



Chatbot Application for Learning Computer Laws Using Artificial Intelligence

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Abstract

This research aimed to develop and evaluate a "Chatbot Application for Learning Computer Laws using Artificial Intelligence." The study involved assessing user attitudes towards this application, utilizing questions and answers derived from pertinent laws in Thailand, including the "Computer-Related Crime Act," the "Copyright Act," "Thailand's Personal Data Protection Act," the "Cybersecurity Act," and the "Patent Act." In an evaluation of the Chatbot AI performance with a sample group of 100 evaluators, the following metrics were observed: Accuracy = 0.98, Precision = 1.00, Recall = 0.97, and F1-Score = 0.98. The research outcomes encompassed the successful development of the chatbot application and the summary results of the performance from a sample data set of the Chatbot Application for Learning Computer Law using Artificial Intelligence. The sample size, comprising 244 undergraduate students from Western Rajabhat Universities, was determined using the Taro Yamane table. The universities included Kanchanaburi Rajabhat University, Nakhon Pathom Rajabhat University, Phetchaburi Rajabhat University, and Muban ChomBueng Rajabhat University. The assessment revealed that the overall of performance from a sample data set was at the highest level ($\bar{X} = 4.59$, $SD. = 0.09$).

Keywords: Chatbot, Dialog flow, Artificial Intelligence.

1. Introduction

Computers in Thailand are mostly now connected to the Internet, which constructs massive online social networks in

the country that follow with the increase in computer crimes as well. Therefore, the Thailand Computer Crimes Act 2007 was enacted to deal with the problems of the promising increase in computer crimes. The Computer Crimes Act (No. 2) B.E. 2560 (2017) amendment is, therefore, a specific law applicable to Internet or computer-related offenses. It is a law that aims to prevent and suppress crimes related to computers and electronic data in the country [1].

The Thailand computer laws are the Copyright Act B.E. 2537 (1994) amended by Copyright Act (No. 2) B.E. 2558 (2015), Copyright Act (No.3) B.E. 2558 (2015) and Copyright Act (No.4) B.E. 2561 (2018), Thailand's Personal Data Protection Act B.E. 2562 (2019) and Cybersecurity Act B.E. 2562 (2019), Patent Act B.E. 2522 (1979) as amended by the Patent Act (No.2) B.E 2535 (1992) and the Patent Act (No.3) B.E 2542 (1999).

Based on the researcher's experience of teaching law and ethics for computer professionals and law and ethics for the digital workforce for over 10 years, it has been found that students have limited knowledge about digital laws, as evidenced by past exam scores. Therefore, having a chatbot facilitates immediate interactive learning and motivates students in various ways such as through interactive and conversational methods. This allows for interactions at any time and place. Students who engage in self-directed learning based on their interests align with the findings of [2], They identified key reasons for using chatbot programs to develop a question-and-answer system on digital law issues: 1) The ability to communicate with users at any time, 2) Minimal time required for user communication, 3) Accurate and relevant responses

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to user queries, and 4) The capability to develop chatbots that operate on web applications, allowing users to access the chatbot through web applications without needing to download and install an app on their smartphones. The researcher has developed a chatbot system for addressing questions related to digital law and information. This enables users to study laws more conveniently and quickly. This approach facilitates access for individuals seeking knowledge about digital and related laws.

2. Theoretical background and related research

2.1 Artificial Intelligence

Artificial intelligence is related to thinking and reasoning processes, with humans as the prototype. It branches into several fields, such as 1) Natural Language Processing (NLP), which deals with communication using human languages, such as text, letters, and speech. Current examples include various chatbots.

NLP's primary goal is to enable computers to understand and accurately follow the natural language communication of humans. The principles of NLP used for the Thai language have specific characteristics unique to Thai. The key principles of NLP for Thai are as follows:

Tokenization and Word Segmentation: This involves breaking down Thai text into meaningful units. Unlike some other languages, Thai does not have spaces between words. For example, words such as deception, collection, entry, giving, message, imitations of rights, personal data, necessity, consent, and independence are segmented.

