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Faraid distribution calculation using AI-based Quranic chatbot

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ABSTRACT

Faraid, Islamic inheritance law, refers to that aspect of Shariah law which is not properly understood and has created issues and impediments in the distribution of estates. This paper discusses the development of an AI-based Quranic chatbot to be used by the public to learn the Faraid rules and automate calculations of inheritance distribution. The chatbot has been developed using natural language processing and a rule-based algorithm, which intends to search and get an accurate interpretation from the user queries, retrieve relevant verses of the Quran, and compute the share of inheritance according to the established Islamic jurisprudence. Fuzzy match identifies and corrects variation in queries, enhancing user interaction, ensuring that it appears more intuitive and accessible. The system processes user input regarding heirs of the deceased, estate value, and debts, and applies Faraid rules to generate accurate distribution results that happen to be web-based platforms of this chatbot. It intends to link traditional Islamic knowledge with modern digital solutions, bringing Faraid calculations closer, more comfortable, faster, and transparent. Through rigorous tests and user feedback will prove above, revealing the chatbot's potential in understanding the application of Islamic inheritance law and promoting digital engagement in all these through Quranic teachings.

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1. INTRODUCTION

Technology has become a crucial component of several industries in the modern day, including production, education, and religious study. The way people connect with information and look for knowledge has been completely transformed by artificial intelligence (AI), which has created new avenues for accessibility and participation [1]. Present-day manual techniques are labor-intensive, prone to human mistakes, and frequently unavailable to the general public. The development of AI, especially in the areas of chatbots and natural language processing, holds great promise for automating and streamlining Faraid delivery, increasing its accuracy and accessibility. Faraid, or Islamic inheritance law, is still a crucial part of Shariah that guarantees equitable asset distribution after death, but it requires complicated calculations that call for specialized knowledge in light of the growing need for easily available, precise, and technologically advanced solutions. Even though Faraid is crucial to maintaining fair distribution of wealth in Islam, the typical person finds it challenging to accurately calculate due to its complex regulations and dependence on specialized knowledge. Manual techniques are laborious, prone to mistakes, and difficult to use, particularly in rural areas. By using an AI-based chatbot to automate and simplify Faraid computations, our study fills this gap and improves their efficiency, accuracy, and accessibility.

Millions of Muslims around the world continue to rely heavily on the Quran as a timeless source of knowledge and moral instruction. However, due to obstacles including language difficulties, restricted access to scholarly resources, and a lack of interactive learning platforms, many people find it difficult to comprehend and apply its teachings. Even though the Quran is a vital source of guidance, many people struggle to apply its teachings because they lack access to interactive learning environments and qualified mentors. According to studies, a lot of Muslims find it difficult to find time for studying the Quran because of their employment and household obligations [2]. Additionally, the absence of readily accessible digital resources discourages involvement even more, making it challenging to study the Quran in depth. A decrease in spiritual connection and information retention may result from a lack of involvement with Quranic teachings. The ignorance of and disregard for Faraid regulations among Muslims is another important topic covered in this study. Due to selfishness, false information, or delays in the legal process, many Muslims decide to divide their inheritance according to personal preferences rather than Islamic principles, which can lead to an unequal distribution and possible disputes [3].

Ismail *et al.* [4] claim that one of the main causes of arguments over Faraid distribution is poor communication within the family. As a way to lessen these tensions, they recommend using a digital platform to increase public knowledge and engagement. Mohd Saad and Mohamad Rasli [5] claim that they have created a web browser-based Faraid distribution system, but their program has search constraints as well, as it can only run on web browsers with a 16:9 device resolution. The web platform is the sole way to access this program. Zulkefli *et al.* [6] developed a Faraid distribution platform in 2018 that was based on a mobile application; however, as the development was mostly focused on a rule-based idea, it failed to incorporate any AI elements. Hishamudin [7] suggested an intelligent calculator system based on the thesis "intelligent Faraid calculator systems", also unclear what precise artificial intelligence techniques were employed. In "examining the role of artificial intelligence (GPT-3.5) [8], in Issuing Fatwas for Islamic Family Cases: A Comparative Analysis," it was examined how GPT-3.5 can be used to provide fatwas on topics like inheritance, divorce, and marriage. The study comes to the conclusion that while GPT-3.5 offers quicker answers than conventional academic approaches, it usually produces inaccurate choices when applied to Islamic family law, which could lead to misleading recommendations.

In order to overcome this difficulty, this study presents an I-based Quranic chatbot that uses natural language processing (NLP) to provide a more interesting and customized educational experience [9]. The chatbot has been developed using NLP, Fuzzy logic, and a rule-based algorithm, which intends to search and get an accurate interpretation from the user queries, retrieve relevant verses of the Quran, and compute the share of inheritance according to the established Islamic law. Fuzzy match identifies and corrects variation in queries, enhancing user interaction, ensuring that it appears more intuitive and accessible. In order to handle linguistic differences, misspellings, and informal phrasing in user input, the fuzzy logic component is essential. It increases response accuracy by allowing the system to match unclear or incomplete inquiries with the most appropriate phrases or rules. This improves user engagement by giving the impression that the chatbot is more flexible, intuitive, and approachable-especially for users who are not conversant with accurate legal or religious terms.

This chatbot allows users to interact with Quranic teachings, comprehend Islamic laws like Faraid (Islamic law on inheritance), and get interpretations of Quranic verses by mimicking human-like dialogue [8]. AI chatbots are getting better at conducting natural conversations and establishing connections with users. They have the potential to help programs that encourage lifestyle changes. They are, therefore, a useful and affordable tool for behavior modification programs [10]. Chatbots and AI have developed quickly in recent years and are now widely used in a variety of fields, including academics [11]. By bridging the gap between traditional Quranic studies and contemporary technology, this incorporation of AI in religious education makes Islamic teachings more approachable for individuals with varying backgrounds and degrees of understanding.

