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Chat Bot News Analysis to Support Education Services Using Neural Network

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Abstract

During the Covid-19 pandemic, all learning is held online, so all lecture activities up to student administration must be done online. To make it easier for students to obtain information about academics and administration, a chatbot feature is needed which can provide information while communicating two-way to students as users. Chatbots can provide services practically, quickly, and responsively. In order for the chatbot to provide answers that match user expectations, the question sentences that enter the system must be classified properly and correctly. This study applies the Neural Network method to classify answers on chatbots. Neural Networks are used in research methods because they can build models easily and can be used to classify text with a high level of accuracy. To measure the performance of the chatbot system in providing appropriate answers, an evaluation is carried out by calculating the accuracy, precision, recall, and f-measuring values using a confusion matrix. The results of the study show that the Neural Network method built on the chatbot system in classifying answers can run well with an accuracy value of 99.21%, precision of 88.09%, recall of 88.09%, and f-measure of 88.09%.

Keyword: Chat Bot, Educational Services, Neural Network, Online News.

1. Introduction

During the Covid-19 pandemic, many lecture activities have used online systems, including student administration systems. The Informatics Engineering Study Program at UIN Maulana Malik Ibrahim Malang uses the department website to exchange information between department admins, lecturers, students and the faculty. During this period, students asked almost the same questions, and the admin had to reply to the same messages repeatedly. To support this, a chat bot system was created, which is a virtual robot with artificial intelligence that can imitate human conversation in the form of text or voice. Chatbots are designed to understand human language using natural language processing and simulate text chats with users to provide quick responses (Adamopoulou & Moussiades, 2020).

Several previous studies support the use of chatbots in providing convenience and efficiency for users to obtain the information they need (Buhalis & Cheng, 2020); (Malik, 2021); (Selamat & Windasari, 2021). In addition, chatbots are now widely used in various online business sectors because they are considered to be able to help support services to users and make work more effective (Chen et al., 2021). The response or

answer given by the chatbot is the result of scanning the keywords given by the user, which is then processed so that it can provide a response that is considered the most suitable or a word pattern that is considered the closest (Ranoliya et al., 2017). The chatbot system must be able to understand the natural language of what is entered by the user, and can provide a response or answer that is in accordance with expectations (Rapp et al., 2021). To make the chatbot system able to simulate a conversation with the user, the intent or purpose and purpose of the input needs to be classified correctly (Suhaili et al., 2021). Classification is used to determine the intent of the text input given by the user so that the system can provide an appropriate response (Adamopoulou & Moussiades, 2021).

There are several methods that can be used in building a chatbot system, one of which is using the Artificial Neural Network (ANN) method (Suta et al., 2020). Bhartiya et al., (2019) implemented a university counseling auto-reply bot, which is able to provide answers to questions related to engineering at the university level. The bot is based on a feed forward artificial neural network model, a framework used to process complex data input. Using a chatbot can provide convenience in obtaining information practically, quickly, and responsively. Allah subhanahu wa ta'ala says in Surah Al-Insyirah verses 5-6:

يُسْرًا الْعُسْرِ مَعَ إِنَّ , يُسْرًا الْعُسْرِ مَعَ فَإِنَّ

"So truly with difficulty there is ease. Indeed, with difficulty there is ease." (QS. Al-Insyirah [94] : 5-6)

According to the interpretation of al-Wajiz (Tafsir Web, n.d.), in fact, with every difficulty there is a relief that will change quickly, such as the suffering experienced by the Prophet Muhammad SAW due to interference from polytheists which then turned into ease and help for them. When polytheists mocked Muslims for their poverty, that was when this verse was revealed. Then the Prophet Muhammad SAW said as Ibn Jarir said from Hasan Al-Basri: "Are you happy with your position in ease, difficulty will not always be above ease." In fact, along with difficulties there are other conveniences and the way to face every difficulty is to seek ease. Just like in building a chatbot system, in order to be able to provide responses or answers to questions that have been given by users accurately and correctly, the chatbot must be able to classify the answers correctly. So by using a chatbot it is hoped that it can help and make it easier for users to get information.

This study aims to build a chatbot system to help engineering and informatics study programs classify answers to questions given by students in order to produce the most appropriate response or answer. The use of chatbots is also expected to provide convenience in obtaining information quickly and without time constraints.