Part-of-Speech Tagging (POS): This involves identifying the grammatical categories of words in Thai based on their context, such as nouns and verbs.

Named Entity Recognition (NER): This involves identifying and categorizing entities, such as copyright or section 5, in the natural language of Thai.

Dependency Parsing: This involves analyzing the grammatical structure of Thai sentences to find the relationships between words in a sentence.

Sentiment Analysis: This involves analyzing the sentiment in the Thai natural language, such as determining whether a text is positive, negative, or neutral.

Text Classification: This involves categorizing text into different types or labels, such as Acts or sections.

Speech Recognition: This involves converting spoken Thai language into text for searching purposes, such as recognizing the phrase "คอมพิวเตอร์ มาตรา 8" (computer section 8).

2) Computer Vision, which enables computers to perceive various environments from images, such as recognizing human faces. 3) Robotics, which involves making machines perform various tasks accurately and intelligently. And 4) Expert Systems, which simulate experts in specific fields using computer programs to perform tasks or assist human experts in decision-making.

The National Electronics and Computer Technology Center (NECTEC) developed the AI FOR THAI platform to serve as a digital infrastructure for the Thai population. This platform, integrated with NECTEC's Artificial Intelligence (AI) research, is offered as API services for users and developers to create and enhance applications that benefit both businesses and society. The AI FOR THAI platform comprises 11 services, including Basic NLP, Tag Suggestion, Machine Translation, Sentiment Analysis, Character Recognition, Object Recognition, Face Analytics, Persons & Activity Analytics, Speech to Text, Text to Speech, and Chatbot [3].

2.2 Literature review

Chatbot is a computer application developed using artificial intelligence (AI) and natural language processing (NLP) technology. It has an interface that users can query for an answer in a specific area of knowledge. A Chatbot can be either a voice-enabled or texting-enabled system. AI will recognize keywords in speech or sentences, and NLP will process to construct the meaning of the query and search for the optimized answer from the pre-defined databases or text files, which are subsets of a knowledge-based system. The answer to a query can be in voice, text, or figure. There were lots of research



topics on Chatbot and lots of applications have been developed such as the "College Enquiry Chatbot" [4], the "Designing a Chatbot that Simulates an Historical Figure" [5], and the "Chatbot-A Java Based Intelligent Conversational Agent" [6]. Chatbots can be used in many disciplines. For example, Chatbot in business, Chatbot in education, Chatbot in financial services, Chatbot in law.

Currently, Thailand has several digital laws, also known as Cyberlaws, such as the Copyright Act, which grants exclusive rights to creators for their works. The Computer-Related Crime Act highlights the importance of computer systems in business and daily life, addressing actions that disrupt computer operations. Cybersecurity laws focus on measures to prevent and mitigate cyber threats that impact national security, economic stability, military security, and public order. The Patent Act protects inventions and designs through legal documentation. The Personal Data Protection Act (PDPA) safeguards any information that can identify an individual, directly or indirectly, excluding data about deceased persons.

The content of these laws is extensive and written in formal legal language, making it difficult to understand and access the essential points. Users often need to search government or legal websites to find relevant information. This challenge led to the development of a web application to facilitate asking and answering important questions about digital laws through a chatbot. This web application provides easy access to knowledge about digital laws at any time.

The chatbot's efficiency, effectiveness, and user satisfaction demonstrate its value in providing immediate Q&A services on legal issues related to digital innovations. [2]

This research presents a prototype of a recommendation and guidance system for legal processes in handling computer crime cases. The system utilizes a chatbot on the LINE application to answer questions and provide guidance to users and police officers on matters related to computer crime. The information is based on the Computer-Related Crime Act. The researcher focuses on the practical training of police cadets.