The AI-based Quranic chatbot will address these problems by acting as an interactive teaching tool that streamlines Faraid inheritance distribution and Quranic learning. Users will get tailored answers through NLP-based dialogues and automated asset computations, which will facilitate comprehension of Islamic teachings and guarantee that inheritance is allocated equitably in accordance with Islamic law. The creation of an AI-based Quranic chatbot that improves Quranic learning and makes appropriate inheritance distribution easier is the main goal of this research. This entails creating an NLP-powered chatbot to efficiently retrieve pertinent Quranic verses and provide Faraid inheritance calculations, designing an NLP algorithm to accurately comprehend and respond to user queries, and assessing the chatbot's efficacy through user feedback and iterative improvements to improve accuracy and usability.

Because it is a web-based platform, individuals of all ages and backgrounds can easily use the chatbot. By automatically calculating inheritance in accordance with Islamic Faraid laws and extracting pertinent Quranic passages in response to user queries, it will function as a learning aid. Although Muslims

are the main audience for this chatbot, non-Muslims who want to learn about Islamic principles can also use it to learn about Islamic inheritance rules. The chatbot will be able to comprehend user inquiries, offer clarifications, and produce precise answers based on Islamic principles thanks to NLP technology. It is crucial to remember that this study does not address all facets of Islamic jurisprudence (Fiqh) and only concentrates on Faraid regulations.

The creation of this chatbot is noteworthy because it uses AI-driven automation and accessibility to modernize Islamic instruction. This project improves users' comprehension of Islamic inheritance laws by fusing Quranic verses with AI-based interactive learning, which makes it simpler for users to understand and apply these lessons in practical situations. The chatbot also tackles a crucial problem by making sure that Faraid inheritance regulations are appropriately adhered to, avoiding injustices and heir disputes. This is consistent with Islamic beliefs, which place a strong emphasis on justice, fairness, and human dignity [12]. Additionally, this effort resolves the misunderstanding that Islam and modernity cannot coexist by bridging the gap between traditional religious studies and contemporary technical breakthroughs by making Islamic knowledge more accessible [13].

Finally, by creating an AI-based Quranic chatbot that improves interaction with Quranic teachings and makes Islamic inheritance computations easier, this project investigates the incorporation of AI technology into Islamic education. Natural language processing (NLP) will be used by the chatbot to comprehend customer inquiries, retrieve pertinent passages from the Quran, and determine inheritance shares in accordance with Islamic Faraid laws. The study's importance is in its ability to bridge the gap between contemporary technology and traditional Islamic teachings, improving the accessibility, comprehension, and applicability of Quranic learning and Islamic legal principles in daily life. The study is organized as follows: section 1 introduction, section 2 literature survey, section 3 method, section 4 result and discussion and section 5 conclusion as well as recommendation.

2. LITERATURE SURVEY

The creation of these an intelligent Quranic chatbot, attempts to bridge the gap between religious advice and contemporary technology by helping users comprehend Islamic inheritance law (Faraid) and provide pertinent Quranic verses. The integration of NLP techniques and algorithms is examined in this literature study, which compares several strategies to identify the best fit for this chatbot. It also looks at the study of Faraid in the Quran, including its verses, distribution guidelines, and integration with NLP for precise inheritance computations.

2.1. Faraid studies in Al-Quran

This section will display a detailed overview of what Faraid or Islamic Law on Inheritance is in the Qur'an how to integrate Faraid with an intelligent chatbot. It covers the definition of Qur'an, Faraid, its distribution law, and the integration of Faraid and Quranic verse in an intelligent chatbot. The Holy Qur'an is the holy scripture of Islam, and it was written in Classical Arabic and, for Muslims, it is a source of moral compass for their faith and legal matters. It serves as a transcendent communication medium, promoting human life and transcendent communication with Allah through the Prophet Muhammad SAW [14]. In the Qur'an, there are various rules, tales, and decrees from Allah that it become the sacred guidance for the whole Muslims in this world since the Prophet Muhammad SAW. Classical Muslim scholarship views the Quran as the word of God revealed to the prophet Muhammad, the primary source for determining beliefs and practices of Islam, and serves as a sacred object in ritual and everyday settings [15]. Faraid or Islamic inheritance law is one of many topics touched on in the Qur'an. There are multiple times the Qur'an mentions Faraid in Surah An-Nisa.

2.1.1. Faraid distribution law

Faraid, the Islamic law of inheritance, divides the properties of a dead Muslim among his/her children in an exact way. This method depends on particular portions mentioned in the Qur'an and the traditions of the Prophet, which maintain fairness in property distribution among children and avoid misunderstanding as well as portraying conservative Islamic virtues. As for children of the deceased, daughters receive half of what sons do because the Quran says sons deserve twice what daughters do. This is practiced in the inheritance law because, according to the Quran, "To the male the equivalent of two females". Therefore, sons get the bigger share since they are supposed to take care of their families traditionally. The Faraid system protects a balanced and just apportionment of a dead Muslim's property, specifically set out under Islamic law. Hence, by following these principles, the partition respects relations between relatives and ensures the right to property ownership by transferring ownership rights from a deceased person to their living relatives based on Allah's provisions [16].

In case the late husband leaves kids, the estate share of the wife is lowered to one-eighth. On the other hand, if there are no children, then this lady is entitled to one-quarter of all his properties. This clearly

demonstrates one of the reasons for reducing her entitlement is due to the fact that somebody is already taking up quite an amount in terms of parental responsibility. In the same way, the man whose wife has died without having children should take the half of what belongs to her; but when they leave some kids behind him it is better for him to leave three quarters (¼) because they need it more than adults after all as they are more connected than anyone else as stated in the

The proportion of the mother's entitlement is dependent on whether there are any children involved or not. If the deceased had children, she would get a sixth part as an heir; otherwise, she would take a third part considering her closer proximity to and main responsibility for the departed. The father gets 1/6 of the share when there are kids. If the dead person does not have any kids, then the dad can receive more money from the estate because he's still part of it after everyone else gets their fixed parts, it is often what is left to him.

2.2. AI chatbot

Intelligent chatbots are cutting-edge AI-powered devices made to converse like humans and carry out operations in response to user input, decreasing the need for human intervention and accelerating procedures [17]. Intelligent chatbots use AI, NLP, and machine learning to comprehend context and produce precise, natural responses, in contrast to simple chatbots that depend on predefined scripts. By learning from user chats, intelligent chatbots may personalize interactions, increasing user pleasure and engagement. For example, AI chatbots in health programs have demonstrated effectiveness in encouraging healthy habits and lifestyle changes [10]. They can help with customer service, e-commerce transactions, scheduling, and financial advice in a variety of industries, including retail, banking, education, and healthcare [18]. Intelligent chatbots provide a dynamic and effective solution for a variety of applications by combining real-time data retrieval and content search capabilities.

