Asking a chatbot for food ingredients halal status

C. Suardi, D. Angeani, A.P. Wibawa*, N. Murtadho & I.A.E. Zaeni

Universitas Negeri Malang, Malang, Indonesia

N.A.M. Jabari

Palestine Technical University Kadoorie, Tulkarm, Palestine

ABSTRACT: For Muslims who live side by side with non-Muslims, understanding halal and haram is significant. This paper is intended to discuss the use of a chatbot in the halal-haram status of food ingredients. The results of this study are a review of foods in various categories including healthy, natural foods and even foods that are not included for consumers. The respondents used consisted of 30 and gave a total assessment of 53.84% of the chatbot that has been built and implemented. The higher the rating given, the higher the quality of the chatbot to identify halal and haram foodstuffs.

Keywords: chatbot, food ingredients, halal

1 INTRODUCTION

Religion is an important domain to study as it influences everyone (Eid 2013; Mokhlis 2009; Zamani-Farahani & Henderson 2010). There are several religions in this world, one of which is Islam. Islam has its regulations that are supposed to help its faithful to adhere to the right path. The Muslim community globally is vast and will continue to grow. The population is expected to increase to 31.1%, equivalent to 3 billion Muslims in 2060 (Yousaf & Xiucheng 2018).

There is a strict Islamic dietary law. This law specifies the foods should be eaten (halal) or not eaten (haram) (Sin & Sin 2019). Islamic law must follow Al-Qur'an and Sunnah (Abdullah & Ahmad 2010; Suardi et al. 2019). Knowing halal and haram is essential for Muslims who live side by side with non-Muslims. Halal is a term used in Islam to label something permissible, which cannot be excluded for Muslims (Eid & El-Gohary 2015; El-Gohary 2016), and haram is the opposite of halal. It is helpful for Muslims to fully understand the halal or haram animals list because it protects them from carrying out sinful activities. Animals are categorized as haram because they are viewed as impure, unclean, or as the cause of human disease. Examples of animals that are categorized as haram for consumption are cats, dogs, and pigs (Kamarulzaman et al. 2016). They are known as dangerous and do not help human life if they are consumed. The use of technology is not new in the halal discussion. An RFID validates halal food status (Norman et al. 2009; Yang & Bao 2011). Another applicable platform is camera phone barcode scanning for halal dietary detection (Junaini & Abdullah 2008). These technologies indicate halal-status based on food ingredients, yet do not show the law. People may consult a trusted source and go to reliable Islamic scholars to discuss this matter. Finding reliable information sources could be problematic in minority Muslim countries (Bonne & Verbeke 2008). Thus, another technology-driven solution should be delivered to address the problem, and one of the potential solutions is a chatbot. A chatbot is a program that simulates human dialogue with users through chat text messages (Husein et al. 2020; Ranoliya et al. 2017). Its essential role is to help users find answers to their questions. A chatbot operates using rules and

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*Corresponding author

is often considered an artificial intelligence. This service may be used for a variety of things, from practical to enjoyable.

This paper aims to discover the use of a chatbot in the halal-haram status of food ingredients, which is developed using the Extreme Programming (XP) approach. This XP method is easy-to-use, fast and straightforward, especially for developing a small application like a chatbot (Sударsono et al. 2020). The paper consists of several sections, such as explaining the research method, findings, and discussion.

2 METHODS

Co Artificial Intelligence Markup Language (AIML) was used to build the chatbot. It is an XML-based markup language used to build interfaces while keeping the application simple in the program, easy to understand, and maintainable (Satu et al. 2017; Shawar & Atwell 2002). The content of AIML is a collection of questions and responses that can be useful for chatbots to find answers to each user sentence. AIML is used to receive input and search for answers to AIML documents (Wijaya et al. 2020). We used Extreme Programming (XP) to develop the system (Abrahamsson & Koskela 2004). XP is an approach or model for software development that seeks to simplify different development stages to become more versatile and adaptive (Assassa & Dossari n.d.). XP not only focuses on scripts, but also encompasses the whole software development environment (Paulk 2001; Rump & Schröder 2014) (Table 1).

2.1 *User Experience Questionnaire (UEQ)*

A User Experience Questionnaire (UEQ) is an easy and efficient tool for measuring User Experience (UX) (Laugwitz et al. 2015; Schrepp et al. 2017). UEQ contains six assessment scales: Attractiveness, clarity, efficiency, dependability, stimulation, and novelty. UEQ has twenty-six question components and seven answer options. A list of questions with a choice of answers or UEQ questionnaires is displayed in Figure 1. Then the data collected will be processed to analyze the data and convert the raw data into information that has useful knowledge value using Data Analysis Tools.

