

## Society's Perspectives on Contemporary Islamic Law in Indonesia through Social Media Analysis Technology: A Preliminary Study

Dian Sa'adillah Maylawati<sup>1\*</sup>, Siah Khosyi'ah<sup>2</sup>, Achmad Kholiq<sup>3</sup>

<sup>1</sup>Department of Informatics, UIN Sunan Gunung Djati Bandung, Indonesia

<sup>2</sup>Faculty of Sharia and Law, UIN Sunan Gunung Djati Bandung, Indonesia

<sup>3</sup>Faculty of Sharia and Law, IAIN Syekh Nurjati Cirebon, Indonesia

\*Corresponding Author E-mail: [diansm@uinsgd.ac.id](mailto:diansm@uinsgd.ac.id)

### Abstract

The social, cultural, and technological developments of society are unavoidable. This has an impact on the development of Islamic Law, which keeps all Muslim activities in the right corridor. Contemporary Islamic law, known as Contemporary Islamic Law, has also developed to answer new societal problems. Various views on Contemporary Islamic Law in solving multiple issues certainly reap various responses from the community and scholars. These views are often conveyed through social media such as Youtube, Instagram, Facebook, and Twitter. Therefore, this article aims to discuss a preliminary study of text analysis techniques used to find out the views of the community and Ulama on Contemporary Islamic Law issues computationally and automatically. This initial study reviews the methods and techniques that will be used, namely the Indonesian National Work Competency Standards (SKKNI) methodology for data science. This study will also use a sentiment analysis approach, topic modeling, and pattern analysis to find out people's views on issues of Contemporary Islamic Law through social media. The algorithm used for sentiment analysis is the Multinomial Naïve Bayes Classifier (MNBC), for topic modeling is Latent Dirichlet Allocation (LDA), while for pattern analysis using the Prefix-projected Sequential Pattern Mining (PrefixSpan) algorithm. The model generated from sentiment analysis, topic modeling, and pattern analysis will be evaluated by measuring the confusion matrix, coherence value, and silhouette coefficient value. In addition, analysis and interpretation of the model results will be carried out in-depth qualitatively by involving the views and thoughts of Islamic Law experts.

Keywords: Islamic Law, Perspective, Preliminary Study, Social Media, Technology

### INTRODUCTION

Islam is the second-largest religion after Christianity which reaches 1.91 billion of the world's total population, around 7.85 billion people in 2021 (Widiyani, 2021; World Population Review, 2021b). Even a study predicts that in 2035 the number of Muslim babies born will exceed the number of Christian babies, so it is expected that by 2060 Islam will be the religion with the most adherents in the world (Jenik, 2021; Pew Research Center, 2017). Indonesia is the country with the largest Muslim population globally, reaching 231 million people (World Population Review, 2021a). With so many distributions of Muslims globally, it is essential to know the development of Islamic law, especially in Indonesia.

Various problems in studying, understanding, and implementing Islamic law as rules and guidelines for Muslims in daily activities often arise with contemporary issues. Islamic law is the rules, norms, rules from Allah SWT contained in the Qur'an and Hadith as the basis and instructions for living life for Muslims, which are closely related to sharia and fiqh (Mardani, 2017; Marzuki, n.d.; Rohidin, 2016). Shariah is fundamental and absolute, which shows the unity in Islam, such as *aqidah* and *akhlaq* (Al-Qhattan, 1976; Mardani, 2015; Marzuki, n.d.). Meanwhile, fiqh is instrumental, has a relationship with Islamic laws whose scope is limited to regulating human actions, and is relative and dynamic to show the diversity in Islam (Djamil, 1997; Mardani, 2015; Marzuki, n.d.). In the scope of Islamic jurisprudence, Islamic law includes *muamalah* and worship.

\* Copyright (c) 2022 Dian Sa'adillah Maylawati, Siah Khosyi'ah, Achmad Kholiq

This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/).

Received: November 1, 2021; Revised: December 30, 2021; Accepted: January 4, 2022

The development of contemporary Islamic law or what is often called contemporary Islamic law or Islamic law in modern times is an exciting thing to discuss. In this modern era and using this technology, Islamic law dynamically regulates the life activities of Muslims, ranging from family law, economics, crime, gender, health, technology, politics to religious aspects such as worship (Materan, 2012). Contemporary Islamic law reviews legal aspects, halal-haram, and discusses contemporary issues that cause significant changes in Islamic law from time to time. There are at least 3 factors behind the development of contemporary Islamic law, including (Materan, 2012): (1) Modernization in various countries, including Indonesia with the largest Muslim population, has resulted in changes in the social order of Muslims, both in terms of social, political, cultural, ideological, and so on; (2) there is a view that there is a need for Islamic law that is relevant to the development of the times from among Muslim scholars; as well as (3) the need for contemporary thinking (not textual, ad hoc and partial), but it needs to be actual and comprehensive as well as being able to adapt to current developments. These contemporary Islamic issues have become hot issues, not only among Muslim scholars or scholars, but also among the public, for example the development of Islamic economics (Abidin, 2020). Even in Indonesia, the Indonesian Ulema Council (MUI) recommendations are seen as capable of answering and providing solutions to various contemporary problems of Muslims in Indonesia (Zuhrah, Ardiansyah, & Adly, 2020).

Entering the Industry 4.0 era, all human activities cannot be separated from technology, especially the internet. No less than 4.66 billion people worldwide are connected to the internet by 2021 (Marsyaf, 2021; Wardani, 2021). Even in Indonesia, until 2021 there will be 212.35 million Internet users Indonesia or 76.8 percent of the 276.3 million Indonesian population (Kusnandar, 2021). Of the many Internet users in Indonesia, around 61.8 percent spend their activities on the internet to access social media (Nistanto, 2021). This phenomenon cannot be separated from the rapid and rapid development of technology. This social media is also the source of big data with a huge volume of data, varied data types, and flows very fast (Borne, 2014; Sagirolu & Sinanc, 2013). This abundant data from social media is certainly an interesting source that can be processed into important information and knowledge (insight knowledge) using social media analysis technology (Brooker, Barnett, & Cribbin, 2016; Lee, 2018; Stieglitz, Dang-Xuan, Bruns, & Neuberger, 2014; Stieglitz, Mirbabaie, Ross, & Neuberger, 2018). Youtube will be the most popular social media in Indonesia in 2021, followed by WhatsApp, Instagram, Facebook, Twitter, and other social media applications (Ahmad, 2021; Dahono, 2021).

Various social media analysis techniques have been carried out, including Natural Language Processing (NLP) technology, part of Artificial Intelligence (AI). Where NLP is a technology used to obtain insight knowledge from a natural language data set, whether the data is in the form of text, audio, or video (Chowdhury, 2005; Hirschberg & Manning, 2015; Nadkarni, Ohno-Machado, & Chapman, 2011; Pandey & Rajput, 2020). Various techniques and methods can be used for NLP, such as text mining and machine learning, with multiple approaches, such as classification, clustering, association, regression, and a combination of several approaches. Several social media analysis research has been carried out, where the most widely raised topics include public services, industry, finance, customer satisfaction, education, and health services (Rathore, Kar, & Ilavarasan, 2017). The social media used as the most widely used data source is Twitter. This is due to the easy access and permission to pull data from Twitter compared to other social media. Social media analysis technology is currently a research force in the digital era (Kabir, Karim, Newaz, & Hossain, 2018).