2. The Art of Research

1) Chatbot

This study examines the existing chatbot working style in generating responses and then identifies their shortcomings from the perspective of engaging in a dialogue with users. A chatbot is proposed specifically for the domain named IntelliBot, which is a dialogue-based chatbot that generates responses using multiple strategies to generate responses. IntelliBot is trained on two datasets, namely Cornell movie dialogues and a custom-made insurance dataset so that it has domain-specific knowledge (Piro, 2019). Nuruzzaman & Hussain (2020) tested the performance of IntelliBot then validated and compared it with three other chatbots from the literature, namely RootyAI, ChatterBot and DeepQA and the results showed the superiority of IntelliBot in interacting with users and providing complete answers in the insurance domain. In another study, it is explained that in the future, Zumstein & Hundertmark (2017) explains that chatbots will be the most important form of communication in the business world. In order for chatbots to really work well, they must

have the ability to engage users in dialogue (Haugeland et al., 2022). IntelliBot was trained on a corpus of movie dialogues and an insurance data set to provide specific answers regarding questions.
Shumanov & Johnson (2021) revealed that many of the world's leading brands and an increasing number of government agencies are using intelligent agent technology. Given that online conversations increasingly involve chatbots, capturing and processing as few as twenty words using machine learning algorithms (Suta et al., 2020). Adel, et al. (2022) explains the presence of ordering applications using chatbot features that are used by more than 1.5 billion users worldwide and include Facebook Messenger and other social media platforms (Batish, 2018; Haristiani et al., 2019; Smutny & Schreiberova, 2020).

2) Natural Language Processing (NLP)

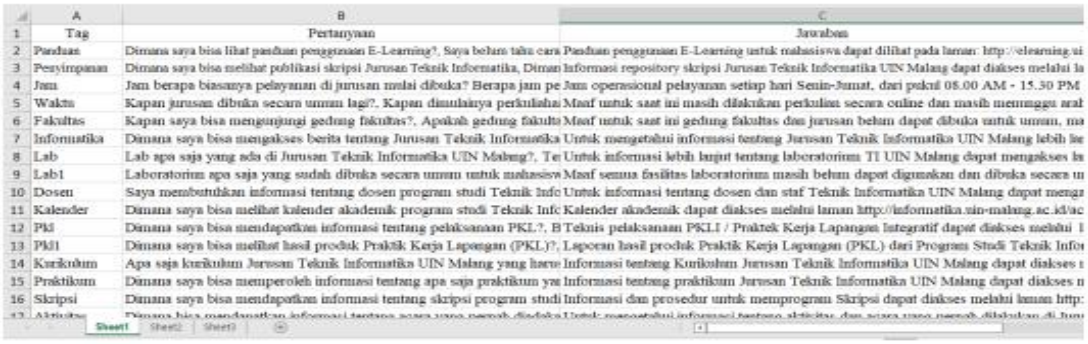
Natural language processing (NLP) is a subfield of computer science that uses computational techniques to study, understand, and produce human language (Hirschberg & Manning, 2015). NLP is often used to help the communication process between humans such as in machine translation (Fanni et al., 2023), and to help human communication with machines such as the use of conversational agents (chatbots) (Allouch et al., 2021). Prasetyo et al., (2021) built a chatbot system using the Natural Language Processing (NLP) approach to process questions submitted by users and to obtain keywords from the desired information. Husamuddin et al., (2020) where using the Natural Language Processing (NLP) method to provide Frequently Ask Questions (FAQ) services on the bot feature on the Telegram messenger using TensorFlow technology.
The NLP process uses keyword extraction techniques that are used to analyze text using keywords contained in the text (Nasar et al., 2019). The use of this method helps to summarize text and identify the subject of the text (Sharma & Sharma, 2022). The process carried out in keyword extraction includes word tokenization, stopword removal, and analysis. If the initial crawling results do not provide an answer, the crawling process will be carried out again using the results of combinations of synonyms of keywords with question words. The answers found based on the crawling results will be stored in the database, along with the combination of question words and keywords used (Mincheva et al., 2022).