This research shows that police cadets can effectively use

the chatbot system to assist and provide guidance in handling computer crime cases quickly. [7]

Thailand Computer law first be announced in 2007, called "Computer-Related Crime Act B.E. 2550," which was amended by the "Computer-Related Crime Act (No. 2) B.E. 2560" in 2017, ten years later. In this Act, there are several sections describing the terms used, responsibility and control for the execution of this Act, the authority to issue a Ministerial Rule for the execution of this Act, the Computer-related offenses, and the Competent officials. Noticed that the two Acts had already been published for 15 years and 5 years, accordingly, which were relatively new when compared to the other laws. So, the awareness and knowledge of the content of these Acts among the Thai citizens and concerned parties are limited. The students in computer-related disciplines in the university who will pursue the computer profession and be the workforce in the computer industry in the country should have proficiently understood all contents of the two Acts to protect. The two Acts' purposes are to govern cyber security and computer system protection. Later, in 2019, the law that governs data protection was announced as "Thailand's Personal Data Protection (PDPA) Act BE 2562" with a one-year grace period. This law has just been officially affected in the year 2021. The content in the law's sections is new to everyone. The current tools of study for these Acts are content reading tools which are books, websites, and social media. The searching tool in electronic form has only a Google search, which provides a hundred or thousand answers that relate to the keywords provided, which might not be specific enough to the questions that learners would like to know or learn.

As described earlier, Chatbot is an efficient learning tool that can be used in education for learning subjects by querying the question learners would like to know. The AI and NLP are the background mechanisms of the application, which will look up the answer from the databases or files system and respond to the learner an answer through an application's interface interactively. This paper then proposes the development of a Chatbot for learning Thai computer law and PDPA law

to increase efficiency and overcome those existing pain points in Thai computer law and PDPA law learning, as indicated before.

3. Research Methodology

This research has endorsed ethical considerations in humans. COA No. 031/2022 from Kanchanaburi Rajabhat University Research Ethics Committee.

The design of a conceptual framework of this research is shown in Figure 1.

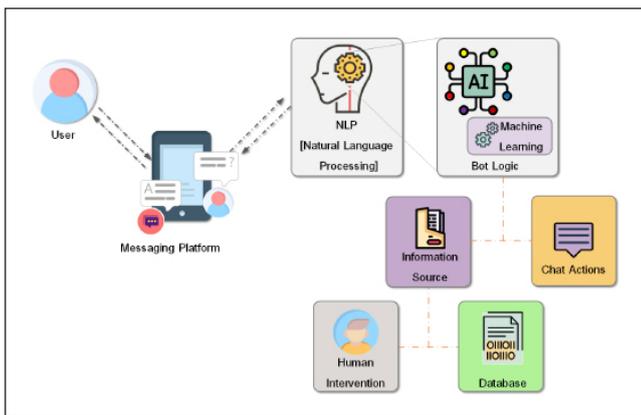


Figure 1. A Conceptual Framework of Chatbot Application for Learning Computer Laws by Using Artificial Intelligence.

From Figure 1, the chatbot application is a platform used to exchange messages between human and computer programs, analyzing the user's needs based on the complexity of the language and being able to interact in real time. A section, called Natural Language Processing (NLP) is a natural language processing technology that gives computer programs the ability to understand human language as spoken or written. Artificial Intelligence (AI) works with machine learning (ML) to help analyze and recognize user needs. Based on natural language processing (NLP), chatbot applications can initiate user interactions with Chat Action, which is a collection of conversations with users by retrieving real-time data via an information source, which can be either extracted from the stored database or file system through the API or passed on to human intervention. The research methodology consists of 2 parts:

3.1 Build the "Chatbot Application to Learn Computer Law using Artificial Intelligence" by preparing the dataset for the training process using the keywords derived from the contents of the "Computer Crime Act" as the input data. The output data is the information after training. After that, design a chatbot application from the process of preparing the data used for training to be the input sentences as input data. Output data is the complete sentence that will be the initial answer to users. The steps were as follows:

In this research, Dialogflow was applied to the study of computer law. Dialogflow integrates techniques that understand user inputs and respond accurately. It comprises Machine Learning and statistical machine translation to analyze training phrases (train set) and user questions (test set). This analysis helps understand patterns and relationships between words and phrases. From this analysis, Dialogflow creates an internal model, which becomes an algorithm that updates with each change. It uses Rule-based grammar matching for easy training and ML matching for creating statistical models from training data, which includes entities, sentiment, moderation, and categories.