Research using social media analysis related to religious issues, especially Islam, is still little done. Some of them: (1) Modeling Islamic extremist communication on social media using contextual dimensions: religion, ideology, and hatred (Kursuncu et al., 2019); (2) Discourse and networks in critical construction of British Muslim social boundaries on social media (Downing & Dron, 2020); (3) Framework for detecting hate speech on social media related to religious issues in Indonesia (Darmalaksana et al., 2021); (4) Media and Messages: Exploring the Language of Islamic

State Media Through Sentiment Analysis (Macnair & Frank, 2018); (5) Sentiment analysis regarding ISIS (Islamic State of Iraq and Syria) and the destruction of heritage (Cunliffe & Curini, 2018); dan (6) A changing perspective on Russia and Islam using sentiment analysis (Smirnova, Laranetto, & Kolenda, 2017). Few social media analysis studies comprehensively discuss contemporary Islamic law. There are studies related to Islamic law in Indonesia specifically, such as applying data mining technology for sentiment analysis related to the issue of polygamy (Hertina et al., 2021) and related to waqf (Rusydziana, 2018). Therefore, it is a very big and interesting opportunity to analyze public opinion and sentiment towards contemporary Islamic law by utilizing social media analysis technology. Likewise, it is interesting to know the views of Ulama on contemporary Islamic law on social media so that you can see a comparison between the views of Ulama and society.

Various approaches, techniques, and methods of social media analysis can be carried out, including the word frequency analysis approach (Stansfield, O'Mara Eves, & Thomas, 2017), sentiment analysis (Alrumaih, Al-Sabbagh, Alsabab, Kharrufa, & Baldwin, 2020; Branz & Brockmann, 2018; Liu, 2012; Shobana, Vigneshwara, & Maniraj Sai, 2019), *topic modeling* (Kherwa & Bansal, 2020), pattern analysis (R Agrawal, Mannila, Srikant, Toivonen, & Verkamo, 1996; Rakesh Agrawal & Srikant, 1994; Dian Sa'adillah Maylawati, Aulawi, & Ramdhani, 2018; Dian Sa'adillah Maylawati, 2018b; Srikant & Agrawal, 1996), and other techniques that are part of NLP. Seeing the very wide opportunity to study and find opinions/views of scholars and the public regarding contemporary Islamic law in Indonesia (starting from family law, economics, crime, gender, health, technology, politics, to religious aspects such as worship), the research This study aims to maximize the use of social media analysis technology to analyze the views of Indonesian scholars and society on contemporary Islamic law issues.

Based on this explanation, this preliminary research aims to prepare a study to (1) Apply sentiment analysis, topic modeling, and pattern analysis approaches as part of social media analysis technology to find insight knowledge regarding the views of ulama and society in Indonesia on contemporary Islamic law; (2) Evaluating the sentiment analysis model, topic modeling, and pattern analysis that was built for further interpretation and analysis to produce insight knowledge related to the views of scholars and society in Indonesia on contemporary Islamic law; and (3) Knowing the comparison of views and opinions between ulama and the people in Indonesia on contemporary Islamic law.

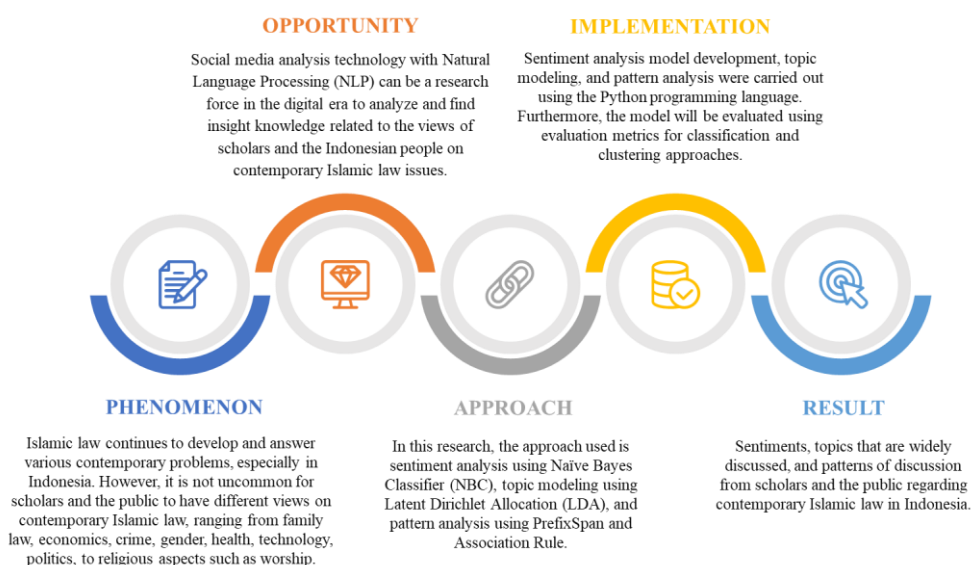


Figure 1 Research Framework

## RESEARCH METHOD

Figure 1 shows the framework of the researcher's thinking in conducting this research which is based on the phenomena, facts, and problems faced related to Contemporary Islamic law. Next is to look at research opportunities that can contribute to and benefit the scientific development of Islamic law studies through technology. The approach used is the application of sentiment analysis technology implemented using the Python programming language. The framework ends with the results of model evaluation, interpretation and analysis of the views of scholars and society on the development of contemporary Islamic law.

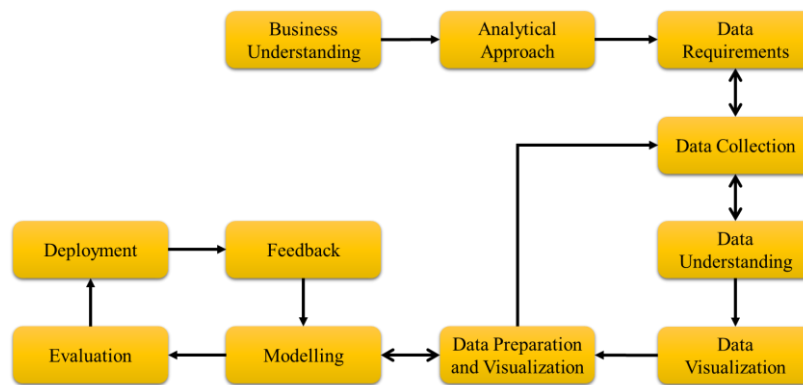


Figure 2 SKKNI Data Science life cycle

The methodology used in this research is a mixed-method between quantitative and qualitative. Quantitative analysis is carried out during the development and evaluation of sentiment analysis models, topic modeling, and pattern analysis. While qualitative when interpreting and analyzing the results of model development. This research was conducted with a data science approach using the data science methodology of the Indonesian National Work Competency Standards (SKKNI), based on the Decree of the Minister of Manpower of the Republic of Indonesia Number 299 of 2020 concerning Stipulation of Indonesian National Work Competency Standards for the Information and Communication Categories of Programming, Computer Consulting, and Main Group Activities. Related Activities (YBDI), Artificial Intelligence Sub-Sector Data Science (Kementerian Ketenagakerjaan Republik Indonesia, 2020). The SKKNI Data Science methodology includes business understanding, data understanding, data preparation, modeling, model evaluation, deployment, and evaluation. These activities will be described in Chapter II and implemented throughout this research in more detail. Meanwhile, the qualitative method is carried out when analyzing and interpreting the results of the data science process using the Islamic Law and Contemporary Islamic Law approaches.