3) Neural Network (NN)

The development of several chatbots is more based on the Feed forward Artificial Neural Network model (Bhartiya et al., 2019) which is a complex data input process framework and has a unidirectional information flow, without feedback (Kuhail, 2023). Chatbots utilize neural networks to perform tasks such as keyword recognition, sentiment analysis, and understanding context in conversations (Suta et al., 2020). Neural networks allow chatbots to learn from previous conversation data and recognize patterns in user interactions so that they can provide more relevant and personalized responses based on the context of the conversation (Shumanov & Johnson, 2021). Some modern chatbots, for example Chatgpt (Generative Pre-trained Transformer) are built on large-scale neural networks trained on very large text datasets so that they can produce human-like text, understand complex questions, and provide coherent answers (Zohuri & Rahmani, 2023).

3. Method

The process flow on the chatbot using the Neural Network method (see figure 1) using a web-based platform. The process flow consists of several stages, namely inputting questions from users in the form of text, preprocessing stages (translate, stemming, stop word removal, and tokenization), Bag of Words (converting text data into vectors), building a Neural Network (NN) model, classifying questions into the appropriate class (taking a class with a high probability value), inverse label encoder to determine the answer, and measuring accuracy, precision, recall, F-measure.



	A	B	C
1	Tag	Pertanyaan	Jawaban
2	Panduan	Dimana saya bisa lihat panduan penggunaan E-Learning?, Saya belum tahu cara	Panduan penggunaan E-Learning untuk mahasiswa dapat dilihat pada laman: http://elearning.ui
3	Penyimpanan	Dimana saya bisa melihat publikasi skripsi Jurusan Teknik Informatika, Diman	Informasi repository skripsi Jurusan Teknik Informatika UIN Malang dapat diakses melalui la
4	Jam	Jam berapa biasanya pelayanan di jurusan mulai dibuka? Berapa jam pe	Jam operasional pelayanan setiap hari Senin-Jumat, dari pukul 08.00 AM - 15.30 PM
5	Waktu	Kapan jurusan dibuka secara umum lagi?, Kapan dimulainya perkuliaha	Masf untuk saat ini masih dilakukan perkuliat secara online dan masih seminggu arat
6	Fakultas	Kapan saya bisa mengunjungi gedung fakultas?, Apakah gedung fakulta	Masf untuk saat ini gedung fakultas dan jurusan belum dapat dibuka untuk umum, ma
7	Informatika	Dimana saya bisa mengakses berita tentang Jurusan Teknik Informatika	Untuk mengetahui informasi tentang Jurusan Teknik Informatika UIN Malang lebih lu
8	Lab	Lab apa saja yang ada di Jurusan Teknik Informatika UIN Malang?, Te	Untuk informasi lebih lanjut tentang laboratorium TI UIN Malang dapat mengakses la
9	Lab1	Laboratorium apa saja yang sudah dibuka secara umum untuk mahasisw	Masf semua fasilitas laboratorium masih belum dapat digunakan dan dibuka secara u
10	Dosen	Saya membutuhkan informasi tentang dosen program studi Teknik Info	Untuk informasi tentang dosen dan staf Teknik Informatika UIN Malang dapat menga
11	Kalender	Dimana saya bisa melihat kalender akademik program studi Teknik Infc	Kalender akademik dapat diakses melalui laman http://informatika.uin-malang.ac.id/ac
12	Pkl	Dimana saya bisa mendapatkan informasi tentang pelaksanaan PKL?, B	Teknis pelaksanaan PKLI / Praktek Kerja Lapangan Integratif dapat diakses melalui l
13	Pkl1	Dimana saya bisa melihat hasil produk Praktik Kerja Lapangan (PKL)?,	Laporan hasil produk Praktik Kerja Lapangan (PKL) dari Program Studi Teknik Infor
14	Kurikulum	Apa saja kurikulum Jurusan Teknik Informatika UIN Malang yang harus	Informasi tentang Kurikulum Jurusan Teknik Informatika UIN Malang dapat diakses u
15	Praktikum	Dimana saya bisa memperoleh informasi tentang apa saja praktikum ya	Informasi tentang praktikum Jurusan Teknik Informatika UIN Malang dapat diakses m
16	Skripsi	Dimana saya bisa mendapatkan informasi tentang skripsi program studi	Informasi dan prosedur untuk memprogram Skripsi dapat diakses melalui laman http:
17	Aktivitas	Dimana bisa mendapatkan informasi tentang acara yang pernah diadaka	Untuk mengetahui informasi tentang aktivitas dan acara yang pernah dilakukan di Jur