The data preparation process in this research involves splitting the data into two sets: the training set for training the chatbot model to learn language patterns, conversational behavior, and response methods, and the Test Set for evaluating the trained model's performance by comparing its responses to the correct answers. The steps for preparing the Train Set and Test Set are as follows:

1) Define the Scope of Data: Define the language that the chatbot will understand and respond to in Thai natural language, set the domain, and define the topics the chatbot can ask and answer questions about, such as the Personal Data Protection Act, the Computer-Related Crime Act, and the Copyright Act.

2) Data Collection: Select information from the publication of Acts by copying the essential content within the Acts to form the answer set.

3) Data Cleaning: Remove duplicate data, and format the data into an online database format so that the program

can retrieve answers and make corrections if necessary.

4) Data Splitting into Train Set and Test Set:

The research uses methods to split the data into Train Set and Test Set, creating question sets from analyzing the content of the Acts, such as from the analysis of events.

5) Data Acquisition Method: Use augmentation to modify existing data to synthesize key terms for constructing question sentences. Utilize Natural Language AI (Figure 2) to synthesize key terms related to the Personal Data Protection Act, B.E. 2562, Section 19, including law, case, committee, request, withdrawal, deception, collection, entry, giving, message, limitation of rights, personal data, committee, necessity, consent, independence, provision, service, benefit, impact, controller, Act, language, electronic system, purpose, method, condition, contract, part, book, chapter, condition, owner, etc.

3.1.1 Users enter a text message in the chat field in the application or choose to use speech to convert to text in the application. The message can be a search term.

3.1.2 When the chatbot application receives the content of the message, it will be forwarded to the back-end service with a chatbot agent that uses artificial intelligence (AI) and natural language processing (NLP) to interpret the content and recognize the needs of users.

3.1.3 After the automatic conversation dialog, the system searches and gets the right answer. The response will be sent to the users through the chat box in the same application. A new cycle then begins through conversations between the users and the chatbot application.

The principles of operation of the chatbot application are in Figure 3 from the chat channel in the LINE Chat application, receive messages from the user in the Client section, and then connect through the Line messaging API channel, which is the transmission between the Dialogflow automated chat system in the backend management system. with the LINE Chat application platform.

The method for communicating is part of the blackened management system within the LINE Chat application platform; LINE Chat is handled via message notification as a standard