Figure 2 shows the process flow or life cycle of SKKNI Data Science. The activities contained in the Data Science SKKNI are in detail, including: (1) Business Understanding which is an activity to identify and explore organizational needs, determine business objectives, determine data science technical goals, and create data science project plans. At the business understanding stage, an analysis of what approach or technical data science will be used is also carried out in accordance with the business problem to be solved; (2) Data Understanding is the process of understanding and analyzing data requirements that will be used to solve business problems that have been analyzed. Data collection is carried out in this data understanding activity for further review and validation; (3) Data preparation is the initial process before developing the model. Activities carried out include sorting, cleaning, constructing, integrating, and labeling data. This process also produces data visualization that facilitates data analysis; (4) Modeling is the primary process in developing models used in solving data science problems. At this modeling stage, apart from

building the required model, they also create test scenarios; (5) Evaluation is a process after several model testing scenarios have been carried out. This evaluation is carried out to select the best model and ensure that the model is well implemented and successfully resolves business problems; (6) Deployment is implementing a model in the form of an application or software that can be accessed by end-users. Where at this stage, the activities carried out include making a model deployment plan, carrying out the model deployment process, making a maintenance plan, and performing maintenance on the model and application; and (7) Feedback is the process of evaluating the entire data science process that has been carried out by reviewing and making data science output reports.

The limitations of the problem in this study include: (1) Social media used as a source of datasets in this study include Youtube, Instagram, Facebook, and Twitter. Data taken from Youtube is in the form of comments, from Instagram in the form of captions and comments, from Facebook in the form of posts and comments, while from Twitter in the form of tweets; (2) Data is collected in the form of text and in Indonesian; (3) The time span of data collection is the last 3 years since the research started; (4) The Data Science process does not reach the deployment stage or build software for the results of this research; (5) The set of keywords used to collect data is grouped by themes of family law, economics, crime, gender, health, technology, politics, and worship; (6) The algorithm used for sentiment analysis is Multinomial Naïve Bayes Classifier (MNBC), for topic modeling is Latent Dirichlet Allocation (LDA), while for pattern analysis using the Prefix-projected Sequential Pattern Mining (PrefixSpan) algorithm; (7) The programming language used is Python; (8) Data collection for the views of Ulama is carried out using specific keywords and selecting several Ulama accounts that exist on social media and are known by the majority of people in Indonesia. Meanwhile, the public's views are taken based on specific keywords regardless of gender, age, or other personal data of social media users.

## RESULTS AND DISCUSSION

### Related Study Analysis

Contemporary Islamic law studies have indeed been carried out in line with social, cultural, political developments, and other aspects of community needs. Like several studies related to contemporary Islamic law in Indonesia in the last five years, among others:

1. Thoughts on the trend of the *syar'i* hijab, veil or niqab in the contemporary Islamic era (Fathonah, 2018; Husna, 2019). Covering *aurat* (genitals) is one of the rules to keep women from harmful things. Interestingly, in the modern era, women who wear the veil are viewed negatively, and often people judge them as terrorists or deviant sects (Husna, 2019). Both the hijab and the veil are cultural symbols distinguishing one community from another. The hijab is derived from Islamic dogma, while the veil has no basis in religion nor is it rooted in traditions from the archipelago's history and is not an agreed religious decree. However, in the contemporary Islamic era, most scholars have an opinion regarding the limits of women's genitalia, which do not discuss the veil as a cover for the genitals (Fathonah, 2018).
2. The role and contribution of Muhammadiyah in the development of the contemporary Islamic law paradigm in Indonesia (Asnajib, 2020; Jamaa, 2017). Both of these studies review the view of Islamic law that dynamically and various contemporary methods emerge to solve the problems of modern society.
3. Contemporary Islamic law is also used to consider implementing good governance and governance in Indonesia (Solikhudin, 2017). Based on contemporary Islamic law, good governance in Indonesia must be implemented where the method of achieving state prosperity with various contemporary problems is solved based on law with the contemporary *ijtihad* method.
4. The concept of Islamic economics is also one of the applications of the contemporary Islamic law that answers the issues of economic needs in the era of globalization (Muala, 2020). The

concept of Islamic economics itself does not only meet individual material needs, but can create the common good and maintain the safety of religion, soul, mind, lineage, and human property. Studies related to Islamic economics continue to develop and continue to be carried out, starting from investigations related to the study of the history of Islamic economic thought from time to time (Havis Aravik, 2017; Helim & Fauzi, 2019; Istiqomah, 2019), to the thoughts of several figures, both classical and contemporary Islamic economics, and the contributions of these figures to the development of Islamic economics (Amarudin, 2018; Fathurrahman, 2021; Hamzah, 2020; Maulidizen, 2017). Islamic economy in Indonesia is deemed necessary to be built to prevent chaos and conflicts of interest in the economic sector based on the perspective of the Qur'an and As-Sunnah (Witro, 2020). The existence of Islamic economic law in Indonesia continues to grow in various sectors, such as halal food and medicine, Islamic clothing, the proliferation of sharia banking, and even sharia tourism (Pratama, Disemadi, & Prananingtyas, 2019). Meanwhile, the position of Islamic economic law in Indonesia is based on historical demands and the fact that the majority of the Indonesian population is Muslim and for various problems currently needed by the wider community. Islamic economic law is considered fair to achieve the welfare of the Indonesian people. For example, the development of e-commerce in the era of the industrial revolution 4.0 which provides various marketplaces with a dropship system can also be regulated with a contemporary Islamic economic law approach (Rasidin, Sidqi, & Witro, 2020). Likewise, the rise of online gold investment has become a hot topic that is studied from the point of view of contemporary Islamic law (Kartikasari, 2021; Malihah, 2019; Rahayu, 2020; Sitepu, 2020).

5. "Halal" is now a lifestyle. Halal is a necessity in various aspects of Indonesian people's lives, ranging from culinary (food and beverage), cosmetics, modest fashion, banking, tourism, technology, media, recreation, education, health, entertainment/events, travel and so on (Hasan, 2016; Karim, 2017; Nafi'an, 2018; Oktaviani, 2019; Puspaningtyas, 2019; Putri, 2016). Indonesia, where most of the population is Muslim (Kusnandar, 2019), has become a large market and the country with the most significant ranking of halal product providers (Karim, 2017). This has encouraged various industries to produce halal-certified products. Not only that, the entertainment/media industry, health, economy, fashion, and even cosmetics are currently competing to apply the halal concept. Various halal events were also held to support the achievement of an Indonesian halal lifestyle, both events such as conferences, exhibitions, to music charity (Nafi'an, 2018). Lifestyle, a personal reflection in carrying out daily activities and interacting with others, is essential. With the halal lifestyle, it is hoped that the Indonesian people will be wiser in their actions and choosing the products they use daily. This halal lifestyle indicates Indonesian people's awareness that blessings in every aspect of life are essential, from selecting halal products and activities. There are at least four principles in a halal lifestyle, including (Afifah, 2019): sharia principles that are following Islamic law (God's rules), the focus of priority, the principle of morality, and the principle of quantity in the sense that it is not excessive/wasteful and following the portion and designation. The concept of the halal lifestyle developing in Indonesia cannot be separated from the development of contemporary Islamic law, where people in Indonesia choose an Islamic lifestyle through a halal lifestyle (Adinugraha & Sartika, 2019; Sukardani, Setianingrum, & Wibisono, 2018). To meet the needs of millennials who choose a halal lifestyle, technology is a solution to access various economic sectors with a halal lifestyle concept (Agustina, Afriadi, Pratama, & Lestari, 2019).
6. In aspects of family law such as marriage, there is a study of the guardianship of the marriage contract, which is carried out remotely by utilizing technology (NUR, 2020). The phenomenon of online marriage is also an interesting issue to be studied based on the perspective of contemporary Islamic law (Farid, 2018; Safirra, 2020), especially during the COVID-19

pandemic, where weddings are being held online (Rizky, Shohibudin, Junianto, Mubarokah, & Aulia, 2020).