2.3. Natural language processing (NLP) in intelligent chatbot

Because chatbots can effectively converse utilizing sophisticated NLP techniques, they are growing in popularity. NLP gives chatbots the ability to fully understand syntax, semantics, and context. This enables them to properly interpret and react to user inquiries. NLP has greatly enhanced automated text and language analysis, boosting chatbot capabilities with advances in machine and deep learning [19]. The goal of the artificial intelligence field of NLP is to create systems that can comprehend and process human language [20]. Data preparation is the first and most important stage in transforming unstructured text into structured data for additional analysis, which requires a variety of NLP approaches. Lemmatization, stemming, tokenization, and stop word removal are basic preprocessing methods. To make analysis easier, tokenization divides text into smaller chunks, like words or phrases [21]. To improve processing speed, stop word removal removes common words with low semantic meaning [22].

2.4. Algorithms in NLP

Building an intelligent chatbot that excels in response production, context management, and language comprehension requires careful consideration of the algorithm to be used. The algorithm needs to be able to figure out user inquiries precisely, carry on meaningful discussions, and provide pertinent answers instantly. Several very efficient algorithms that are frequently employed in NLP-based chatbot building have been found during research. These consist of transformer and attention mechanisms, rule-based systems, machine learning-based models, and sequence-to-sequence (Seq2Seq) models. Regarding accuracy, efficiency, and conversational context adaptability, each of these algorithms has unique benefits. They do, however, have drawbacks and difficulties of their own, such as processing complexity, data dependency, or trouble answering unclear inquiries. As a result, choosing the best algorithm depends upon the particular needs of the chatbot, the type of user interactions, and the degree of automation and intelligence required for the system to operate efficiently.

Ruled-based system is one of NLP algorithm that use a set of predefined rules created by developers to determine the chatbot's response. These rules are commonly written using if-then statements and are designed to handle specific queries and scenario. This algorithm comes with features that easy to design and implement, and provides precise control over chatbot behavior and responses [23]. Next is machine learning-based system algorithm, an NLP algorithm that use algorithm that allow the chatbot to learn from data and improve from time to time. It can understand and generate responses based on patterns and examples found in the training data. The advantages of using this algorithm are it can learn from previous algorithm and interactions and improve over time without manual intervention. However, by using this algorithm, a large amount of data for training is required to achieve high performance and it requires significant computational resources for training and inference [24]. The last algorithm that can be used to develop NLP in the intelligent chatbot is Seq2Seq algorithm which is a group of neural-network-based models [25]. Seq2Seq, usually implemented using recurrent neural network (RNN) or long short-term memory network (LSTMs), are powerful for handling conversational task.

2.5. Exploring approaches to Faraid implementation: traditional practices and technological innovations

The usefulness of GPT-3.5 in providing fatwas associated with Islamic family law is investigated in this study [8]. It provides answers more quickly and easily than conventional techniques, but it frequently comes short of human researchers' clarity and depth. GPT-3.5 might give incorrect answers, reflect biases in its training data, and misinterpret questions. Furthermore, it is unable to duplicate the interactive dialogue that is necessary for conventional fatwa procedures. E-FaraidTanah, a web-based expert system, was created in [5] to help Muslims comprehend Islamic inheritance law and determine land allocation based on Faraid. In their recent study in [26], the authors presented blockchain technology in estate distribution, highlighting its advantages, which include quicker claims, enhanced security, and the avoidance of illegitimate asset sales.

The authors examined typical problems with conventional approaches and presented modifications based on the results of their qualitative study in order to enhance the current inheritance distribution system [27]. In order to learn more about the best practices in Islamic estate planning, the study used interviews. Respondents and estate planning service providers in Peninsular Malaysia's northern region participated in semi-structured interviews [28]. This research uses a grounded theory-based qualitative methodology that combines inductive and qualitative analysis with constructivist and interpretivist viewpoints. In-person interviews and a review of the literature were used to collect data [29].

To facilitate continual improvement and assess customer satisfaction, the project employed an incremental and iterative strategy. The creation of M-Faraid, a smartphone app intended to inform Muslims about Islamic inheritance law, is covered in this study. The application assists users in determining their inheritance shares and comprehending wealth distribution. It seeks to lessen inheritance disputes within the family by allowing self-calculation [6]. In order to facilitate the complicated procedure of allocating money in accordance with Islamic Inheritance Law [7], the author presents the Intelligent Faraid Calculator. The system's goal is to help Muslims understand and execute the right calculations in line with Islamic law. It also aims to teach Muslims how to properly organize their estate distribution and improve upon an earlier version created by a USM student.

The purpose of this study is to determine how much knowledge Muslims in Kuala Lipis, Pahang, have about Faraid [30]. There are 102 participants chosen by convenience sampling, and data was gathered quantitatively using an online questionnaire. The results demonstrate that a sizable portion of respondents had an adequate understanding of Faraid. The study resulted to the conclusion that the majority of Muslims are capable of determining the legitimate heirs in inheritance cases after carefully reviewing the research papers [31]. This result emphasizes how important it is to maintain and improve Islamic education. However, there is a demonstrable decrease in some populations' comprehension of Faraid.

2.6. Integration of Qur'an with intelligent chatbot

The development of Quranic chatbots with AI in place is to offer a platform where followers can access, comprehend, and interact with messages contained in Al-Quran. This document investigates the major subjects, approaches taken and results found in the applications of AI to Quranic studies with specific reference to NLP, machine learning as well as chatbot development. A chatbot in which NLP is integrated with the Quranic text can substantially improve the ability to give precise, meaningful, and contextual responses to user query. Doing this may require exploiting diverse NLP approaches while interpreting Arabic's intricate and sensitive nature; thus, informally educating or directing people through these meanings is made possible using such a chatbot.