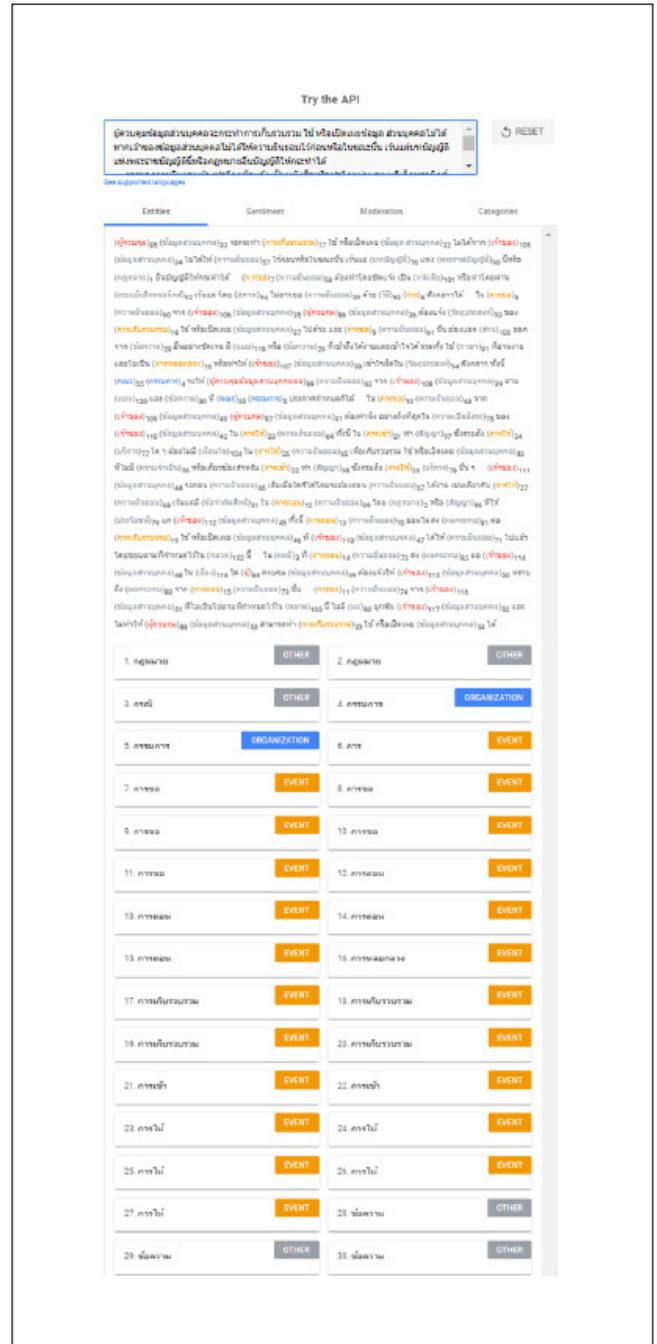


Figure 2. Train Set and Test Set

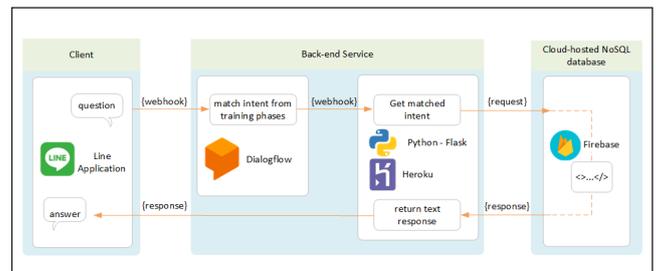


Figure 3. The principle of the operation of the chatbot application.

LINE Server provided, known as a webhook. A webhook is an Application Programming Interface or a type of API that operates on events rather than on requests.

In a normal API connection channel, the default client-side application sends a request to the server or service provider. To receive a response and to get information that is up to date at all times in real-time in 4.

The application has to keep sending the same words without knowing when the data will be changed. Then the server side has to handle a large number of requests. While most of the data has not been changed at all, it's a waste of resources and this is a normal API limitation.

Webhooks are sometimes referred to as "reverse APIs" instead of functioning as the usual API-style connections. It functions based on the events in which the dataset changes will be tracked by the client-side application, the real-time dataset will be sent to the client-side application as needed. Then the server can send more data than it receives. In short, the Webhooks are an API service that allows data to be transmitted as soon as a specific event occurs. Then, when the received message arrives in the dialogue automation, the Dialogflow will be responsible for understanding the intent of the received message. And compared to the message thread that has already been prepared in Figure 4.

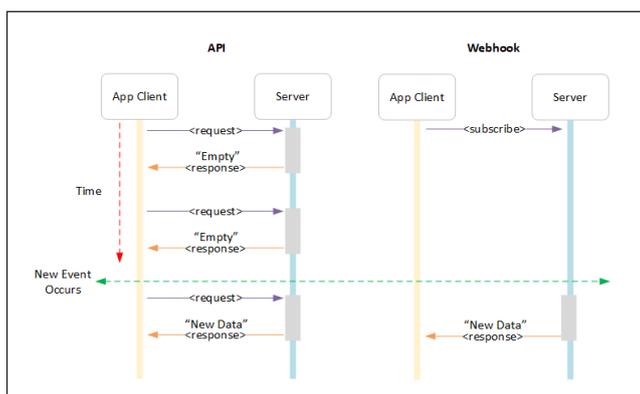


Figure 4. A comparison of the normal API connection and the Webhook connection.