Several studies that examine the views of the social media community regarding contemporary Islamic law (including in Indonesia) include:

1. Modeling Islamic extremist communication on social media using contextual dimensions: religion, ideology, and hatred (Kursuncu et al., 2019). This study tries to analyze the communication of extremists in the name of Islam on Twitter social media. Using a computational approach, this study analyzes the dimensions of the context of religion, ideology, and hatred that are the strategies of extremists on social media;
2. Discourse and networks in critical construction of British Muslim social boundaries on social media (Downing & Dron, 2020). This study conducted a thematic and social network analysis of Tweet content related to the fire incident at London's Grenfell Tower in 2017. The findings of this study are that social media has proven to be an essential platform in spreading positive narratives about Muslims during the fire incident and allows individuals to oppose fake news (hoax) circulating on social media and hate narratives related to Muslims in the UK;
3. Framework for detecting hate speech on social media related to religious issues in Indonesia (Darmalaksana et al., 2021). In this study, the author tries to create a frame of mind that can be used as a general activity used to analyze hate speech on social media;
4. Media and Messages: Exploring the Language of Islamic State Media Through Sentiment Analysis (Macnair & Frank, 2018). This study analyzes the sentiments released by extremists who promote the Islamic State and distinguishes how they speak on social media. It was found that the language and discourse used by Islamic State affiliates in their online media was dominated by negative traits, with language derived from video data containing the highest concentration of negative sentiments;
5. Sentiment analysis regarding ISIS (Islamic State of Iraq and Syria) and destruction of heritage sites (Cunliffe & Curini, 2018). This study analyzes the sentiment towards the reaction to the destruction of heritage sites in 2015-2016, which was deliberately carried out as part of a more comprehensive threat strategy against local communities in Syria and Iraq. This research contributes to the international community in better tackling terrorism, protecting heritage sites and supporting affected communities;
6. A changing perspective on Russia and Islam using sentiment analysis (Smirnova et al., 2017). This research combines the paradigm of critical learning analysis and quantitative methods with automated text analysis. This study analyzes changes in sentiment towards Islam in the New York Times before and after 9/11.
7. The utilization of data mining technology for sentiment analysis related to the issue of polygamy has been carried out based on the perspective of the Indonesian people (Hertina et al., 2021). Based on the results of the sentiment analysis, polygamy is considered reasonable because Islamic law allows men to have polygamy. The law in Indonesia also allows it but under certain conditions.
8. The technique of analyzing the sentiments of the Indonesian people regarding waqf has also been carried out (Rusyadiana, 2018). This study aims to see the community's response to waqf in Indonesia. The results of this study indicate that 66% of the community shows a positive sentiment towards the issue of waqf in Indonesia.

Based on some of the research that has been done above, it can be seen that the study of contemporary Islamic law in Indonesia is still developing. The public's view of contemporary Islamic law issues is an essential source of information and knowledge regarding how scholars and society respond to contemporary Islamic law in various sectors of life such as family law, economics, crime, gender, health, technology, etc., politics, and worship. Apart from research related to the developments and trends of contemporary Islamic law, the use of technology in the digital era to find out the views of scholars and the public regarding contemporary Islamic law



issues has not been massively carried out, especially in Indonesia. The research that has been done around specific issues is not yet comprehensive. In addition, the analysis carried out does not classify the ulama and the community. Therefore, this study will find a comprehensive comparison of views between scholars and society regarding contemporary Islamic law.

### **Contemporary Islamic Law**

The law, which is practically a rule that must be enforced and is coercive, becomes narrower than the understanding of Islamic law, which includes religious norms, moral norms, and social norms taught by Islam to cover broader and more dynamic aspects (Anwar, 2021). Islamic law that lives in society becomes responsive, adaptive, and dynamic in facing various life problems. Contemporary Islamic law is the development of contemporary Islamic legal thought that is responsive, adaptive, and dynamically responding to new issues (Materan, 2012). Not only responding to legal aspects (halal-haram), but also responding to significant changes in Islamic law from time to time. Contemporary Islamic law studies are categorized into several aspects, including (Materan, 2012): (1) Aspects of family law, such as division of inheritance, marriage contracts with technology, waqf, family planning, abortion, pregnant marriage, divorce, polygamy, unregistered marriage, interfaith marriage, *'iddah* and *ihdad* periods, and others; (2) The criminal aspect, which raises issues of human rights and religious humanism, for example, various new interpretations of *qisas*, cutting hands, the national legal system, and others.; (3) Medical aspects, such as IVF technology, cloning, artificial insemination, breast milk banks, organ transplants, blood donation, autopsies, contraceptives, sex change surgery, selection of the sex of the fetus, and others; (4) Technological aspects, which cannot be avoided from development, such as mechanical slaughter of animals, the call to prayer through recordings, virtual congregational prayers, and others; (5) Economic aspects, such as highlighting the issue of usury and modern zakat management, bank interest systems, credit, social gathering, insurance, the growth of sharia banking, the growth of e-commerce, and others; (6) Gender aspects, such as discussing the point of view of activities that were previously considered only done by men, are now carried out by women, career women, women's leadership, women's Muslim clothing (hijab), sexual deviations, and others; (7) Political aspects, such as the issue of an Islamic state, the electoral process, loyalty to the government, corruption, collusion, nepotism, and so on; and (8) Aspects of worship, such as sacrifice with money, holding menstruation for the pilgrimage, pilgrimage with travel, halal lifestyle, hajj savings, halal food and drink, limits on women's genitalia, and so on.

The current development that raises various problems requires problem-solving based on religious values. This is where the importance of contemporary Islamic law can answer and provide a new paradigm for comprehensively multiple problems of contemporary life. Contemporary Islamic law solves actual problems that raise pros and cons and become problematic in society (Yanggo & Muhaimin, 2019). Conventional Islamic law is solid, but sometimes rigid and limited in the concept of a new contemporary problem. Not infrequently, new legal cases cannot be found in harmony with conventional Islamic law, so they are often trapped in the old paradigm, which is very contextual and dwells on the literal meaning of the legal text (Muhaki, 2020). Therefore, contemporary Islamic law continues to develop to solve new problems more dynamically.

### **Sentiment Analysis, Topic Modeling, and Pattern Analysis as Social Media Analysis Technology**

Natural Language Processing (NLP) is one part of Artificial Intelligence (AI) technology that seeks insight knowledge or important information obtained from the lexical, semantic, and syntactic processes of various natural languages (Dale, Moisl, & Somers, 2001; Pandey & Rajput, 2020). NLP processes text data with multiple approaches, including Sentiment Analysis (Hussein, 2018), *Topic Modeling* (Kherwa & Bansal, 2020), and Pattern Analysis (Fournier-Viger et al., 2017a).



Sentiment analysis is a technique to find public sentiment on specific issues (Lin et al., 2018; Liu, 2012). Sentiment analysis groups data with positive, neutral, and negative class labels related to public opinion or views from many sources, such as social media (Ali, 2017; Alrumaih et al., 2020; Branz & Brockmann, 2018; Rodrigues, Rao, & Chiplunkar, 2018; Rosenthal, Farra, & Nakov, 2017; Ruz, Henríquez, & Mascareño, 2020), movie review (Amrullah, Sofyan Anas, & Hidayat, 2020; Dian Sa'adillah Maylawati, Mudyawati, Wahisyam, & Maulana, 2021; Nanda, Dua, & Nanda, 2018), news portal (Negara, Shidik, Fanani, & Noersasongko, 2018), product review (Fang & Zhan, 2015; Marimuthu, Shankar, Ranganathan, & Niranchana, 2018), and others. The sentiment analysis technique uses a classification approach, where the training data must be labeled (positive, negative, neutral) so that the computer can learn to recognize patterns and predict labels on other text data.

