MERN Implementation in Online Quiz Applications to Recognize and Avoid Social Media Hoaxes

Khairun Nisa Cipta Hapsari*, Yuri Yudhaswana Joefrie, Syaiful Hendra, Mohammad Yazdi Pusadan, Yusuf Anshori

Information Technology Department, Faculty of Engineering, Tadulako University, Jl. Soekarno Hatta No KM 9 Palu 94148, Central Sulawesi, Indonesia

*nisacipta1413@gmail.com

Abstract. Social media makes it easier for people to get information on the internet by allowing them to do more than just consume it. They can also create, comment on, and share content in different formats. False information that has permeated society can be readily ingested and used as a source of reference. A JavaScript application developed with the MERN stack technology, which combines several technologies—MongoDB, ExpressJS, ReactJS, and NodeJS—all functioning with one programming language. Data from numerous relevant research sources is gathered using qualitative approaches, and the Scrum method is employed to construct the application system. In addition to fostering creativity and innovation, this approach can resolve challenging and adaptive challenges. There is a maximum duration for every Scrum event. Once a sprint has begun, it cannot be stopped or shortened. Another event may be called off if its objectives have been fulfilled. The purpose of this study is to develop a website that offers pertinent tools and data to social media users in an attempt to stop the spread of hoaxes and fake news. The achieved result is that this application provides various quizzes designed to test users' knowledge of hoaxes and online scams.

1. Introduction

False information and fake news are widespread in society, causing much concern and loss. One example is the free internet news link from the government [1]. An example of a hoax circulating in society, such as free internet, caught the attention of 71.9 percent of respondents [1]. Furthermore, 36.7 percent of respondents said they would ask their friends or family about the information they received. However, there were 32.3% of respondents who did nothing about the information they received at that time [1]. Another example is the Indonesian Ministry of Communication and Information Technology finding 554 fake news about COVID-19 spreading widely until April 18, 2020 [2]. Another example of scams is email scams often promising prizes or attractive offers, leading people to be deceived and lose

money or sensitive personal data [3]

Social media allows users not only to consume content but also to participate, create, comment on, and disseminate content in various formats, making access to information on the internet easier now [4]. Hoaxes that have spread in society in the form of information can be easily consumed and used as reference material [5]. The impact on society can form a negative public opinion and create anxiety within the community [6]

The application created utilizes the MERN stack technology, which is a combination of various technologies working with one programming language, namely JavaScript [7]. MERN (MongoDB, ExpressJS, ReactJS, NodeJS), MongoDB is a document-oriented database, not a relational database. The reason for using a NoSQL database is to make it easier to scale in storing data. Document-oriented databases replace the concept of "rows" with a more flexible model, namely "documents" [8]. Express JS is a framework installed on top of the Node.js web server function to make APIs easier to use and add useful new features [9]. ReactJS is a front-end library developed by Facebook and used to support web frameworks. One of the advantages of ReactJS is allowing developers to create more interactive, stateful, and reusable user interface components. Other advantages include speed, ease, and scalability. In the Model View Control (MVC) paradigm, ReactJS is responsible for the view components [10] [11].

The aim of this research is to create a website that provides resources and relevant information for social media users with the aim of reducing the spread of fake news or hoaxes. Through interactive quizzes on this website, it is hoped that users can recognize and avoid the motives of hoaxes that can harm themselves or others.

2. Methods

2.1. Type of Research

Descriptive research is a type of research that aims to explain or describe a phenomenon or event in a specific and clear manner [12]. A qualitative approach is used to collect data from various related research sources. The process involves visual analysis and literature review to gain a deep understanding [13]. Data collection is carried out by conducting literature searches on journals, books, articles, news, and previous research related to the issue of hoaxes. The data obtained is then analyzed to serve as a source and basis for the preparation of quiz questions.

2.2. System Development

The application system development is carried out using the Scrum method. This method can solve complex and adaptive problems and generate creativity and innovation. The steps in the system development in the Scrum method include the stages of product backlog, sprint planning, sprint and daily scrum, and sprint review [14]. Each Scrum event always has a maximum duration. Sprints cannot be extended or shortened once started [15]. When the goals of another event have been achieved, another event can be terminated

3. Results and Discussion
3.1. Planning

In this stage, the main focus is to identify and plan the activities to be carried out within the sprint (a limited work period). Task allocation and prioritization of features to be developed are part of this process [17]. The application development team conducts planning, assesses user needs, and selects which features are the top priorities [18]. Each feature, such as the quiz system with levelling, educational articles, and the login and register landing page, will be broken down into smaller parts that can be implemented within a specific timeframe.