Figure 1. Initial View of Research Data

The initial stage in the chatbot system is that the user provides input in the form of questions about student academic information (See Figure 2). Then the questions in the form of text enter the preprocessing stage. In the case of document classification that uses text-type data, there are several types of processes that can be carried out at the text preprocessing stage including translate, stemming, stopwords, and tokenization. Translate is used if there is text in English, then it will be translated into Indonesian so that it is easy to process the text. Stemming is the process of removing word inflections to their basic form, but the basic form does not mean the same as the root word. Stopwords are common words that often appear in large numbers and have no meaning. Tokenization is the process of separating text into pieces called tokens for later analysis. After the preprocessing process is carried out, the collection of words resulting from tokenization enters the Bag of Words (BoW) stage which changes words into vectors so that they can be used as input to the Neural Network (NN). Because computer machines can only understand numbers or numerics and cannot process if they are in text form. Then the training process is carried out by building an NN model to produce good accuracy and the system can classify the answers correctly.

Figure 2. Chatbot System Design

4. Result

1) Preprocessing

At the preprocessing stage, it is the process of processing the question text before it is used in the Neural Network (NN) algorithm. The text processing process uses techniques from Natural Language Processing (NLP) stages of translation, stemming, stopword, and tokenization.

a. Translation Process
   The text translation module in this study uses deep translator which is a flexible python package for translating between different languages in a simple way.
b. Stemming
   Stemming is used to change words in each sentence into their basic form or to remove affixed words. In Indonesian, there are more complex affixed words compared to other languages because they have various affixes such as prefixes, suffixes, confixes (combinations of prefixes and suffixes), and infixes (insertions) so that the stemming process is needed. This study uses the Python Sastrawi library which can be accessed openly and publicly through Github Sastrawi (https://github.com/har07/PySastrawi, 2016) Nazief and Adriani algorithm.
c. Stop Word Removal
   The main characteristic in selecting stop words is usually words that have a high frequency of occurrence, for example conjunctions such as "and", "or", "I", "will" and others. At this stage, the system takes important words from the sentence by removing stopwords.
d. Tokenizationi
   In this process, in NLP tokens will be interpreted as "words" and each word in the tokenization process will be identified based on spaces. A sentence or text data can be split into word pieces using the word_tokenizer class.

2) Bag of Words (BoW)

The resulting tokens or words from the preprocessing stage are then encoded into vector form using the Bag of Words (BoW) model to record the appearance of each bag created for each type of word. This method produces a vector with a length equal to the number of words contained in the Bag of Words. Each word will have a value of 1 if the word bag contains the input word token and if no matching word is found in the word bag it will be given a value of 0 (See table 1).

Tabel 1. Contoh Penggunaan BoW

Token	**Bag of War**							
	what	require	UKT Pay	for	lab	registration	thesis	online
what	1	0	0	0	0	0	0	0
require	0	1	0	0	0	0	0	0
UKT Pay	0	0	0	0	0	0	0	0
for	0	0	0	1	0	0	0	0
lab	0	0	0	0	1	0	0	0
registration	0	0	0	0	0	1	0	0
thesis	0	0	0	0	0	0	1	0
online	0	0	0	0	0	0	0	1

3) Label Encoder

This label encoder aims to change the label words in the column into sequential numbers. The labels are sorted alphabetically from top to bottom, then the labels are encoded into sequential numeric forms. The results of the label encoder (see appendix A) are used by the output layer as output variables or as target values.

4) Neural Network Architecture

The architecture of the Neural Network in this study consists of three layers, namely, input layer (system input layer in the form of sentence representation from the results of the Bag of Words stage), hidden layer (layer used to assist the prediction process), and output layer (layer that produces the final output and classification of data) (see Figure 3). The number of neurons in the input layer is 355 neurons, according to the number of unique tokens/words generated from the preprocessing stage which is then converted into the Bag of Words model. The second layer is a hidden layer that has 400 neurons. The third layer is the output layer that has the same number of neurons as the number of outputs, namely 30. Each neuron in the multilayer perceptron is interconnected and has a weight symbolized by w (weight) which will be operated using a weight sum model where the weight value at each node will be multiplied by the input value. The hidden layer and output layer have additional inputs commonly called bias. The result of the multiplication between the weight value and the input value will then be added to the bias value.