Topic modeling is a technique of uncovering, finding, and adding essential themes, topics, information from text documents (Kherwa & Bansal, 2020). This modeling topic is a revolution from text mining which has two models, namely a probabilistic model and a non-probabilistic model. The probabilistic model is used to improve the latent semantic analysis model by using a generative and probability model approach (Blei, 2012). At the same time, the non-probability model finds topics based on terms with similar meanings that appear in the document's text with closeness in their contextual use (Dumais, 2005). Figure 3 illustrates the hierarchy of modeling topics ranging from types, learning approaches to text representations that can be used.

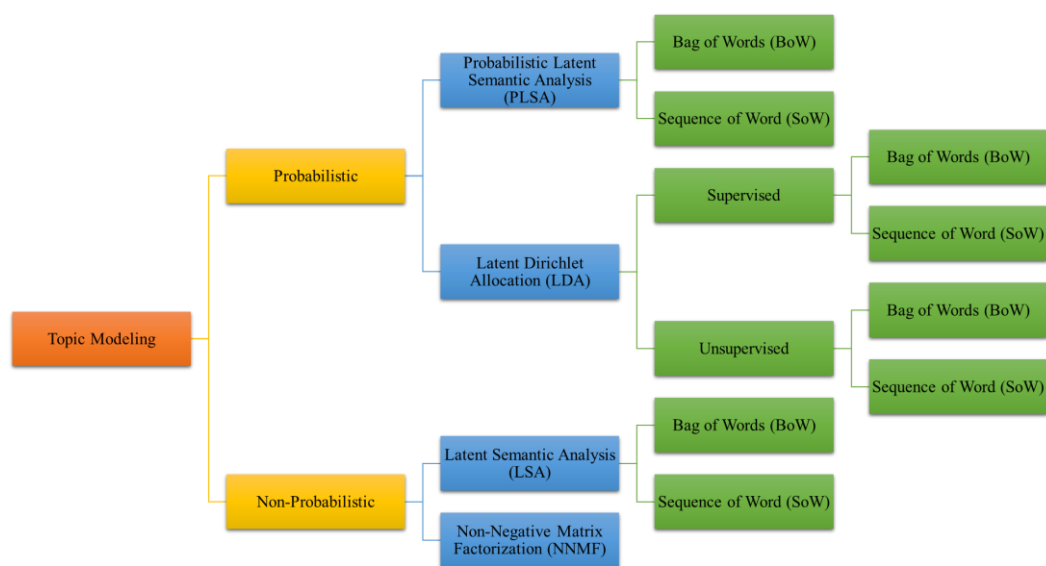


Figure 3 Modeling Topic Hierarchy

While pattern analysis is the process of finding important information or insight knowledge based on patterns that often emerge from text documents. This pattern analysis uses the basic pattern mining consisting of Frequent Pattern Mining (FPM) and Sequential Pattern Mining (SPM) (Han & Kamber, 2006). FPM produces patterns that often appear simultaneously regardless of the order in which words appear (Fournier-Viger et al., 2017b; D. S. Maylawati, 2018). For example, the pairing pattern for the word "love you" will be considered the same as "you love" pattern. Meanwhile, SPM produces patterns that often appear together by paying attention to the order in which words appear (Fournier-viger & Lin, 2017; D S Maylawati, Kumar, Kasmin, & Ramdhani, 2019; D. S. Maylawati, Aulawi, & Ramdhani, 2018; Dian Sa'Adillah Maylawati, Kumar, Kasmin, & Raza, 2019; Sa'Adillah Maylawati, Irfan, & Budiawan Zulfikar, 2017). For example, the pairing pattern for the word "love you" will be considered different from "you love" pattern. Several FPM

algorithms include FP-Growth (Fitria, Nengsih, & Qudsi, 2017; Wahana, Maylawati, Irfan, & Effendy, 2018), *Compact Pattern Tree* (CP-Tree) (D. S. A. Maylawati, Ramdhani, Rahman, & Darmalaksana, 2017; Dian Sa'adillah Maylawati, 2018a; Shin, Lee, & Lee, 2014), and so forth. While the SPM algorithm, for example, includes PrefixSpan (Pei et al., 2004), BIDE (Wang & Han, 2004), CloSpan (Yan, Han, & Afshar, 2003), and so on.

**Framework Plan for the Implementation of Social Media Analysis Technology for Community and Ulama Views on Contemporary Islamic Law**

In accordance with the mixed-method methodology used, this research uses the stages in the SKKNI Data Science method as a quantitative approach which is carried out first, then a qualitative method to analyze and interpret the results of the data science process with the Islamic Law and Contemporary Islamic Law approaches. Figure 4 shows research activities starting from business understanding to interpretation of the results of the data science process.

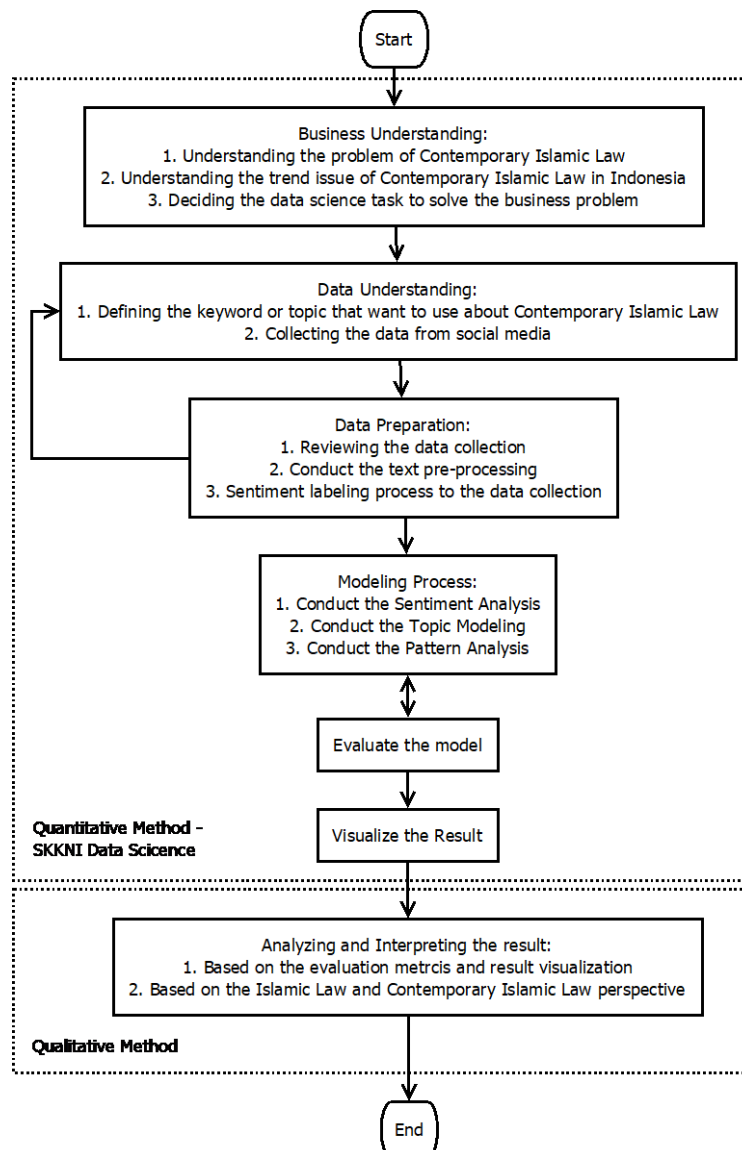


Figure 4 Research Activity Plan Flowchart

**a. Business Understanding**

At the stage of recognizing a business or problem, several activities are carried out, including:

1. Recognize the problems, problems, and phenomena of contemporary Islamic law. At this stage collect various information related to existing phenomena and become problems in developing contemporary Islamic law. Data is collected from various sources from the media, journal articles, and other credible sources.
2. Recognize contemporary Islamic law issues that are popular or become hot topics discussed by scholars and the Indonesian people. At this stage, it collects various popular issues related to contemporary Islamic law, grouped based on the themes of family law, economics, crime, gender, health, technology, politics, and religious aspects such as worship. Here are some popular issues for each theme, including: (a) Family Law: long distance marriage (online), polygamy, unregistered marriage, division of inheritance, pregnant marriage, divorce, and interfaith marriage; (b) Economics: sharia banking, e-commerce development, gold investment, sharia insurance, sharia credit and pawnshops; (c) Crime: the national legal system and new interpretations of *qisas*; (d) Gender: career women, female leaders, headscarves and veils; (e) Health: IVF technology, cloning, artificial insemination, contraceptives, sterilization, fetal sex selection, breast milk bank, and sex change surgery; (f) Technology: the application of technology for worship, such as virtual congregational prayers, especially during the COVID-19 pandemic, the issue of online *ta'aruf* (matchmaking); (g) Politics: the issue of the Islamic state, loyalty to the leadership, and the issue of Collusion, Corruption, and Nepotism; and (h) Worship: sacrificing with money, holding back menstruation for Hajj, halal lifestyle, and limiting women's genitalia.
3. Determine the technical approach used in the data science process carried out. Technical data science used is sentiment analysis with a classification approach, topic modeling with a clustering approach, and pattern analysis with a sequence pattern mining approach. The algorithm used for sentiment analysis is the Multinomial Naïve Bayes Classifier (MNBC), for topic modeling is Latent Dirichlet Allocation (LDA), while for pattern analysis using the Prefix-projected Sequential Pattern Mining (PrefixSpan) algorithm.

**b. Data Understanding**

Identifying the data needed in this research starts with defining and collecting keywords related to popular issues for every aspect of contemporary Islamic law. In addition, collecting social media accounts of popular and influential Ulama in Indonesia (and even the world) to see the views of the ulama for every issue of contemporary Islamic law. Next is to collect data from Youtube, Instagram, Facebook, and Twitter data. On Youtube social media, videos of Ulama related to contemporary Islamic law issues were taken and analyzed the opinions of the people submitted in the comments column of the video. At the same time, the data from Instagram, Facebook, and Twitter are captions, posts, or tweets submitted by Ulama and the public regarding issues of contemporary Islamic law.

Examples of keywords in the Indonesian language used in retrieving data from social media (where these keywords can develop as experiments are carried out) include:

- a. Family Law: "*hukum nikah online*", "*nikah online*"; "*akad online*", "*pernikahan jarak jauh*", "*poligami*", "*nikah siri*", "*nikah bawah tangan*", "*bagi waris*", "*nikah hamil*", "*hamil di luar nikah*", "*kawin kontrak*", "*cerai*", "*gugat cerai*", "*nikah beda agama*".
- b. Economic: "*bank syariah*", "*bank islam*", "*hukum islam e-commerce*", "*hukum islam dropship*", "*investasi emas syariah*", "*asuransi syariah*", "*ekonomi syariah*", "*riba*", "*pegadaian syariah*", "*hukum pinjaman online*", "*hukum pinjol*", "*pinjol syariah*", "*pinjaman online syariah*".
- c. Criminals: "*hukum pidana islam*", "*kisas*", "*hukum potong tangan*".

- d. Gender: *"wanita karir dalam islam", "wanita karir", "pemimpin wanita", "pemimpin wanita dalam islam", "jilbab", "cadar", "niqab"*.
- e. Health: *"hukum islam bayi tabung", "hukum islam cloning", "hukum islam inseminasi buatan", "hukum islam alat kontrasepsi", "hukum islam keluarga berencana", "hukum islam bank asi", "hukum islam sterilisasi", "hukum islam ganti kelamin", "hukum islam pilih jenis kelamin"*.
- f. Technology: *"sholat berjamaah online", "sholat jamaah virtual", "solat idul fitri online", "solat idul adha online", "sholat jumat online", "taaruf online", "jodoh online", "cari jodoh online"*.
- g. Politics: *"negara islam", "khilafah", "loyalitas pada pimpinan", "loyalitas ulil amri", "pandangan islam kkn", "pandangan islam korupsi", "pandangan islam kolusi", "pandangan islam nepotisme"*.
- h. Worship: *"kurban uang", "idul kurban uang", "tahan haid haji", "halal lifestyle", "makanan halal", "minuman halal", "wisata halal", "kosmetik halal", "gaya hidup halal", "obat halal", "aurat wanita", "aurat perempuan"*.

To get Ulama's views on contemporary Islamic legal issues using this social media analysis technology, you need Youtube, Instagram, Facebook, and Twitter social media accounts from the Ulama. Based on the Indonesian Survey Circle (LSI) and several sources (Editor, 2020; Ridwan, 2018; Yulianingsih, 2020). The list of popular and influential ulama in Indonesia is obtained in Table 1, presenting their official social media accounts. This list of Scholars may also evolve and change as research progresses.

Table 1 List of Popular Ulama in Indonesia and Their Official Social Media Accounts

Ulama's Name	Youtube Account	Instagram Account	Facebook Account	Twitter Account
Ustadz Abdul Somad (UAS)	Ustadz Abdul Somad Official	ustadzabdulsomad_official	-	@UAS_AbdulSomad
KH. Abdullah Gymnastiar (Aa Gym)	Aagym Official	@aagym	KH. Abdullah Gymnastiar	@aagym
Prof. KH. Quraish Shihab	Quraish Shihab	@quraish.shihab	-	-
Ustadz Yusuf Mansur	Yusuf Mansur New	@yusufmansurnew	Yusuf Mansur (Official) – Fans Page	@Yusuf_Mansur
KH. Said Aqil Siroj	-	@saidaqilsiroj53	-	@saidaqil
Prof. KH. Haedar Nashir	-	@haedarnashirofficial	-	-
Adi Hidayat	Adi Hidayat Official	@adihidayatofficial	-	-
Felix Siau	Felix Siau	@felixsiau	-	-

### c. Data Preparation

The intermediate data preparation activity process is conducting a review and pre-processing of the text data. Pre-processing of text data is very important because at this stage, the data is prepared, cleaned, and selected based on the need to maintain the quality of the input data (Kannan et al., 2015; Dian Sa'adillah Maylawati, Aulawi, & Ramdhani, 2019; Vijayarani, Ilamathi, & Nithya, 2015). Activities carried out in the pre-processing of this text include: (1) labeling the data as a sentiment analysis requirement, the data is labeled with positive, negative, and neutral labels; (2) case folding, namely the process of uniforming the size of the text into lowercase letters, because in computing using the Python language, capital letters and lowercase letters are distinguished

(case sensitive); (3) clean the text of unused characters (regular expressions) and redundant characters, such as the use of excessive punctuation; (4) changing Indonesian slang words into their standard words; (5) changing emoticons that will affect the results of sentiment analysis; (6) change the abbreviation into the standard word; (7) eliminate stopwords or unimportant words that have no meaning, for example the conjunctions "which", "at", "is", "that isz", and so on; (8) stemming, namely the process of changing words that have affixes into their basic word forms, such as "eating" to "eat"; and (9) tokenizing is the process of cutting words which will then be represented in a structured form such as BoW or SoW, and the frequency of occurrence of the word is calculated either by TF-IDF or word frequency.