3.2. Analysis

In this stage, the writer identifies issues and challenges related to misinformation circulating on social media. This is done to gather the necessary data or information to serve as a foundation for research.

3.3. System Design

NoSQL is short for "Not Only SQL," which means that it doesn't solely use SQL syntax, such as MongoDB, which is based on documents. This means that it uses documents and collections instead of columns, rows, and tables. Since MongoDB is in JSON document form, data is stored in BSON (Binary JSON), which has data types like float, integer, string, date, boolean, etc. Due to this, MongoDB uses key-value pairs to store data, so each data has a key-value [19]. Because of its more flexible schema, MongoDB can automatically create its table structure when performing an Insert. MongoDB is a NoSQL database with larger data storage capacity and cheaper prices [20].

In Figure 1, the "user" collection is used to store data such as id, username, email, password, and level. This data is utilized when users attempt to log into the application. The "question" collection contains data about question id, question type, the question itself, answer options, answer key, and image links. This collection is employed to store all quiz questions from level one to level five. The "User answer" collection is utilized to store user id, question type, level, question id, user's answer, pass/fail status, and user's score. When users press the submit button, this data is stored in this collection. The relationship between the "user" collection and the "question" collection is marked by the presence of user_id and question_id. The "medal" collection is used to store level information, medals, and descriptions. The data in this collection provide information required when users successfully complete the quiz levels they are working on.
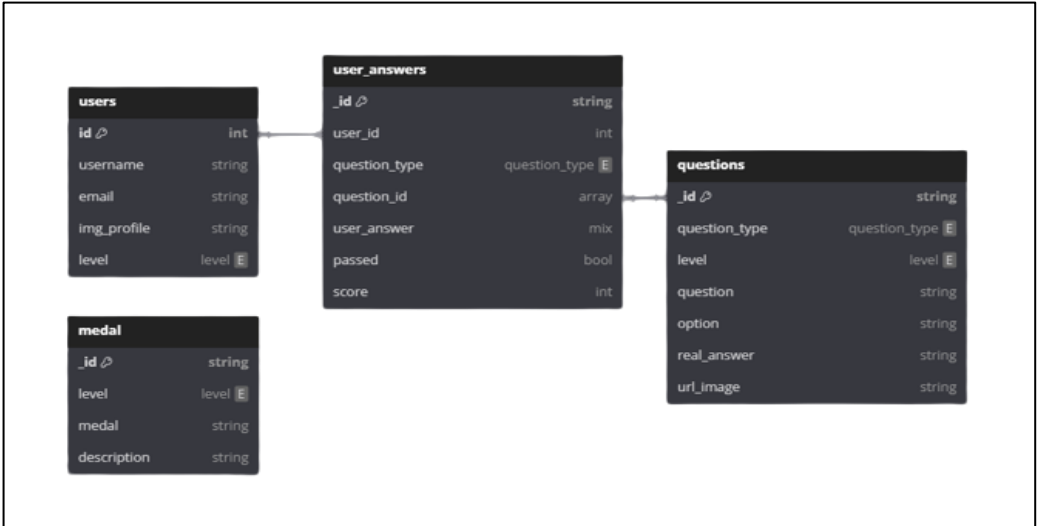

Figure 1. Relationship between collections

3.4. Implementation

The first step in introducing the application to users is the creation of a landing page. The landing page is designed to provide clear information about the application's purpose. This information includes a brief explanation of the benefits and utility of the application. To access the quiz, users are required to register first and then log in to the application. Additionally, the application presents relevant articles providing information and news about hoax-related topics and how to identify them. The implementation of MERN can be seen in Figure 2 below
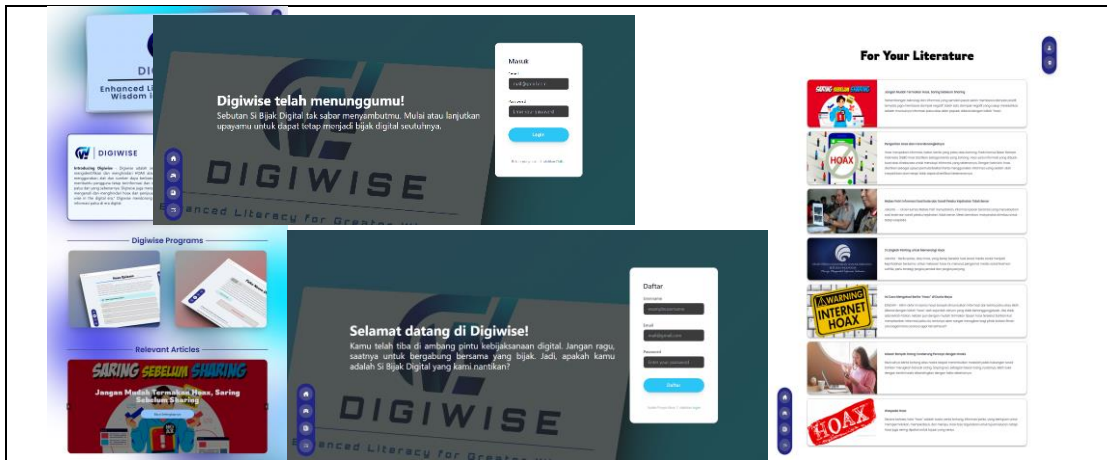
Figure 2. Landing page, User registration, User login, and Collection of articles