Studies like existing chatbot that effectively handles general medical question in Algerian Arabic dialect using three sequence-to-sequence models based on RNN [32] show that the chatbot can execute and perform the process that involved different language dataset like Quranic Arabic. Tokenization, part-of-speech tagging, and named entity recognition are language processing techniques that have been implemented in the analysis of Quranic verses.

3. METHODOLOGY

This part introduces the methodology used for building the Quranic chatbot developed for aiding people in comprehending Islamic inheritance laws (Faraid) and provision of relevant Quranic verses. The chatbot that assists Muslims in resolving Faraid-related issues is developed using a variety of techniques. This study addresses the basic Faraid distribution, which includes the husband, wife, father, mother, and children, including both sons and daughters. The four primary sections of the technique are requirements, design, development, and testing.

3.1. Requirement Analysis

Understanding and specifying the essential elements for an extensive study or system associated with Islamic inheritance law (Faraid) requires an intensive requirement analysis phase. In order to guarantee

authenticity, dependability, and comprehensiveness in the representation of Quranic inheritance principles, this step focuses on gathering, evaluating, and validating appropriate information sources.

3.1.1. Quranic verses dataset

Google Chrome was used to browse a GitHub repository where the data was imported and extracted. A complete collection of Quranic verses is included in this dataset, along with translations for each word and verse. It also offers thorough explanations of Faraid, or Islamic inheritance law, with an emphasis on important Quranic verses that describe the division of inheritance. These passages, which determine the rightful shares of heirs, including parents, spouses, children, and other relatives, include Surah An-Nisa (4:7, 4:11, 4:12, and 4:176). Islamic inheritance law is based on these passages, which guarantee equity and justice in the disposal of wealth in accordance with divine precepts. The dataset helps experts, researchers, and students comprehend the exact legal and theological ramifications of Faraid as outlined in the Quran by providing word-by-word translations and contextual meanings.

3.1.2. Faraid laws and principles

Information about Faraid laws and principles is compiled from a thorough literature assessment and is supported by a number of reliable sources, including scholarly journals, research papers, reputable websites, court records, and traditional Islamic writings. The comprehension of Faraid is further enhanced by information from recent legal research, fatwas published by Islamic scholars, and government laws pertaining to inheritance law in certain nations with a majority of Muslims. In order to ensure a thorough and well-rounded examination of inheritance distribution, legal principles, and contemporary uses of Faraid in the current setting, the information is also sourced from scholarly publications, digital repositories, and university research databases.

3.2. Design phase

The system architecture, which describes the structural elements and their interconnections, is presented to give a thorough grasp of the implementation strategy. A well-structured flowchart that shows the methodical procedure and logical progression of operations is then used to portray the system's sequential flow. Figure 1 shows the flow begins with user inserting their queries in the chat box. After receiving user queries, the chatbot system will process the queries along with other details before starting the calculation. Then, with all the rules, and principles of Faraid related to user queries gathered, the calculation perform at the same time as the process of retrieval of relevant Quranic verses. Finaly, the calculation result displayed along with the selected relevant Quranic verse to the user.

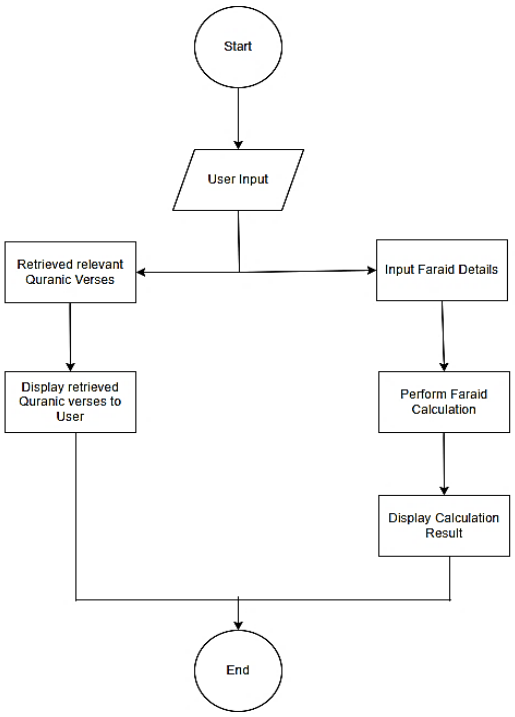

Figure 1. Flowchart outlining the entire research process

3.2.1. System architecture

The suggested Quranic bot's system architecture as depicted in Figure 2 is built primarily to respond to user queries, it also finds relevant passages from the Quran as well as calculates Faraid (Islamic inheritance). The primary layers of the system include user interface layer, application logic layer, and data layer. Online users can communicate with the chatbot by means of web-based platforms, this is where the user interface layer is. As far as requests are concerned, the application logic layer is composed of the chatbot engine, NLP module and Faraid calculator which all handle them in terms that make sense to man while calculating inheritance at the same time. In order for correct actions to be carried out, data layer has certain key data sets like Faraid rules, user query logs, Quranic verses among others depending on the scenario in question.

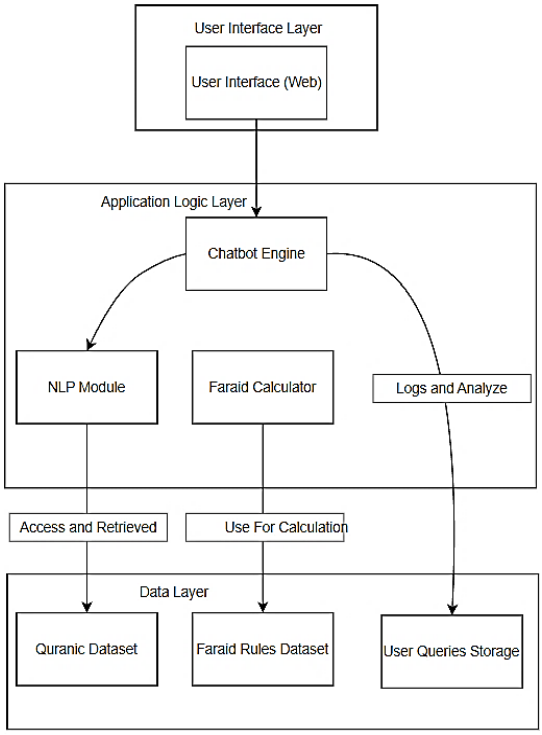

Figure 2. Diagram of the proposed system's architecture

3.3. Development phase

The methodology for developing the Faraid chatbot is centered around the implementation of a rule-based algorithm for inheritance distribution and a fuzzy matching function for user interaction. These two components ensure that the chatbot provides accurate and reliable calculations while improving the overall user experience.