#### **d. Modeling**

Modeling activity carries out a data science approach that is chosen according to the need to solve problems. That is, in this activity, sentiment analysis is carried out using the Multinomial Naïve Bayes Classifier (MNBC) algorithm, topic modeling with the Latent Dirichlet Allocation (LDA) algorithm, and pattern analysis using the Prefix-projected Sequential Pattern Mining (PrefixSpan) algorithm. Where the model development process is carried out with variations in experimental scenarios, for example, in sentiment analysis, training data and test data are divided with various variations on topic modeling according to the calculated coherence value. In contrast, pattern analysis is based on threshold value or minimum support and pattern length which is determined.

#### **e. Model Evaluation dan Visualisasi**

Evaluation is done using Confusion Matrix for sentiment analysis, coherence and silhouette value for topic modeling, and minimum support for pattern analysis. The visualization presented for this social media text analysis uses word clouds, line diagrams for coherence values, scatterplots for silhouette coefficient values, and visualization of the confusion matrix results.

#### **f. Analysis and Interpretation of Sentiment Analysis Results, Topic Modeling, and Pattern Analysis**

This activity is an essential part of discovering the views of the community and Ulama in Indonesia on contemporary Islamic law. The analysis and interpretation are carried out based on two approaches, namely the first based on the results of sentiment analysis, topic modeling, and pattern analysis. Second, based on the study of Islamic law and applicable contemporary Islamic law. In the process of analysis and interpretation, it also compares the views or thoughts of scholars and experts in Islamic law.

### **CONCLUSION**

This preliminary study aims to prepare research related to the views of society and scholars in Indonesia on Contemporary Islamic Law that utilizes social media analysis technology. The research was prepared using the SKKNI method for data science starting from business understanding, data understanding, data preparation, process model, evaluation model, then conduct the result analysis and interpretation. The social media analysis technology used is sentiment analysis, pattern analysis, and topic modeling from Twitter, Instagram, and Facebook. The algorithm used for sentiment analysis is the Multinomial Naïve Bayes Classifier (MNBC), for topic modeling is Latent Dirichlet Allocation (LDA), while for pattern analysis using the Prefix-projected Sequential Pattern Mining (PrefixSpan) algorithm. This preliminary study produces a research activity plan framework that can be implemented for further research.

## REFERENCES

- Abidin, Z. (2020). Islamic Economics Development in Indonesia: Reflection on Contemporary Thoughts of Muslim Intellectuals. *Shirkah: Journal of Economics and Business*, 5(3), 411–435.
- Adinugraha, H. H., & Sartika, M. (2019). Halal Lifestyle Di Indonesia. *An-Nisbah: Jurnal Ekonomi Syariah*, 5(2), 57–81.
- Afifah, A. (2019). 4 Prinsip Konsumsi Halal Lifestyle. Retrieved December 9, 2019, from Kompasiana website: <https://www.kompasiana.com/yufoehfuvfi/5c66c13fab12ae3485627753/empat-prinsip-konsumsi-halal-lifestyle?page=all>
- Agrawal, R., Mannila, H., Srikant, R., Toivonen, H., & Verkamo, a I. (1996). Fast discovery of association rules. *Advances in Knowledge Discovery and Data Mining*, Vol. 12, pp. 307–328. Retrieved from <http://www.cs.helsinki.fi/hannu.toivonen/pubs/advances.pdf>
- Agrawal, R., & Srikant, R. (1994). Fast Algorithms for Mining Association Rules in Large Databases. *Journal of Computer Science and Technology*, 15(6), 487–499. <https://doi.org/10.1007/BF02948845>
- Agustina, A. H., Afriadi, R. D., Pratama, C., & Lestari, A. (2019). Platform Halal Lifestyle dengan Aplikasi Konsep One Stop Solution. *Falah: Jurnal Ekonomi Syariah*, 4(1), 56–68.
- Ahmad. (2021). 10 Sosial Media Paling Populer di Indonesia. Retrieved October 3, 2021, from gamedia.com website: <https://www.gamedia.com/best-seller/sosial-media-paling-populer/>
- Ali, A. (2017). *Sentiment Analysis on Twitter Data using KNN and SVM*. 8(6), 19–25.
- Al-Qhattan, M. K. (1976). *At-Tasyri' wa al-Fiqh fi al-Islam: Tarikhan wa Manhajan*. Maktabah Wahbah.
- Alrumaih, A., Al-Sabbagh, A., Alsabah, R., Kharrufa, H., & Baldwin, J. (2020). Sentiment analysis of comments in social media. *International Journal of Electrical and Computer Engineering*, 10(6), 5917–5922. <https://doi.org/10.11591/ijece.v10i6.pp5917-5922>
- Amarudin, M. (2018). KONSTRUKSI SISTEM EKONOMI ISLAM PEMIKIRAN TOKOH EKONOMI ISLAM KONTEMPORER (ABU A'LA AL-MAUDUDI, BAQIR ASH-SADR, DAN ADIWARMAN A. KARIM): Muchamat Amarudin. *EKSYPAR: Jurnal Ekonomi Syari'ah & Bisnis Islam*, 5(01), 41–55.
- Amrullah, A. Z., Sofyan Anas, A., & Hidayat, M. A. J. (2020). Analisis Sentimen Movie Review Menggunakan Naive Bayes Classifier Dengan Seleksi Fitur Chi Square. *Jurnal Bumigora Information Technology (BITE)*, 2(1), 40–44. <https://doi.org/10.30812/bite.v2i1.804>
- Anwar, H. S. (2021). *Studi Hukum Islam Kontemporer Bagian Dua*. UAD PRESS.
- Asnajib, M. (2020). Perkembangan Paradigma Penafsiran Kontemporer di Indonesia: Studi Kitab Tafsir At-Tanwir. *Diya" Al-Afkar: Jurnal Studi Al-Quran Dan Al-Hadist*, 8, 49–64.
- Blei, D. M. (2012). Probabilistic topic models. *Communications of the ACM*, 55(4), 77–84.
- Borne, K. (2014). Top 10 List – The V's of Big Data. Retrieved from Data Science Central website: <https://www.datasciencecentral.com/profiles/blogs/top-10-list-the-v-s-of-big-data>
- Branz, L., & Brockmann, P. (2018). Sentiment Analysis of Twitter Data. *Proceedings of the 12th ACM International Conference on Distributed and Event-Based Systems - DEBS '18*. <https://doi.org/10.1145/3210284.3219769>
- Brooker, P., Barnett, J., & Cribbin, T. (2016). Doing social media analytics. *Big Data & Society*. <https://doi.org/10.1177/2053951716658060>
- Chowdhury, G. G. (2005). Natural language processing. *Annual Review of Information Science and Technology*. <https://doi.org/10.1002/aris.1440370103>
- Cunliffe, E., & Curini, L. (2018). ISIS and heritage destruction: A sentiment analysis. *Antiquity*, 92(364), 1094–1111.
- Dahono, Y. (2021). Data: Ini Media Sosial Paling Populer di Indonesia 2020-2021. Retrieved October 3, 2021, from Kompas.com website: <https://www.beritasatu.com/digital/733355/data-ini-media-sosial-paling-populer-di-indonesia-20202021>
- Dale, R., Moisl, H., & Somers, H. (2001). Handbook of Natural Language Processing. *Computational Linguistics*, 27(4), 602–603. <https://doi.org/10.1162/coli.2000.27.4.602>
- Darmalaksana, W., Irwansyah, F. S., Sugilar, H., Maylawati, D. S., Azis, W. D. I., & Rahman, A. (2021). Logical framework for hate speech detection on religion issues in Indonesia. *IOP Conference Series: Materials Science and Engineering*, 1098(3), 32046. IOP Publishing.