3 RESULTS AND DISCUSSION

The system produced in this study is a chatbot application that has a chat appearance. The page will directly interact with the user. The process that will occur is that the user will send a message to the server. The message that has been sent will be matched with an existing pattern in the database. Designing and building this system begins with the design stage, which is to identify the problems described in the previous chapter regarding the importance of reliable information regarding the halal or prohibited nature of an animal for consumption. In the system requirements analysis phase, a literature study on chatbots is carried out and collects research-related data such as lists of permitted and forbidden animals along with propositions that confirm the status of these animals.

The design stage begins with identifying the previous chapter's problem regarding the importance of reliable information regarding the halal or haram of an animal for consumption. In the system requirements analysis phase, a literature study on chatbots is carried out and collects research-related data such as lists of permitted and forbidden animals along with propositions that confirm the status of these animals. The design stage carries out the interface design process of the designed chatbot. The next step of coding is implementing the Artificial Intelligence Markup Language (AIML) method (Wijaya et al. 2020) and inputting data into the built system as diagram of creating a chatbot application shown in Figure 1. The last is testing, where the system is evaluated using methods and questionnaires distributed to obtain assessments from various users. The UI and response testing of the chatbot is shown in Figure 2. The figure illustrates the chatbot response the user's greeting, and in Table 2 shows chatbot interface testing.

Table 1. List of food ingredients halal status.

Food Ingredients	Status	Hadith or Al-Quran
Pig	Haram	<i>Al-Qur'an Surat Al-Maidah</i> Verse 3
Shrimp	Halal	<i>Al-Quran Surah Al-Maidah</i> Verse 96
Bat	Haram	In <i>Al Mughni</i> (11: 66) and <i>Al-Quran Surah Al-A'raf</i> Verse 157
Snake	Haram	The Prophet <i>sallallaahu 'alaihi wa sallam</i> said: "Every wild animal with unclean fangs is eaten" (Narrated by Muslim: 1933).
Fish	Halal	Fish and Fish Carcasses of HALAL said the Prophet <i>sallallaahu alaihi was-salam</i> : "Two carcasses sanctified uTwo carcasses and blood sanctified us. The two carcasses were fish and grasshoppers. While the two bloods are the liver and spleen." (HR. Ibnu Majah)
Chicken	Halal	<i>Al-Quran Surah Al-An'am</i> Verse 142
Eagle	Haram	The Prophet Muhammad <i>sallallaahu 'alaihi wasallam</i> prohibited "the eating of every wild animal and bird with sharp claws" (Narrated by Muslim).
Mouse	Haram	The prohibition of animals is because the Prophet <i>sallallaahu 'alaihi wasallam</i> ordered us to kill them. "Five fasiqs (nuisance) animals that should be killed both in the halal (haram) and haram lands, namely: snakes, scorpions, ravens, ravens, eagles" (HR. Muslim)
Blood	Haram	<i>Al-Qur'an Surat Al-An'am</i> Verse 145
Alcohol	Haram	The Prophet Muhammad <i>sallallaahu 'alaihi wasallam</i> say "Everything that is intoxicating is alcohol and all alcohol is haram." (HR. Muslim)
Horse	Halal	<i>Al-Quran Surat An-Nahl</i> Verse 8
Camel	Halal	<i>Al-Quran Surat Al-Maidah</i> Verse 1 "Do you who believe, fulfill the <i>aqad-aqad</i> . Livestock for you are permitted, except for those that will be read to you. (That is) by not legalizing hunting while you are doing <i>Haji</i> . Indeed, Allah determines the laws according to His will.)
Rabbit	Halal	From Anas <i>radhiyallahu 'anhu</i> , he said, "We were busy catching rabbits in the <i>Marru Azh-Zhohran</i> valley, people tried to catch them until they were exhausted. Then I caught it and I brought it to face Abu Tholhah. So, he slaughtered it and then sent the flesh of his quads or hamstrings to the Prophet <i>sallallaahu 'alaihi wasallam</i> . Then he accepted it."
Lizard	Haram	From Abdur Rahman bin Syibl said: Rasulullah prohibits eating <i>dhab</i> (a type of lizard). [Hasan. HR Abu Daud, Al-Fasawi in <i>Al-Ma'rifah wa Tarikh</i> , Baihaqi and written by Al-Hafidz Ibn Hajar in <i>Fathul Bari</i> and approved by Al-Albani in <i>As-Sahihah</i>]

Figure 1. Shows a diagram of the process of creating a chatbot application.