3.3.1. Rule-based algorithm implementation and fuzzy matching function

The Faraid chatbot is implemented using the rule-based system, which gives it a high degree of reliability and accuracy based on well-defined Faraid rules. Accordingly, Islamic inheritance laws have been encoded within an if-then framework that the chatbot will be evaluating in order to respond to user input and determine the lawful distribution of assets. The system may use decision trees or look-up tables to follow and analyze different situations of inheritance, based on actual heirs in the case: partners, children, or parents. Based on the pseudocode in Figure 3, the function to calculate Faraid distribution in the rule-based have multiple subfunctions and processes. First off, it deducts debts from the total estate, then apportions fixed shares to parents and spouses. The remaining estate (Asabah) is equally shared among the children, with double allocation to the sons as compared to their sisters according to Faraid rules. It, in fact, acts as an impartial, precise, and automated allocator based on user input. In other words, first, the entire estate is used to pay off any existing debts. Following that, one-sixth of the remaining assets are given to each parent. The boys and daughters inherit in the proportions of half and one-quarter, respectively, while the woman receives one-eighth.

```
Pseudocode:

FUNCTION faraid_distribution(deceased, heirs, estate_value, debt):
    net_estate ← estate_value - debt
    IF net_estate <= 0 THEN
        RETURN {"error": "Debt exceeds estate value", "shares": {}}

    shares ← Empty Dictionary

    // Assign fixed shares to parents and spouses
    IF "father" in heirs THEN
        shares["Father"] ← (1/6) * net_estate
    IF "mother" in heirs THEN
        IF "son" in heirs OR "daughter" in heirs THEN
            shares["Mother"] ← (1/6) * net_estate
        ELSE
            shares["Mother"] ← (1/3) * net_estate
    IF "wife" in heirs THEN
        IF "son" in heirs OR "daughter" in heirs THEN
            shares["Wife"] ← (1/8) * net_estate
        ELSE
            shares["Wife"] ← (1/4) * net_estate
    IF "husband" in heirs THEN
        IF "son" in heirs OR "daughter" in heirs THEN
            shares["Husband"] ← (1/4) * net_estate
        ELSE
            shares["Husband"] ← (1/2) * net_estate

    fixed_share_total ← Sum of all assigned shares
    asabah ← net_estate - fixed_share_total

    // Distribute remaining estate (Asabah)
    num_sons ← heirs["son"] IF "son" in heirs ELSE 0
    num_daughters ← heirs["daughter"] IF "daughter" in heirs ELSE 0

    IF num_sons > 0 AND num_daughters == 0 THEN
        Distribute asabah equally among sons
    ELSE IF num_sons == 0 AND num_daughters == 1 THEN
        shares["Daughter"] ← asabah * 1/2
    ELSE IF num_sons == 0 AND num_daughters > 1 THEN
        Distribute (asabah * 1/2) equally among daughters
    ELSE IF num_sons > 0 AND num_daughters > 0 THEN
        Distribute asabah where each son gets twice the share of each daughter

    RETURN {"estate_value": estate_value, "debt": debt, "net_estate": net_estate, "asabah": asabah, "shares": shares}
```

Figure 3. Pseudocode for rule-based Faraid distribution algorithm

As illustrated in Figure 4, fuzzy matching comes in to help the chatbot understand users' queries that may include typos and variations. It compares the text input against predefined questions in line with fuzzy matching and returns the closest possible response if the similarity is beyond a given threshold value. Therefore, users are assured of getting an accurate answer wherever their wordings differ.

```
FUNCTION fuzzy_match(input_text):
    CONVERT input_text TO lowercase and remove extra spaces
    best_match, similarity ← Perform fuzzy matching between input_text and predefined questions

    IF similarity > 80 THEN
        RETURN response for best_match

    RETURN "I'm sorry, I couldn't understand your question."
```

Figure 4. Figure pseudocode of fuzzy matching function

3.4. Testing phase

Functionality testing was carried out to assess the Quranic chatbot's effectiveness in order to make sure it works and developed well. These tests evaluate the chatbot's precision in answering user questions, retrieving pertinent verses from the Quran, and accurately calculating Faraid distributions. The functioning of the chatbot will be methodically verified in this study using test cases, guaranteeing that it generates accurate responses, finds authentic Quranic references, and executes Faraid computations accurately in a variety of contexts. Seven sample test cases that were utilized to assess the Quranic chatbot are shown in the Table 1. A thorough description, user input, expected and actual outputs, and pass/fail status are all included in each test case.

Table 1. Examples of test cases used to evaluation the Quranic chatbot

Test ID	Test case	Description	Expected output	Pass/Fail
1	User Query Prompt.	Ensure user can prompt their queries in the chat box field.	User can fill the chat box field with their queries.	Passed
2	Send Button Functionality.	Test the functionality of the "SEND" button	User can send the queries they write in the chat box field by clicking "SEND" button.	Passed
3	"ENTER" key Functionality	Test the functionality of the "ENTER" key	User can send the queries they write in the chat box field by pressing "ENTER" key.	Passed
4	User Query Handling	Ensure the chatbot accurately responds to a user query about Faraid.	Chatbot responds to the user queries by replying to the user with follow up question related to the queries.	Passed
5	Quranic Verses Retrieval	Test chatbot retrieval Quranic verses function.	Responses to the user queries with the relevant Quranic verses.	Passed
6	Faraid Calculation Functionality	Ensure the chatbot accurately calculate the Faraid distribution.	Chatbot responses and display Faraid distribution amount accurately.	Passed
7	"Clear Chat" Button Functionality	Test the functionality of the "Clear Chat" button	The chatbot will reset the conversation log and User Interface back to default.	Passed

4. RESULT AND DISCUSSION

This chapter offers a thorough discussion of the outcomes and conclusions drawn from the creation and assessment of this AI-powered Quranic chatbot. The prototype user interface will be the main topics of discussion. To make sure it efficiently promotes user interactions, the prototype user interface will be examined in terms of its design, usability, and overall user experience. The outcomes of the functionality tests will be reviewed in the interim to assess the chatbot's precision, effectiveness, and capacity to deliver dependable answers to user inquiries.