In the hidden unit, the input value will be multiplied by the weight value (w) that connects the input layer with the hidden layer. Then the result of the addition of the weight (w) with the input value will be added to the bias value (bi) in the hidden layer. The results of the calculation operation are then processed and the calculation of the ReLU activation function results for each neuron is carried out, then the results will be forwarded to the next layer. Here is the equation:

- Calculation from input layer to hidden layer:

$$h_j = \sigma\left(\sum_{i=1}^{n} x_i \,.\, w_i + b_i\right) \quad \text{..... (i)}$$

- Calculation from input layer to hidden layer:

$$y_o = \sigma\left(\sum_{j=1}^{n} h_j \,.\, v_j + b_j\right) \quad \text{..... (ii)}$$

Info:

σ = activation function
xi = neurons in the input layer
wi = weight between input layer and hidden layer
bi = bias on hidden layer
hj = neurons in the hidden layer
vj = weight between hidden layer and output layer
bj = bias on output layer

The activation function used in the study is the ReLU activation function for the hidden layer and softmax for the output layer. ReLU (Rectified Linear Unit) activation is an activation layer in the model that applies the function $(x) = max\ (0, x)$ where ReLU essentially only makes a boundary on the number zero, meaning that if $x \leq 0$ then $x = 0$ and if $x > 0$ then $x = x$. The derivative of the ReLU activation function is as in the following equation:

$$F(x) = \int_{x\ for\ c>0}^{0\ for\ x\leq 0} \quad \text{..... (iii)}$$

The softmax activation function is commonly used in probability calculations to determine multi-class classification with the class output that has the largest probability value. The output value produced by the softmax activation function has a probability value between 0 and 1. When the softmax activation function

is used for a multi-class classification model, it will return the probability of each class and the target class will have a higher probability than the other classes. With the following equation:

$$f(Xi) = \frac{\exp(xi)}{\sum_{j=0}^{k} \exp(xi)} \text{ for I = 0,1,2,...k} \quad \text{..... (iv)}$$