	1	2	3	4	5	6	7		
annoying	☐	☐	☐	☐	☐	☐	☐	enjoyable	1
not understandable	☐	☐	☐	☐	☐	☐	☐	understandable	2
creative	☐	☐	☐	☐	☐	☐	☐	dull	3
easy to learn	☐	☐	☐	☐	☐	☐	☐	difficult to learn	4
valuable	☐	☐	☐	☐	☐	☐	☐	inferior	5
boring	☐	☐	☐	☐	☐	☐	☐	exciting	6
not interesting	☐	☐	☐	☐	☐	☐	☐	interesting	7
unpredictable	☐	☐	☐	☐	☐	☐	☐	predictable	8
fast	☐	☐	☐	☐	☐	☐	☐	slow	9
inventive	☐	☐	☐	☐	☐	☐	☐	conventional	10
obstructive	☐	☐	☐	☐	☐	☐	☐	supportive	11
good	☐	☐	☐	☐	☐	☐	☐	bad	12
complicated	☐	☐	☐	☐	☐	☐	☐	easy	13
unlikable	☐	☐	☐	☐	☐	☐	☐	pleasing	14
usual	☐	☐	☐	☐	☐	☐	☐	leading edge	15
unpleasant	☐	☐	☐	☐	☐	☐	☐	pleasant	16
secure	☐	☐	☐	☐	☐	☐	☐	not secure	17
motivating	☐	☐	☐	☐	☐	☐	☐	demotivating	18
meets expectations	☐	☐	☐	☐	☐	☐	☐	does not meet expectations	19
inefficient	☐	☐	☐	☐	☐	☐	☐	efficient	20
clear	☐	☐	☐	☐	☐	☐	☐	confusing	21
impractical	☐	☐	☐	☐	☐	☐	☐	practical	22
organized	☐	☐	☐	☐	☐	☐	☐	cluttered	23
attractive	☐	☐	☐	☐	☐	☐	☐	unattractive	24
friendly	☐	☐	☐	☐	☐	☐	☐	unfriendly	25
conservative	☐	☐	☐	☐	☐	☐	☐	innovative	26

Figure 2. Shows a list of questions with a choice of answers using UEQ web (modified from Hinderks et al. 2018).

Table 2. ChatBot interface testing.

No	Testing	Results expected
1	Input Greetings	Can reply to greetings and explain the bot chat system
2	Input Animal name	Can Reply to the Halal Status of Animal
3	Input the word Thank You	Can Reply and explain the application
4	Incompatible Word Input	Can Reply and explain the chatbot system

Tests were carried out to see the suitability of the system with the expected results. The user enters for several animal names into the system and sees the output that the chatbot replies (Table 2 and Figure 3).

The design stage begins with identifying the previous chapter's problem regarding the importance of reliable information regarding the halal or haram of an animal for consumption. In the system requirements analysis phase, a literature study on chatbots is carried out and collects research-related data such as lists of permitted and forbidden animals along with propositions that confirm the status of these animals. The design stage carries out the interface design process of the designed chatbot. The next step of coding is implementing the Artificial Intelligence Markup Language (AIML) method (Wijaya et al. 2020) and inputting data into the built system as diagram of creating a chatbot application shown in Figure 1. The last is testing, where the system is evaluated using methods and questionnaires distributed to obtain assessments from various users. The UI of the

Figure 3. UI and response testing of the chatbot.

Table 3. Recapitulation of user questionnaire.

No	Questions	Very Bad (%)	Not Good (%)	Neutral (%)	Good (%)	Very Good (%)
1	Easy to use	6.7	0	16.6	30	46.7
2	Creative	0	6.7	20	23.3	50
3	Past Response	0	2.7	13.8	31	48.5
4	Enjoyable	0	10	13.3	16.7	60
5	Helpful	6.7	0	3.3	16.7	73.3
6	Correct Answer	6.7	3.3	7.3	31	51.7
7	Attractive	6.7	3.3	13.3	30	46.7
Average		3.8	4.3	12.5	25.5	53.8

Figure 4. Chatbot response testing.

chatbot is shown in Figure 3. The figure illustrates the chatbot response the user's greeting, and in Table 2 shows chatbot interface testing.

Table 3 shows that the percentage of user responses using 7 variables, the rating on a 1 or very bad scale, is 3.828571%. The assessment occupies the lowest assessment of the entire evaluation. Furthermore, there was an increase in the ratings of not good, neutral, and right the highest assessment position where users think very good at 53.84286%. In other words, users believe that the chatbot is reliable in terms of explaining the halal-status of food ingredients.

4 CONCLUSION

This study concludes that the chatbot system designed and implemented using Artificial Intelligence Markup Language (AIML) and developed with the Extreme Programming (XP) method has been able to help Muslims to provide information on the halal status of an animal for consumption. The expected results can produce overall suitability and provide an outstanding level of satisfaction assessment for 30 respondents. For further research, evaluating user satisfaction and increasing the number of respondents in the current assessment system as well as developing the system according to user needs using the developed methods are encouraged.

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