4.1. Prototype user interface

The user interface is the point at which human users interact with a computer, website or application. The goal of effective UI is to make the user's experience easy and intuitive, requiring minimum effort on the user's part to receive the maximum desired outcome. It hides the complexity that runs behind with the simpler and more user-friendly page. Figure 5 shows the main page of the Faraid chatbot. In the user interface includes the send message box for user to prompt their queries and an interactive send button to send the queries to the chatbot. The message sent will pop up on the right side of the page with green background indicating it is the user messages. The chatbot then will reply to the queries with related responses at the left side of the page with white background. Besides, it also has a clear chat button for user if they want to clear all the previous chat history to get better user experience. In addition, the user interface also has the dark mode button to toggle the theme of the user interface to be dark mode to enhance the user comfortability using the chatbot.

Figure 5. Faraid chatbot main page

4.1.2. Input process test and results

The input process refers to user interactions where they enter messages, queries, or commands into the chatbot. As seen in Figures 6 to 8, which show how the input processing operates, the chatbot analyzes these inputs and responds appropriately based on pre-established criteria. The chatbot will use fuzzy matching to compare user queries with the similarity score with predefined responses to determine whether the user input is related to Faraid topic or not. The similarity score is set differently based on the type of input which are frequently asked questions (FAQs), greetings, and key commands.

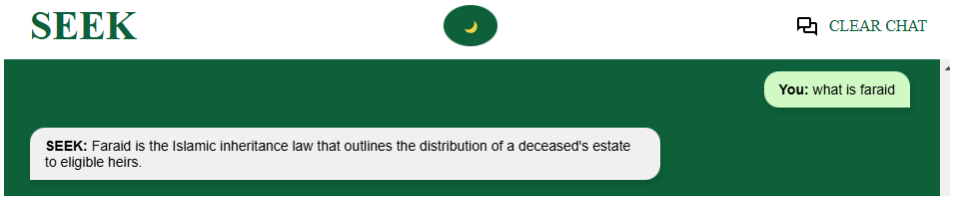

Figure 6. Result of Faraid related question

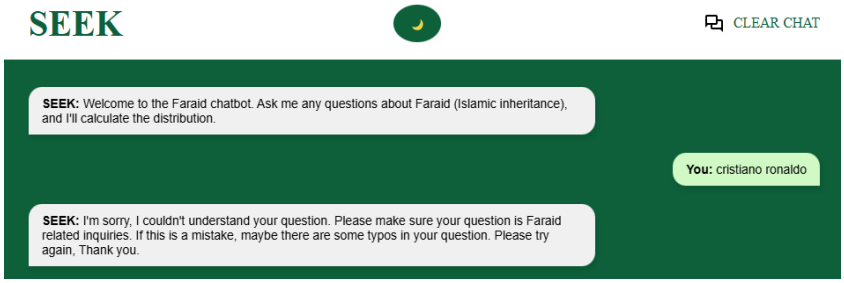

Figure 7. Result of non-Faraid related question

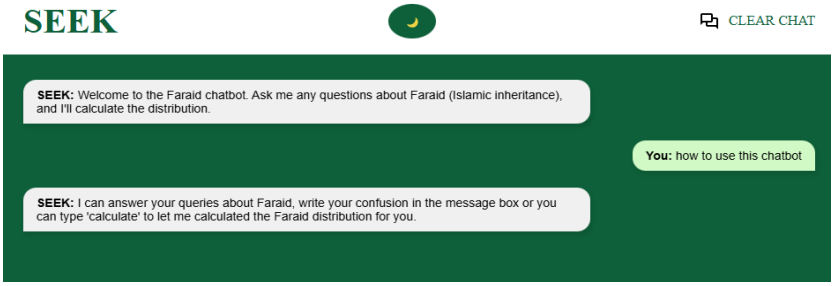

Figure 8. Result of guides queries

4.1.3. Calculation and output process test and results

The calculation process refers to the process to get the final result of the Faraid distribution that occurs at backend of the system. The output process refers to the process of displaying final results of the calculations on the screen for the users. Figures 9 portrayed how the calculation and output process is working. The chatbot will detect the key command from user input such as “calculate” to trigger their calculation function which later will reply to the user with follow up questions for user to insert to gain the information required for the Faraid distribution calculations. The chatbot then will gather the information received from the user update and response and start the calculation based on the decision tree constructed. Finally, the chatbot will display the calculation results and show each heir’s shares accurately following the Faraid law.

4.2. User evaluation test

The usability testing technique was used as the basis for the user evaluation test. After the Faraid chatbot was developed, ten users’ opinions were gathered through a Google Form as part of a user

evaluation. These users were given the chance to test the chatbot and, based on their experiences, offered informative and constructive feedback. The user evaluation's findings show that the Faraid chatbot has received generally positive feedback as shown in Figure 10. Sixty percent of consumers thought the chatbot was simple to use, and seventy percent said they felt at ease using it. The majority of users gave the chatbot a learnability rating of four out of five, indicating that it is comparatively simple to use and comprehend. Just 40% of users, however, thought the error messages were suitable and useful. Sixty percent of the respondents agreed that the information was well-organized, and half (50%) thought that the chatbot provided them with helpful information. 50% of respondents were satisfied with the user interface, while 40% thought the chatbot's functionality and capabilities matched their expectations. Fifty percent of users said they were happy with the chatbot's overall experience.