In this dashboard view, there are medals as visual indicators to provide users with instant information about their achievements in an easily understandable form. In Figure 3, there are visual differences in indicators in solving quiz questions in the application

Figure 3. Quiz Dashboard Page

In Figure 4, it contains information about the user's progress level in the Digiwise application. On this page, users can view the list of levels that have been unlocked, showing their achievements in several stages. Additionally, this page also displays the levels that have not been unlocked yet.
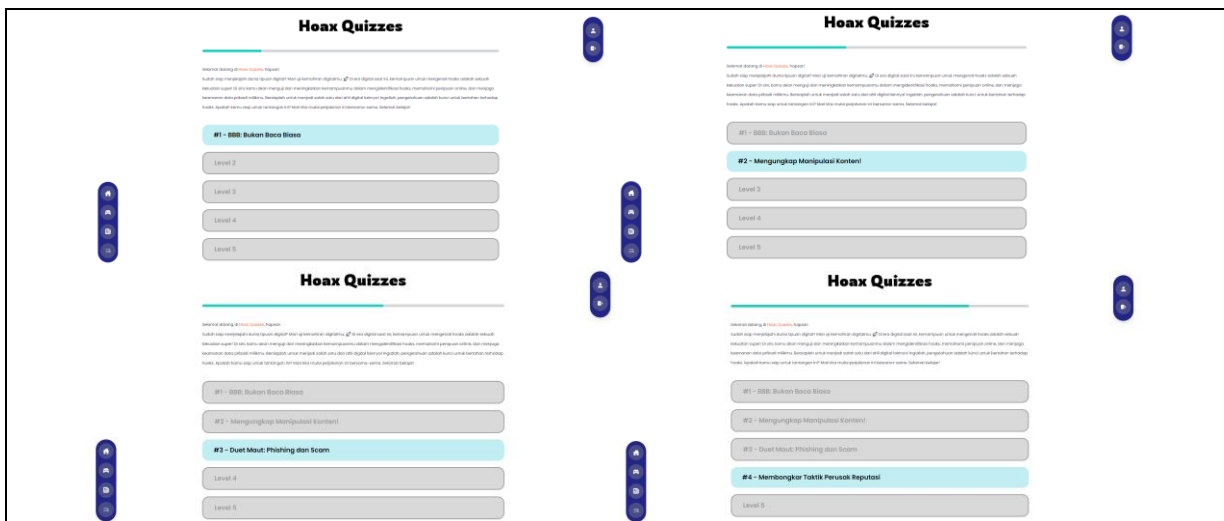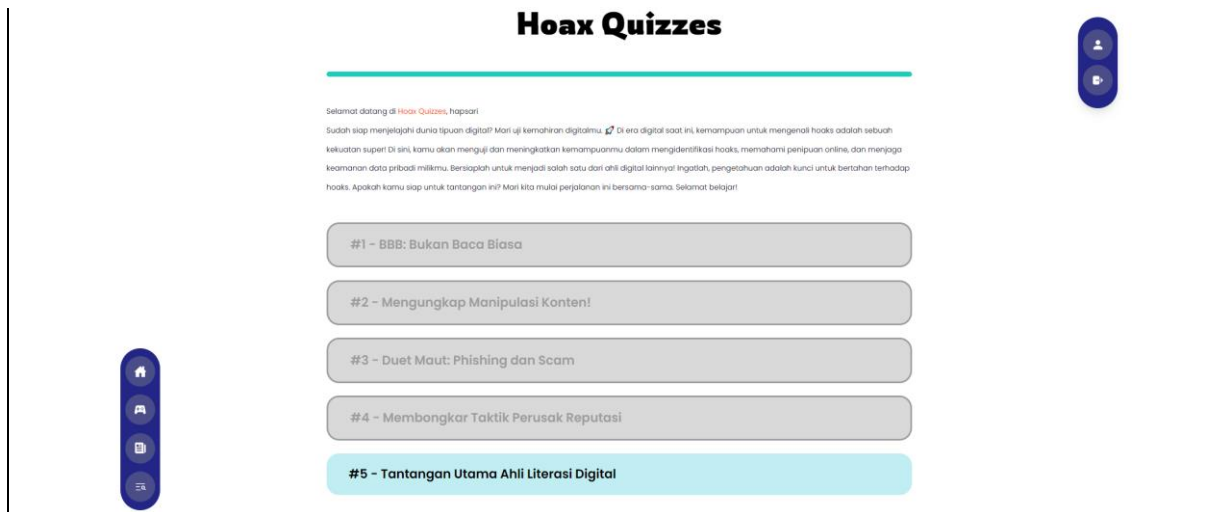
Figure 4. Level Information Page

