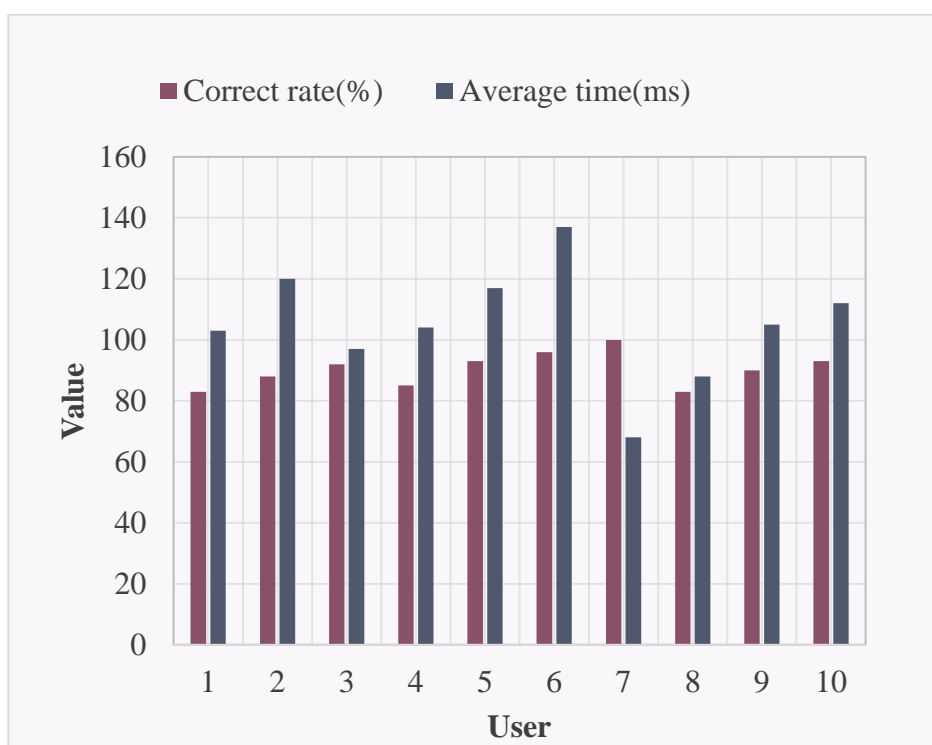


Figure 2: System experimental results

The experimental results show that the average accuracy of the system's automatic answering is 90.3% and the average search time is 105.1ms, indicating that the intelligent answering system can meet the needs of students to answer questions online in terms of accuracy and real-time performance.

## 5. Conclusions

As an important part of the distance teaching system, the question answering system plays an important role in the distance teaching. In this context, this paper designs and implements a new type of intelligent question answering system that integrates natural language processing technology and website development technology. Its core is a Chinese natural language intelligent answering system for common problems in specific courses. It has good scalability and is a general network teaching question answering system architecture, which can be widely used to answer Chinese subjective questions in various courses.

## References

- [1] Dhandapani A, Vadivel V. *Question Answering System over Semantic Web*. *IEEE Access*, 2021, PP(99):1-1.
- [2] Das A, Saha D. *Deep learning based Bengali question answering system using semantic textual similarity*. *Multimedia Tools and Applications*, 2021(4):1-25.
- [3] Tirpude S C. *Comparative Analysis of Keyword and Semantically Enhanced Question Answering System on Law Domain*. *Bioscience Biotechnology Research Communications*, 2020, 13(14):282-286.

- [4] Shah J, Mohammed S. Chatbot Analytics Based on Question Answering System and Deep Learning: Case Study for Movie Smart Automatic Answering. *International Journal of Software Engineering and its Applications*, 2020, 14(1):7-16.
- [5] Karpagam K, Madusudanan K, Saradha A. DEEP LEARNING APPROACHES FOR ANSWER SELECTION IN QUESTION ANSWERING SYSTEM FOR CONVERSATION AGENTS. *ICTACT Journal on Soft Computing*, 2020, 10(2):2040-2044.
- [6] Yunmar R A, Wisesa I. Pengembangan Mobile based Question Answering System dengan Basis Pengetahuan Ontologi. *Jurnal Teknologi Informasi dan Ilmu Komputer*, 2020, 7(4):693-700.
- [7] Karpagam K, Saradha A. A Mobile based Intelligent Question Answering System for Education Domain. *International Journal of Information Engineering and Electronic Business*, 2018, 10(1):16-23.
- [8] Moholkar K, Patil S H. Lioness Adapted GWO-Based Deep Belief Network Enabled with Multiple Features for a Novel Question Answering System. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 2022, 30(01):93-114.
- [9] Sarrouiti M, Said O. SemBioNLQA: A semantic biomedical question answering system for retrieving exact and ideal answers to natural language questions. *Artificial intelligence in medicine*, 2020, 102(Jan.):101767.1-101767.16.
- [10] Kandasamy S, Cherukuri A K. Query expansion using named entity disambiguation for a question-answering system. *Concurrency, practice and experience*, 2020, 32(4):e5119.1-e5119.11.
- [11] Das A, Mandal J, Danial Z, et al. A novel approach for automatic Bengali question answering system using semantic similarity analysis. *International Journal of Speech Technology*, 2020, 23(4):873-884.
- [12] Olaosebikan R, Akinwonmi A E, Ojokoh B A, et al. Development of a Best Answer Recommendation Model in a Community Question Answering (CQA) System. *Intelligent Information Management*, 2021, 13(3):180-198.
- [13] Rao K Y, Gorti S, Murty, et al. DEEP BELIEF NETWORK BASED QUESTION ANSWERING SYSTEM USING ALTERNATE SKIP-N GRAM MODEL AND NEGATIVE SAMPLING APPROACHES. *Journal of Theoretical and Applied Information Technology*, 2019, 97(7):2122-2131.
- [14] Utomo F S, Suryana N, Azmi M S. New instances classification framework on Quran ontology applied to question answering system. *TELKOMNIKA Indonesian Journal of Electrical Engineering*, 2019, 17(1):139-146.
- [15] Prakash A, D. K. Cognitive Computing based Question-Answering System for Teaching Electrical Motor Concepts. *International Journal of Computer Applications*, 2019, 178(45):4-15.
- [16] Putra S J, MZ Naf€An, Gunawan M N. Integrated passage retrieval with fuzzy logic for Indonesian question answering system. *International Journal on Perceptive and Cognitive Computing*, 2019, 5(2):31-34.
- [17] Al-Shenak M, Nahar K, Halawani K. Aqas: Arabic question answering system based on svm, svd, and lsi. *Journal of Theoretical and Applied Information Technology*, 2019, 97(2): 681-691.
- [18] Tohidi N, Hasheminejad S. MOQAS: Multi-objective question answering system. *Journal of Intelligent and Fuzzy Systems*, 2019, 36(4):3495-3512.