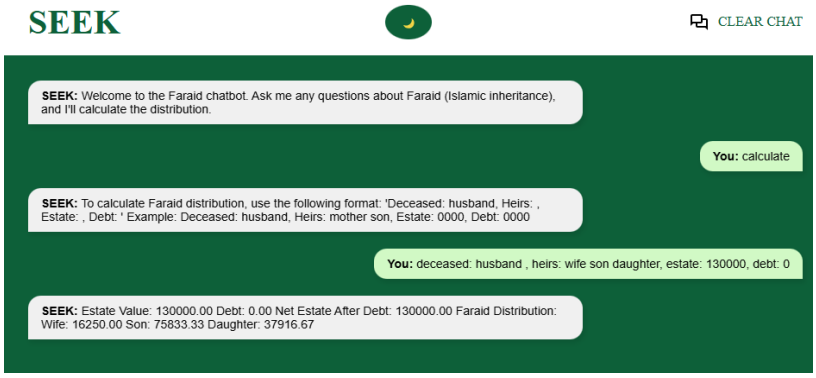

Figure 9. Result of chatbot feedback question

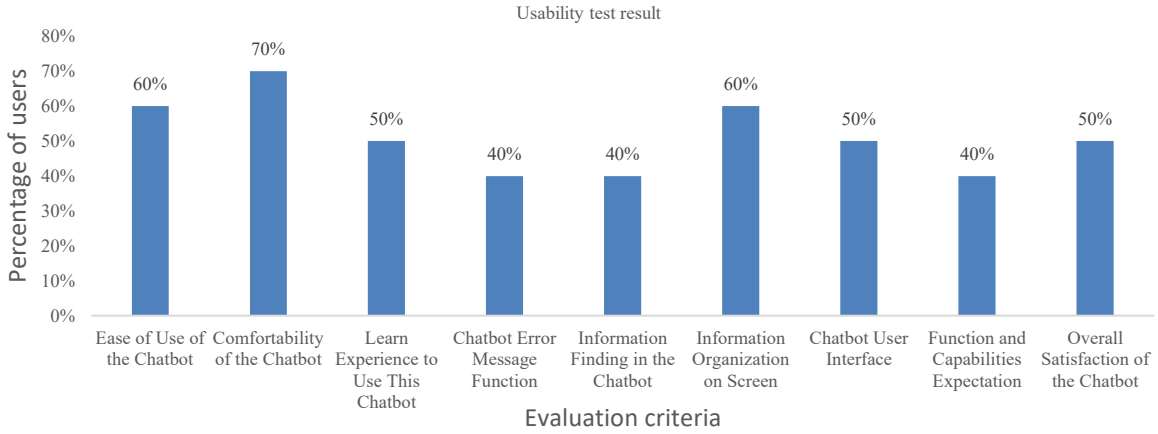

Figure 10. Participants' ratings in the usability test

5. CONCLUSION AND RECOMMENDATION

A ground-breaking development in Islamic legal studies, the Faraid AI-Based Chatbot offers a user-friendly, AI-driven approach to understanding and putting Faraid ideas into practice. It accelerates the complex computations required for Islamic inheritance distribution through the use of NLP and artificial intelligence technologies. For researchers, students, legal scholars, and the Muslim community at large, the chatbot improves accessibility. Since Shariah heavily relies on Islamic inheritance law, detail and accuracy are crucial. In addition to being an instructional tool, the chatbot helps users figure out inheritance shares. It is helpful in both academic and legal contexts due to its capacity to process real-time questions and provide answers derived from reliable sources. Future enhancements should include broadening its database to include all qualified heirs under Faraid law in order to realize its full potential. Creating a mobile application would enhance offline usability, accessibility, and engagement even further. These developments would make the chatbot a vital resource for studying and practicing Islamic law.

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C : **C**onceptualization
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E : Writing - Review & **E**diting
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Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

Data availability is not applicable to this paper as no new data were created or analyzed in this study.

REFERENCES

[1] M. Bond *et al.*, "A meta systematic review of artificial intelligence in higher education: a call for increased ethics, collaboration, and rigour," *International Journal of Educational Technology in Higher Education*, vol. 21, no. 1, 2024, doi: 10.1186/s41239-023-00436-z.

[2] N. M. Ibrahim, A. S. Razick, and I. Saujan, "Factors that present obstacles to the learning of Quran: a study based on Polonnaruwa District in Sri Lanka," *Research on Humanities and Social Sciences*, no. July, 2021, doi: 10.7176/rhss/11-13-04.

[3] M. A. Mohd Yusuf and B. Ibrahim, "Institutions of Islamic education and its function as a source of knowledge of Faraid knowledge among Islamic society in Duyong Island, Kuala Terengganu," *Jurnal Islam Dan Masyarakat Kontemporari*, vol. 10, no. 1, pp. 37–51, 2020.

[4] M. Z. Ismail, N. A. A. Mulup, H. Hosin, M. R. Jailani, and N. A. M. Zaidi, "Exploring the perceptions and practices of Faraid (Islamic inheritance): insight among Muslim families in Padang Terap," *Insight Journal*, vol. 12, no. 1, 2025.

[5] M. S. Mohd Saad and R. Mohamad Rasli, "Web based expert system in area & land value calculation and Faraid distribution," *International Journal of Artificial Intelligence*, vol. 9, no. 2, pp. 83–89, 2022, doi: 10.36079/lamintang.ijai-0902.468.

[6] A. N. Zulkifli, Q. A. Batiha, and M. M. Qasim, "Design and development of M-Faraid: An Islamic inheritance mobile app," *Journal of Advanced Research in Dynamical and Control Systems*, vol. 10, no. 10 Special Issue, pp. 1569–1575, 2018.

[7] H. H. H. H. bin Hishamudin, "Intelligent Faraid calculator systems," 2012.

[8] M. M. Abdulrahman, A. Hafiz, and M. Walusimbi, "Examining the role of artificial intelligence (GPT-3.5) in issuing fatwas for Islamic family cases: a comparative analysis," *Journal of Contemporary Islamic Law*, vol. 9, pp. 30–38, 2024.

[9] M. H. Bashir *et al.*, *Arabic natural language processing for Qur'anic research: a systematic review*, vol. 56, no. 7. Springer Netherlands, 2023.

[10] J. Zhang, Y. J. Oh, P. Lange, Z. Yu, and Y. Fukuoka, "Artificial intelligence chatbot behavior change model for designing artificial intelligence chatbots to promote physical activity and a healthy diet: Viewpoint," *Journal of Medical Internet Research*, vol. 22, no. 9, 2020, doi: 10.2196/22845.