This application provides various quizzes designed to test users' knowledge of hoaxes and online scams. For example, users can take multiple-choice quizzes that test their understanding of hoax characteristics and common scam tactics used on online platforms. For sample questions available in the application, refer to Figure 5 below
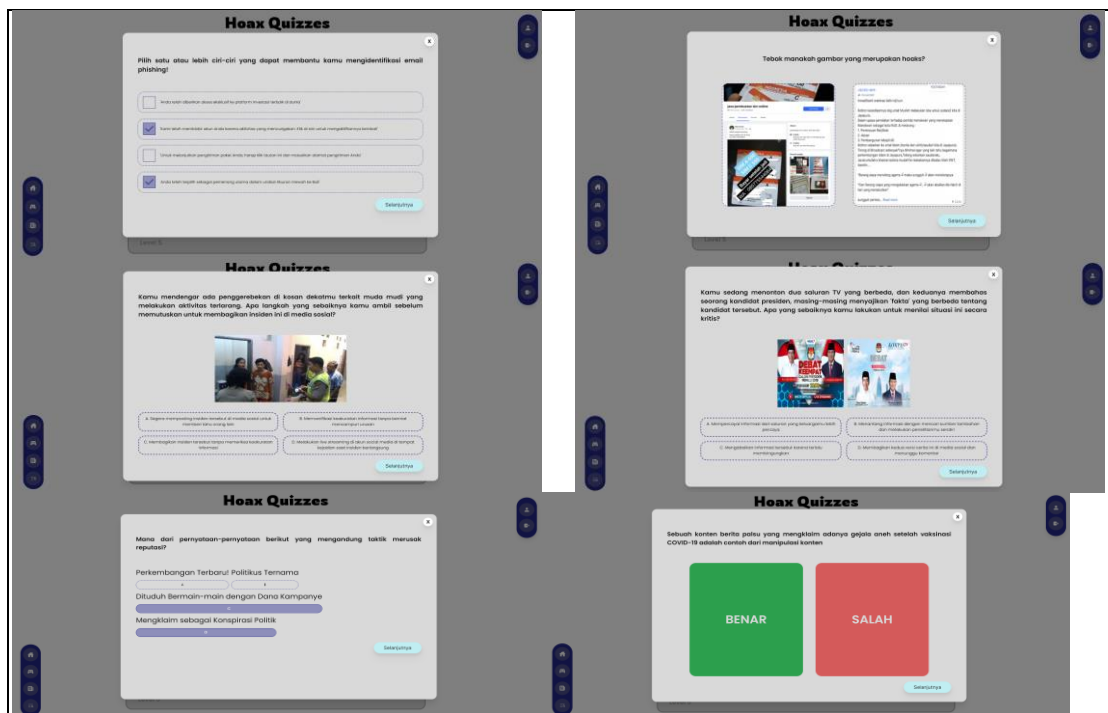

Figure 5. Overview of Questions at Each Level

Additionally, there are interactive quizzes that introduce users to real-life case studies of hoaxes that have spread on social media or specific websites. These quizzes aim not only to test users' knowledge but also to increase their awareness of the various strategies used by online fraudsters.

3.5. System testing

In this stage, the researcher will test the application to ensure its compliance with user needs in quiz execution. The goal is to identify bugs and ensure that the desired functionality runs smoothly.