3.2 Assessed user attitudes toward the usage of the "Chatbot Application for Learning Computer Law using Artificial Intelligence"

The population was 627 undergraduate students who enrolled in the Department of Computers from the Western Group Rajabhat University. The researcher received the sample size of 244 students by using Taro Yamane's table at a 95% confidence level, with a tolerance of ± 5 . The sample was selected by purposive sampling from the undergraduate students. The researchers developed a questionnaire as the user attitude assessment tool of the "Chatbot Application for Learning Computer Law using Artificial Intelligence" and as the data collection tool from a sample of 244 students. The IOC test was reviewed by three experts. This test consists of 26 questions. The attitude test consisted of 11 items consisting of 4 items of content, 5 items of usability, 3 items of efficiency, and 3 items of effectiveness. Five levels of assessment criteria for attitude, content, usability, efficiency, and effectiveness were as follows:

The average is 4.51 - 5.00 = the highest level.

The average is 3.51 - 4.50 = high level

The average is 2.51 - 3.50 = moderate level.

The average is 1.51 - 2.50 = low level.

The average is 1.01 - 1.50 = the lowest level.

4. Result and Discussion

The researcher presented the findings from this research which were classified according to research objectives as follows:

4.1 Computer Laws Chatbot Application

The author developed the "Chatbot Application for Learning Computer Laws by using Artificial Intelligence" by using AI and NLP as a core technology and Line application as the users' interface, as shown in Figure 5 and Figure 6.

4.2 Performance Evaluation

The author evaluates the Chatbot/ AI performance with measure metrics.

$$\begin{aligned}
 1) \text{ Accuracy} &= (TP+TN) / (TP+TN +FP+FN) \\
 &= (67+31) / (67+31+0+2) \\
 &= 98/100 \\
 &= 0.98
 \end{aligned}$$

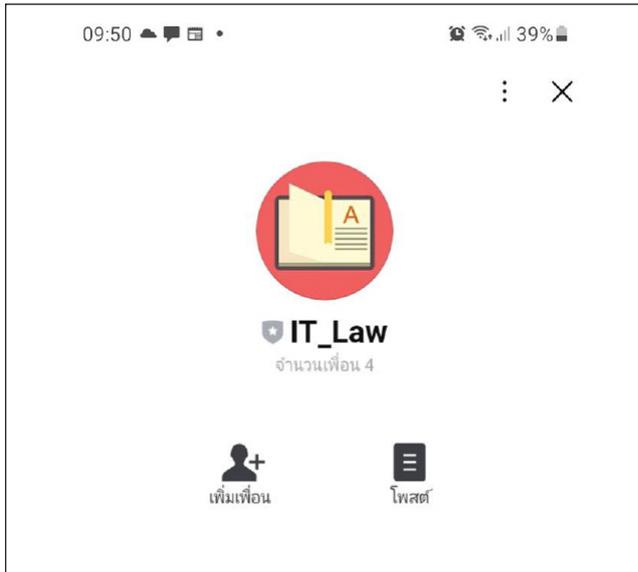


Figure 5. The "Chatbot Application for Learning Computer Laws by Using Artificial Intelligence".