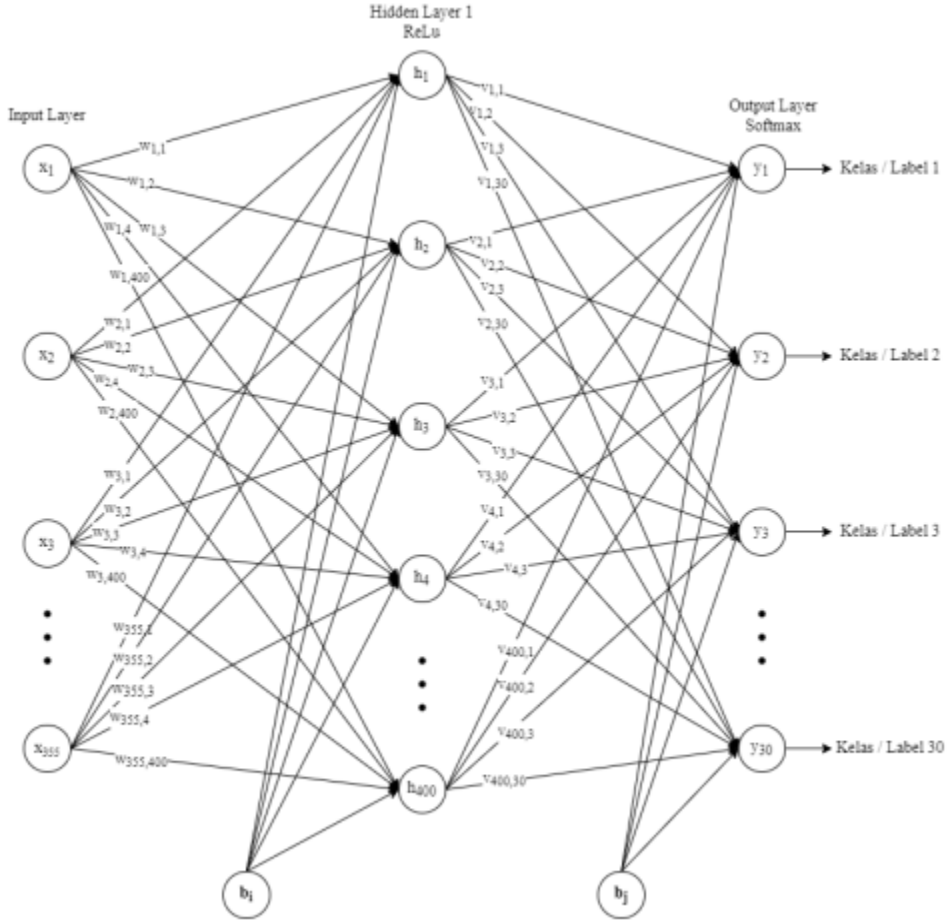


Figure 3. Neural Network Architecture

5) Training on Neural Network

From the feed forward process, an error value will be generated which is due to the random weight value and to optimize the weight value, an experiment can be conducted on the epoch or repetition until a small error value is obtained. At the training stage, each weight value on each neuron will be continuously updated until the output produced is in accordance with expectations (see Figure 4). The resulting output is calculated as the difference in error between the results of the system prediction and the target that corresponds to the maximum epoch limit value. If the epoch value is greater than the maximum epoch value that has been determined, the learning process will be stopped and the weight value will be saved.

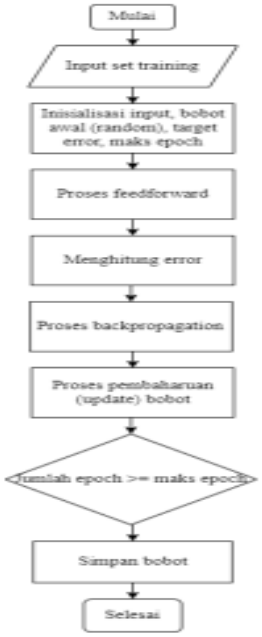


Figure 4. Training Process Flowchart

The number of epochs greatly influences the accuracy value, so the author determines the number of epochs until the training graph has converged and is saturated until the maximum value that can be obtained is obtained, then the training process will be stopped. The learning rate also affects how aggressive the weight changes are. As a result of increasingly aggressive weight changes, the training graph can converge faster but will also be at risk of a higher saturation point or in other words stop at a point where the loss can actually be even smaller. The biggest influence in testing is when changes are made to the number of neurons. The data training process is carried out with a stopping criterion based on epochs of 100 (see Figure 5).

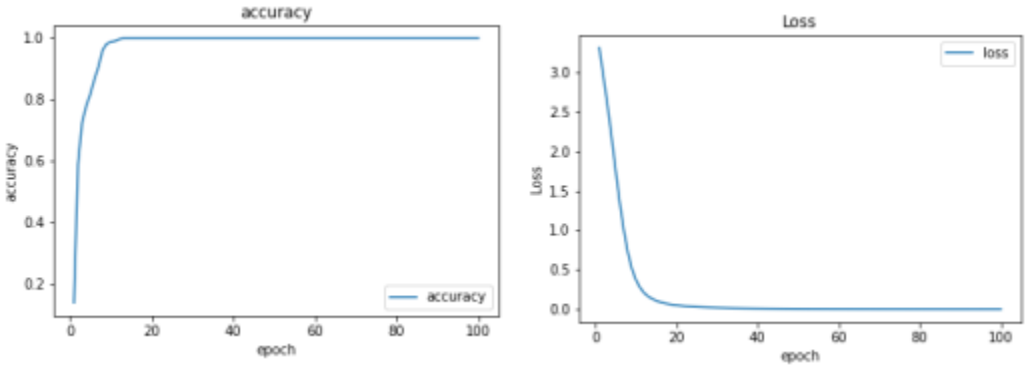


Figure 5. Accuracy and Loss Curve of Training Results

6) Test Scenario

At this stage, testing will be carried out on the chatbot system regarding lecture information using the Neural Network (NN) method to determine whether the chatbot that is built can provide answers that match the input given by the user. Testing will be carried out by testing 84 question sentences given by the user to see

if the chatbot system can provide answers that match the data that has been created. There are several software and hardware devices used for testing practices (see table 2) in this study.