[11] C. Kooli, "Chatbots in education and research: a critical examination of ethical implications and solutions," *Sustainability (Switzerland)*, vol. 15, no. 7, 2023.

[12] S. Lasmi, Z. Wei, and S. Xu, "Human rights in Islamic perspective," *Journal Emerging Technologies in Education*, vol. 7, no. 5, pp. 75–83, 2012, doi: 10.55849/ijen.v1i2.278 P.

[13] M. M. Ringer, "Islamic modernism and the re-enchantment of the sacred in the age of history," *Islamic Modernism and the Re-*

Enchantment of the Sacred in the Age of History, p. 7873, 2020, doi: 10.3366/edinburgh/9781474478731.001.0001.
[14] A. Rahmatika, "Al-Qur'an as a transendent communication media," *QAULAN: Journal of Islamic Communication*, vol. 2, no. 2, pp. 105–116, 2021, doi: 10.21154/qaulan.v2i2.3462.
[15] B. Wheeler, "Quran as scripture in classical Muslim scholarship," *Religions*, vol. 12, no. 11, 2021, doi: 10.3390/rel12111013.
[16] H. Taqiyuddin, M. Millah, and H. Luthfi, "Instruments of property ownership in Islam: the study of inheritance law," *Journal of Islamic Thought and Civilization*, vol. 13, no. 1, pp. 157–171, 2023, doi: 10.32350/jitc.131.11.
[17] P. Jadhav, A. Samnani, A. Alachiya, and A. Shah, VrajSelvam, "Intelligent chatbot," *International Journal of Advanced Research in Science, Communication and Technology*, vol. 2, no. 4, pp. 679–683, 2022, doi: 10.48175/ijarsct-3996.
[18] A. Mishra, A. Singh, P. Singh, S. Singh, S. K. Pandey, and A. Tripathi, "A Review on Chatbots: Advancements and its Downsides," in *2023 International Conference on IoT, Communication and Automation Technology, ICICAT 2023*, 2023, pp. 1–5, doi: 10.1109/ICICAT57735.2023.10263696.
[19] D. Ofer, N. Brandes, and M. Linial, "The language of proteins: NLP, machine learning & protein sequences," *Computational and Structural Biotechnology Journal*, vol. 19, pp. 1750–1758, 2021, doi: 10.1016/j.csbj.2021.03.022.
[20] I. Lauriola, A. Lavelli, and F. Aiolli, "An introduction to deep learning in natural language processing: models, techniques, and tools," *Neurocomputing*, vol. 470, pp. 443–456, Jan. 2022, doi: 10.1016/j.neucom.2021.05.103.
[21] C. L. Cofino, R. B. Escorial, and D. L. B. Enquilino, "A literature review on natural language processing (NLP) in aiding industry to progress," *International Journal of Engineering Trends and Technology*, vol. 72, no. 2, pp. 41–46, 2024, doi: 10.14445/22315381/IJETT-V72I2P105.
[22] D. J. Ladani and N. P. Desai, "Stopword identification and removal techniques on TC and IR applications: a survey," in *2020 6th International Conference on Advanced Computing and Communication Systems, ICACCS 2020*, 2020, pp. 466–472, doi: 10.1109/ICACCS48705.2020.9074166.
[23] J. L. Alty and G. Guida, "The use of rule-based system technology for the design of man-machine systems," *IFAC Proceedings Volumes*, vol. 18, no. 10, pp. 21–41, 1985, doi: 10.1016/s1474-6670(17)60196-4.
[24] Bitext, "Natural language processing (NLP) and machine learning (ML)," *Bitext Innovations, S.L*, 2019. https://www.bitext.com/blog/natural-language-processing-vs-machine-learning/.[Accessed: 17 February 2025]
[25] S. Huang, X. Zhou, and S. Chin, "Application of Seq2Seq models on code correction," *Frontiers in Artificial Intelligence*, vol. 4, pp. 1–13, 2021, doi: 10.3389/frai.2021.590215.
[26] S. B. Anuar, F. A. Azmi, S. Nur, and S. Sidek, "Exploring the potential and suggesting a new conceptual framework of blockchain technology in estate distribution," *International Journal of Advanced Research in Technology and Innovation*, vol. 4, no. 1, pp. 35–43, 2022, doi: 10.55057/ijarti.2022.4.1.5.
[27] M. Mokhsin, S. N. F. S. Hamidulfuad, E. N. M. Ibrahim, M. H. M. Som, F. H. A. Razak, and H. A. Halim, "Design requirements on web-based ancestry platform for Islamic family inheritance in Malaysia," *Journal of Advanced Research in Applied Sciences and Engineering Technology*, vol. 32, no. 3, pp. 26–42, 2023, doi: 10.37934/araset.32.3.2642.
[28] N. Abd. Wahab, S. Maamor, Z. Zainol, S. Hashim, and K. A. M. Kamal, "Developing best practices of Islamic estate planning: a construction based on the perspectives of individuals and estate planning providers," *ISRA International Journal of Islamic Finance*, vol. 13, no. 2, pp. 211–228, 2021, doi: 10.1108/IJIF-03-2020-0052.
[29] R. A. binti R. Adnan, "Developing a working corporate waqf framework for Malaysian public hospital," Universiti Sains Islam Malaysia, 2022.
[30] W. N. H. Wan Jusoh and A. H. Mohd Salehen, "Inheritance insights: unveiling Faraid awareness in Kuala Lipis, Pahang," *Jurnal Ulwan*, vol. 9, pp. 122–133, 2024.
[31] N. M. Azuan and M. S. Jalil, "Understanding Faraid knowledge based on literature," *Jurnal 'Ulwan*, vol. 9, pp. 23–29, 2024.
[32] A. Boulesnane, Y. Saidi, O. Kamel, M. M. Bouhamed, and R. Mennour, "DZchatbot: a medical assistant chatbot in the Algerian Arabic dialect using Seq2Seq Model," *4th International Conference on Pattern Analysis and Intelligent Systems, PAIS 2022 - Proceedings*, no. October, 2022, doi: 10.1109/PAIS56586.2022.9946867.

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