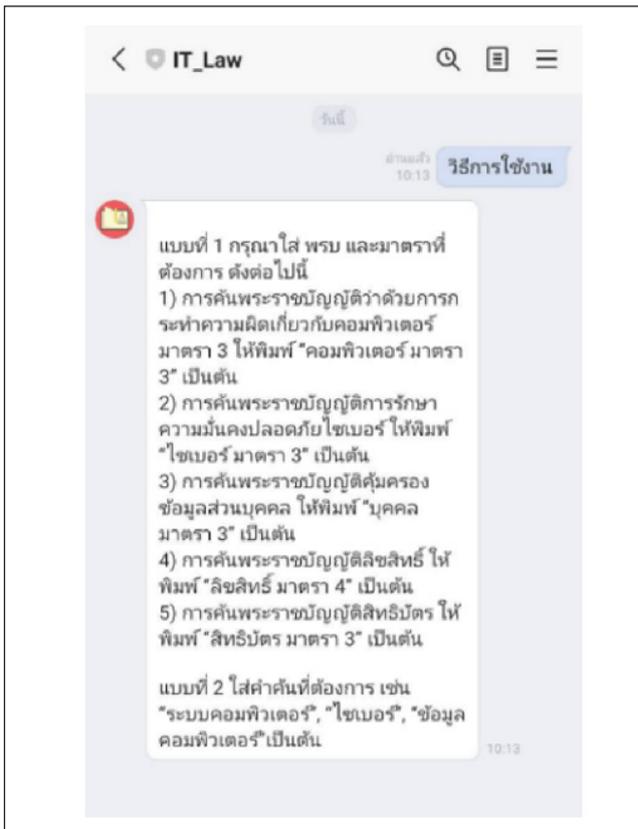


Figure 6. A guideline for using the "Chatbot Application to Learn Computer Laws using Artificial Intelligence"

$$\begin{aligned}
 2) \text{ Precision} &= TP/(TP+FP) \\
 &= 67/(67+0) \\
 &= 1.00
 \end{aligned}$$

$$\begin{aligned}
 3) \text{ Recall} &= TP/(TP+FN) \\
 &= 67/67+2 \\
 &= 67/69 \\
 &= 0.97
 \end{aligned}$$

$$\begin{aligned}
 4) \text{ F1-Score} \\
 \text{F1} &= 2*[(\text{precision}*\text{recall})/(\text{precision} +\text{recall})] \\
 &= 2*[(1*0.97)/(1+0.97)] \\
 &= 2*[0.97/1.97] \\
 &= 0.98
 \end{aligned}$$

Remark:

TP = True Positive

TN = True Negative

FP = False Positive

FN = False Negative

4.3 User Satisfaction

Users tried out the "Chatbot Application to Learn Computer Laws using Artificial Intelligence" that was developed and assessed users' attitudes toward the experiences in using the "Chatbot Application to Learn Computer Laws using Artificial Intelligence" after the trial. The results of the assessment are shown in Table 1.

The assessment results of the Western Rajabhat Universities. The assessment results of the students of the "Computer Education" at the "Muban Chombueng Rajabhat University" found that the "satisfaction as a sample data" domain was at the highest level ($\bar{X} = 4.70$, SD. = 0.47), the "content" domain was at the highest level ($\bar{X} = 4.74$, SD. = 0.45), the "usability" domain was at the highest level ($\bar{X} = 4.71$, SD. = 0.46), the " efficiency " domain was at the highest level ($\bar{X} = 4.64$, SD. = 0.49), the " effectiveness " domain was at the highest level ($\bar{X} = 4.69$, SD. = 0.46) and the overall of performance from a sample data set was at the highest level ($\bar{X} = 4.59$, SD. = 0.09).

Table 3. The summary results of the performance from a sample data set of the "Chatbot Application for Learning Computer Law using Artificial Intelligence".