No	Item	Specification
Hardware		
1	Processor	AMD 3020e with Radeon Graphics 1.20 GHz
2	Memory	8192MB RAM
3	VGA	AMD Radeon (TM) Graphics
4	Display Resolution	1366 x 768
Software		
5	OS	Windows 10 Home Single – 64 Bit
6	Devices	Jupiter notebook
7	Supporting software 1	Anaconda3 2021.11
8	Supporting software 2	Python 3.7.9 (64-bit)
9	Supporting software 3	Microsoft Visual Studio Code

7) System Performance

There are a total of 30 labels with a total of 420 question data and 30 alternative answer choices. In the testing process, the data will be divided into two, namely training data and testing data. Training data is obtained from all questions on each label that has been created and testing data is taken from several representative questions from each label. Where the division of training data is 80% and testing data is 20%. The amount of data used as training data is 336 question data. While the test data is 84 question sentences which will then be measured using a confusion matrix to obtain accuracy, precision, recall, and F-measure values. The source of question and answer data is obtained from the website of the Faculty of Informatics Engineering, UIN Malang (http://informatika.uin-malang.ac.id/). System performance evaluation is used to obtain values from accuracy, precision, recall, and f-measure and according to Markoulidakis et al., (2021) Confusion Matrix is one of the most popular performance measures used when solving classification problems. There are four terms as a representation of the results of the multiclass classification process, namely True Positive (TP), True Negative (TN), False Positive (FP), and False Negative (FN). While for the optimal value of the algorithm's accuracy performance, it can refer to the Area Under Curve (AUC) (Gorunescu, 2011).

From the results of the trial conducted by providing question sentences to be tested on the chatbot system that was built by comparing the prediction results (system) with the actual data as follows:

$$\text{Accuracy} = \frac{74+2426}{74+2426+10+10} \text{ x } 100\% = 99{,}21\% \quad \text{..... (i)}$$

$$\text{Precision} = \frac{74}{74+10} \text{ X } 100\% = 88{,}09\% \quad \text{..... (ii)}$$

$$\text{Recall} = \frac{74}{74+10} \text{ X } 100\% = 88{,}09\% \quad \text{..... (iii)}$$

$$\text{F-Measure} = 2\,\frac{0.88\,x\,0.88}{0.88+0.88} \text{ X } 100\% = 88{,}09\% \quad \text{..... (iv)}$$

The results of the calculation of the system performance that has been carried out using the confusion matrix obtained an accuracy value of 99.21%, a precision value of 88.09%, a recall value of 88.09%, and an f-measure of 88.09%.

5. Discussion

The trials that have been conducted, the chatbot system using the Neural Network (NN) method can classify answers based on the match between the input sentences given by the user with the training data. In the

training process, determining the number of neurons in the hidden layer greatly affects the changes in the results of the training process. If the number of neurons in the hidden layer is too small, the resulting data will often be irrelevant. However, if the number of neurons is too large, it can slow down the training process of the network. So it is necessary to conduct trials several times to determine the number of neurons in the hidden layer that matches good performance. The number of epochs also greatly affects the training results. If the number of epochs is too small, the weight value at each node is not updated optimally, causing the error value to be large. If the number of epochs is too large, it can result in overfitting in the training process. Overfitting occurs when model training produces a high accuracy value, while the model testing process shows low accuracy results. In this study, the amount of data is limited and not large, causing the process of recognizing specific data and generalizing the knowledge that the author provides is also limited.

Based on the chatbot system trial by measuring performance on multiclass classification problems using a confusion matrix, it shows that the model built using the Neural Network method produces an accuracy value of 99.21%, which for example, if from 10,000 data, then the predictions that will be correct are 99,210 data. Because accuracy is the number of correct predictions divided by the number of tests. The precision value obtained is 88.09%, which of the 84 data that are predicted to be correct (positive) turns out that there are 74 data that are actually correct. The recall value obtained is 88.09% because of the 84 data that are actually correct, it turns out that there are 74 that are predicted to be correct (positive). The results of the f-measure calculation are also obtained at 88.09%.

From the results of the experiments that have been carried out, there are still errors that occur so that the accuracy, precision, recall, and f-measure values have not reached the maximum value. This can happen because the author uses one of the text transformation algorithms, namely Bag of Word (BoW) where the input sentence is broken down into tokens into vector form so that it cannot provide information related to semantics (meaning), structure, sequence, and context around the words in each document. The value of each parameter used in the Neural Network also affects the results of the trial accuracy. In today's digital era, technological developments and information exchange processes occur easily and quickly. So that digital information services including chatbots are needed in various fields. The chatbot system that is built is expected to provide convenience to students in obtaining information with a fast response and is able to answer their needs appropriately. The chatbot feature can also improve the quality of information services because it is more practical, fast, and responsive.