Testing the API using Postman can check the API's response to each request, validate the returned data, and evaluate the overall system performance [21]. In this process, developers utilize Postman features to send HTTP requests to the API. Through Postman, developers can check the API's response. By leveraging Postman as an API testing tool, developers can ensure that the quiz answer checking process operates accurately and as expected in assessing user responses.

Table 1. System Testing Result

Test Case	Description	Result
Register	Register an account to log in	Success
Login	User login to access other features in the app	Success
Take the quiz	User can take existing quizzes	Success

In addition to testing through Postman, user feedback testing is also conducted using the SUS method. The System Usability Scale (SUS) method is a way to test the usability of an application. SUS was created as a "quick and dirty" usability measurement and is a questionnaire that can be used to measure how easily a computer system is used by users [22]. The SUS score interpretation scale can be seen in Figure 7.
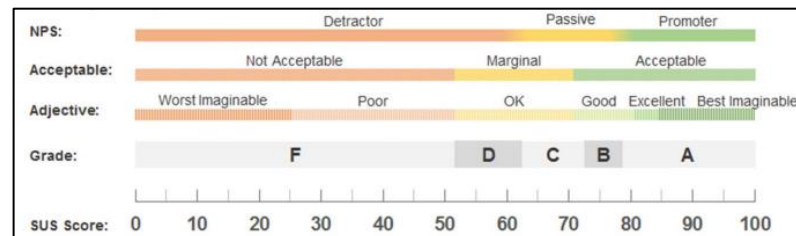

Figure 7. SUS Score Results Interpretation Scale

Responden	Pertanyaan												Jumlah	Nilai (Jumlah x 2,5)
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12		
R1	4	0	4	0	4	0	4	0	4	1	4	0	25	62,5
R2	3	0	3	1	3	0	4	0	3	1	4	0	22	55
R3	3	0	3	1	2	2	3	1	4	1	2	1	23	57,5
R4	3	1	3	1	1	1	1	3	1	2	2	1	20	50
R5	2	2	2	2	2	1	2	2	2	2	2	2	23	57,5
R6	3	1	3	2	2	1	2	1	4	2	2	2	25	62,5
R7	2	2	0	2	3	2	4	1	2	0	4	3	25	62,5
R8	3	2	2	2	2	2	2	2	2	1	2	2	24	60
R9	3	1	2	2	3	2	3	2	3	1	3	1	26	65
R10	4	0	3	0	4	0	4	0	4	0	4	0	23	57,5
R11	4	0	3	0	4	1	4	1	4	1	3	0	25	62,5
R12	3	3	2	2	2	3	3	1	3	2	2	2	28	70
R13	4	0	4	0	4	0	4	0	4	0	4	0	24	60
R14	4	0	2	1	3	1	4	0	4	1	4	0	24	60
Rata-Rata Score														60,18

Figure 8. SUS method test results

Based on figure 8, which contains 12 questions posed to users out of 14 respondents, the average score obtained after calculating the SUS method is 60.18. The average score falls into the "Ok" category and the "D" grade scale category when considering its alignment with the scores in figure 7. Based on the "adjective" value, obtaining an "OK" score implies that the application's impact in reducing the

spread of hoaxes has a positive effect. Despite its simplicity with a good user experience, this application can attract users to actively engage in the learning and understanding process of hoaxes, making them more vigilant and critical of the information they receive.

4. Conclusion

The main focus in this stage is identifying and planning activities for a sprint. The development team plans, considers user needs, and prioritizes features. Each feature is broken down into smaller components for implementation within a specific time frame. During this phase, the writer gathers data on misinformation challenges on social media. NoSQL, such as MongoDB, is used for data storage, employing key-value pairs and JSON-formatted documents. In the application, the "user" collection stores user data, "question" contains quiz questions, and "User answer" stores user submissions. The "medal" collection has level data, medals, and descriptions.

The application introduction begins with a landing page, providing information about the application's purpose and benefits. Users must register and log in to access the quiz. Relevant articles about hoax-related topics are also presented. The dashboard displays medals as visual indicators of user achievements. Figure 5 shows users' progress levels within the Digiwise application. The application offers various quizzes to test users' knowledge of hoaxes and online scams. Quiz questions cover hoax characteristics and common scam tactics. Interactive quizzes introduce users to real-life case studies of hoaxes.

There are shortcomings in the Digiwise application, which can certainly serve as directions for future research by potential improvements for the Digiwise application. This application lacks a feature for users to update their password when they forget it. Future research could consider the utilization of blockchain technology so that every published information will have a digitally verified cryptographic trace. Additionally, further development of the application could involve closer collaboration with institutions or organizations specializing in identifying and verifying the authenticity of information.

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