| University Domain | Kanchanaburi Rajabhat University | | Nakhon Pathom Rajabhat University | | Phetchaburi Rajabhat University | | Muban Chombueng Rajabhat University | | Total | |
|-----------------------------------|--|------|---|------|---------------------------------------|------|--|------|-----------|------|
| | \bar{X} | SD. | \bar{X} | SD. | \bar{X} | SD. | \bar{X} | SD. | \bar{X} | SD. |
| The satisfaction as a sample data | 4.57 | 0.57 | 4.46 | 0.58 | 4.54 | 0.60 | 4.70 | 0.47 | 4.57 | 0.09 |
| The content | 4.64 | 0.53 | 4.44 | 0.59 | 4.62 | 0.59 | 4.74 | 0.45 | 4.61 | 0.11 |
| The usability | 4.62 | 0.58 | 4.44 | 0.63 | 4.69 | 0.49 | 4.71 | 0.46 | 4.62 | 0.11 |
| The efficiency | 4.56 | 0.56 | 4.46 | 0.60 | 4.56 | 0.64 | 4.64 | 0.49 | 4.56 | 0.06 |
| The effectiveness | 4.65 | 0.59 | 4.43 | 0.58 | 4.54 | 0.59 | 4.69 | 0.46 | 4.58 | 0.10 |
| Total Average: | 4.61 | 0.56 | 4.45 | 0.60 | 4.59 | 0.58 | 4.70 | 0.46 | 4.59 | 0.09 |

"Chatbot Application for Learning Computer Law using Artificial Intelligence" in this research uses AI technology to automate chat responses with Dialogflow and a Line Application as a tool to help learn effectively. Students can find answers quickly anytime, anywhere. This research corresponds to the research on an "Application of Artificial Intelligence Chatbot for Learning, a case study of the periodic table with content and detailed properties of various elements". These data were used to create an artificial intelligence system that responds automatically to chats using the Dialogflow program and connects to Line Application [8]. It also corresponds to research on the "Smart Village Management System via Smart Phone with Line API" [9], which is a system developed by using the Line API (Application Programming Interface), which causes users to be able to use the system without having to install other applications. It is convenient for users who are normally familiar with the use of Line, with a chatbot to automatically answer the questions, which makes it as efficient as possible.

A Chatbot Application for Learning Computer Law using Artificial Intelligence" used the Dialog Flow and a Line application to process questions and get answers for users. This is in line with the research on the "Tourism Promotion Information System

via Line Chatbot Application System in Phitsanulok Province" which has the assessment for the efficiency and the effectiveness of the system at a high level [10] and in line with the "Developing an Information System for Learning Computer Network Vocabulary through the Line Chatbot Application" which the efficiency and effectiveness of the Information System through the Line Chatbot is at the highest level [11].

"A Chatbot Application for Learning Computer Law using Artificial Intelligence" has the assessment on its efficiency and effectiveness which the findings are consistent with the findings of the research on "Studied and Developed Chatbots via Web Applications for Q&A on Digital Legal Issues and Related Issues via Chatbots" [2]. An application allows users to be able to query the chatbots through a web application that is always connected to the Internet. An assessment of the research study found that an application has a high level of efficiency and effectiveness. The research on "The Development of the Supporting Data Providing System for the Khorat Geopark Attraction using Digital Technology" [12] used machine learning (ML) and natural language processing (NLP) as a background mechanism to process the chat bot's response and used a responsive web page as a data presentation model. The performance evaluation of the system was also at a high level.

5. Conclusions

Chatbot Application for Learning Computer Laws by using Artificial Intelligence has the main objectives: 1) develop a chatbot application for learning computer laws by using artificial intelligence and 2) assess the attitudes of users of a Chatbot Application for Learning Computer Laws by using Artificial Intelligence. It was found that 1) the Chatbot Application for Learning Computer Laws by using Artificial Intelligence was successfully developed and function as design, 2) the overall results of the assessment of the user attitudes of the Chatbot Application for Learning Computer Laws by using Artificial Intelligence of the students of Computer Education/ Technology at the Kanchanaburi Rajabhat University, the students of the Computer Education at the Muban Chombueng Rajabhat University, and the students of the Computer at the Phetchaburi Rajabhat University were at the highest level. And the assessment of the attitudes of the users of a Chatbot Application for Learning Computer Laws by using Artificial Intelligence of the students of Computer Education at the Nakhon Pathom Rajabhat University was at a high level.

6. Acknowledgments

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