6. Conclusion

This study used 420 data questions classified into 30 labels. Then the data is divided into 80% training data and 20% testing data. From the results obtained from the trial process that has been carried out on the chatbot system in classifying the appropriate answers from user input (questions) using Neural Network, it produces an accuracy value of 99.21%, a precision value of 88.09%, a recall value of 88.09%, and an f-measure of 88.09%. From the results of the accuracy, precision, recall, and f-measure values above, it can be said that the Neural Network model that has been designed in the study is included in the excellent classification category.

There are several suggestions and implications that can be generated from this study, for example: One, Chatbot application development can be carried out by the faculty by recognizing more specific data related to the provision of automated bot services because the amount of data and the accuracy of the data in classifying each label greatly affect the accuracy results and minimal error. Two, this study uses the Bag of

Word feature in performing word embedding. So that in further research, different methods can be used such as TF-IDF, Word2Vec, GloVe, FastText, and other text vectorization methods.
The shortcomings of this study include: One, Specific data related to university services may be relative to each user, it needs good adjustment so that the use of chatbots can be maximized. Two, Neural networks require a very large amount of data to be trained effectively. If conversation data or information relevant to student needs is insufficient, chatbot performance may not be optimal.

Acknowledgments

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APPENDIX

1. Data process label encoder research

Class	Encoder	Scope
Administration	0	Information on academic and student administration services carried out online such as: application for observation permits, application for laboratory use permits, application for PKL permits, and application for research permits
Activity	1	Activities or events organized by the Informatics Engineering Department
Language	2	Information about Arabic (TOAFL) and English (TOEFL) language tests as graduation requirements
Scholarship	3	Information about the list of scholarships available at the Informatics Engineering Study Program
File	4	Download files for PKLI registration purposes, comprehensive exams, thesis preproposals, thesis proposal seminars, thesis defenses, practicum control cards, observation permit application forms, and PKL form
Lecture	5	Information about lecturers and staff of the Informatics Engineering Department
Faculty	6	Information about faculty buildings whether they can be visited by the public
Laboratory Facilities	7	Information about laboratory facilities whether they can be opened and used by students
Information PKL	8	Information about the technical implementation of Field Work Practices (PKL)
Information Tuiton	9	Information and financial administration services for students (payments, relief, returns, adjustments, and deductions)
Information Laboratory	10	Information about the list of laboratories in the Informatics Engineering Department
Informatics	11	Link to access the Informatics Engineering Department website
Service Hours	12	Informatics Engineering Department service operating hours
Journal	13	Information about Journal Matics
Calendar	14	Information about the academic calendar of the Informatics Engineering study program
Late Payment	15	Information about student delays in payment
Curriculum	16	Information about the Curriculum such as the number of credits that must be taken, distribution of subjects per semester, and academic guidebooks.
Internship PKL	17	Report on the results of Field Work Practice (PKL) products from the Informatics Engineering Study Program
Magister Department	18	Information about Masters Studies (S2)
Organization	19	Information about organizations and communities in the Department
Guidelines	20	Guide to using E-Learning for students such as guides for doing online assignments and discussion forums
Submission	21	Information on how to Submit Still Study which can be done through SIAKAD
Announcement	22	Information to access announcements such as; thesis exam participant schedules, results seminars, comprehensive, proposals, and thesis supervisor data

Storage	23	Information about the Department's thesis repository
Library	24	Information about the University's central library such as services, facilities, borrowing and returning books
Practical	25	Information about practicums that must be taken each semester, information about modules, control cards, & practicum guidelines
Achievement	26	Information about various achievements achieved by Informatics Engineering Study Program students
Publication	27	Information about the list of journal publications carried out by Informatics Engineering Department students and lecturers
Thesis	28	Information and procedures for programming a Thesis such as; thesis writing guidelines, registration of pre-proposal proposals, proposals, comprehensive, results seminars, theses, and graduation registration requirements
Time	29	Information about when offline or face-to-face learning will begin