- Djamil, F. (1997). *Filsafat Hukum Islam*. Jakarta: Logos Wacana Ilmu.
- Downing, J., & Dron, R. (2020). Tweeting Grenfell: Discourse and networks in critical constructions of British Muslim social boundaries on social media. *New Media & Society*, 22(3), 449–469.
- Dumais, S. T. (2005). Latent semantic analysis. *Annual Review of Information Science and Technology*, 38(1), 188–230. <https://doi.org/10.1002/aris.1440380105>
- Editor. (2020). 10 Ulama Populer, UAS, Said Aqil Dan Habib Rizieq Bersatu Lawan Corona, Tiadakan Salat Jumat. Retrieved October 10, 2021, from pojoksatu.id website: <https://pojoksatu.id/news/berita-nasional/2020/03/26/10-ulama-populer-uas-said-aqil-dan-habib-rizieq-bersatu-lawan-corona-tiadakan-salat-jumat/>
- Fang, X., & Zhan, J. (2015). Sentiment analysis using product review data. *Journal of Big Data*. <https://doi.org/10.1186/s40537-015-0015-2>
- Farid, M. (2018). Nikah Online dalam Perspektif Hukum. *Jurisprudentie: Jurusan Ilmu Hukum Fakultas Syariah Dan Hukum*, 5(1), 174–186.
- Fathonah, F. (2018). Tren Jilbab Syari Dan Polemik Cadar Menceremati Geliat Keislaman Kontemporer Di Indonesia. *Proceedings of Annual Conference for Muslim Scholars*, (Series 1), 39–53.
- Fathurrahman, R. A. (2021). *Aliran Pemikiran Ekonomi Islam Kontemporer*.
- Fitria, R., Nengsih, W., & Qudsi, D. H. (2017). Implementasi Algoritma FP-Growth Dalam Penentuan Pola Hubungan Kecelakaan Lalu Lintas. *Jurnal Sistem Informasi*, 13(2), 118. <https://doi.org/10.21609/jsi.v13i2.551>
- Fournier-viger, P., & Lin, J. C. (2017). Survey of sequential pattern mining. *Data Science and Pattern Recognition*.
- Fournier-Viger, P., Lin, J. C. W., Vo, B., Chi, T. T., Zhang, J., & Le, H. B. (2017a). A survey of itemset mining. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, Vol. 7. <https://doi.org/10.1002/widm.1207>
- Fournier-Viger, P., Lin, J. C. W., Vo, B., Chi, T. T., Zhang, J., & Le, H. B. (2017b). A survey of itemset mining. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*. <https://doi.org/10.1002/widm.1207>
- Hamzah, A. (2020). Pemikiran Ekonomi Islam Kontemporer: Kajian Teoritis Muhammad Abdul Mannan Tentang Distribusi. *Al-Qisthu: Jurnal Kajian Ilmu Hukum Islam*, 1(18).
- Han, J., & Kamber, M. (2006). Data Mining: Concepts and Techniques. *Annals of Physics*, 54, 770. <https://doi.org/10.5860/CHOICE.49-3305>
- Hasan, E. F. (2016). Indonesia dan “Halal Lifestyle.”
- Havis Aravik, S. H. I. (2017). *Sejarah Pemikiran Ekonomi Islam Kontemporer Edisi Pertama*. Kencana.
- Helim, A., & Fauzi, I. (2019). *Sejarah pemikiran ekonomi islam (Masa Rasulullah sampai masa kontemporer)*. K-Media.
- Hertina, H., Nurwahid, M., Haswir, H., Sayuti, H., Darwis, A., Rahman, M., ... Hamzah, M. L. (2021). Data mining applied about polygamy using sentiment analysis on Twitters in Indonesian perception. *Bulletin of Electrical Engineering and Informatics*, 10(4), 2231–2236.
- Hirschberg, J., & Manning, C. D. (2015). Advances in natural language processing. *Science*. <https://doi.org/10.1126/science.aaa8685>
- Husna, F. (2019). Niqab squad Jogja dan muslimah era kontemporer di Indonesia. *Jurnal Al-Bayan: Media Kajian Dan Pengembangan Ilmu Dakwah*, 24(1).
- Hussein, D. M. E. D. M. (2018). A survey on sentiment analysis challenges. *Journal of King Saud University - Engineering Sciences*. <https://doi.org/10.1016/j.jksues.2016.04.002>
- Istiqomah, L. (2019). Telaah Sejarah Pemikiran Ekonomi Islam. *Al-Iqtishod: Jurnal Ekonomi Syariah*, 1(1), 1–19.
- Jamaa, L. (2017). Kontribusi Muhammadiyah terhadap Dinamika Pemikiran Hukum Islam Kontemporer di Indonesia. *Al-Ihkam: Jurnal Hukum Dan Pranata Sosial*, 12(1), 127–148.
- Jenik, C. (2021). The World's Largest Religious Groups Over Time. Retrieved October 3, 2021, from satista website: <https://www.statista.com/chart/25572/worlds-largest-religious-groups-over-time/>
- Kabir, A. I., Karim, R., Newaz, S., & Hossain, M. I. (2018). The Power of Social Media Analytics: Text Analytics Based on Sentiment Analysis and Word Clouds on R. *Informatica Economica*, 22(1).



- Kannan, S., Gurusamy, V., Vijayarani, S., Ilamathi, J., Nithya, M., Kannan, S., & Gurusamy, V. (2015). Preprocessing Techniques for Text Mining. *International Journal of Computer Science & Communication Networks*.
- Karim, A. A. (2017). Halal Lifestyle. Retrieved October 9, 2019, from [Republika.co.id website: https://republika.co.id/berita/ozof1z440/halal-lifestyle](https://republika.co.id/berita/ozof1z440/halal-lifestyle)
- Kartikasari, L. (2021). *Tinjauan Hukum Islam Terhadap Jual Beli Emas Mini Gold Dengan Sistem Kredit Pada Faeyza Online Shop Kota Surabaya*. IAIN Ponorogo.
- Kementerian Ketenagakerjaan Republik Indonesia. (2020). *Keputusan Menteri Ketenagakerjaan Republik Indonesia Nomor 299 Tahun 2020 tentang Penetapan Standar Kompetensi Kerja Nasional Indonesia Kategori Informasi dan Komunikasi Golongan Pokok Aktivitas Pemrograman, Konsultasi Komputer, dan Kegiatan yang Berhubun*. Jakarta.
- Kherwa, P., & Bansal, P. (2020). Topic modeling: a comprehensive review. *EAI Endorsed Transactions on Scalable Information Systems*, 7(24).
- Kursuncu, U., Gaur, M., Castillo, C., Alambo, A., Thirunarayan, K., Shalin, V., ... Sheth, A. (2019). Modeling islamist extremist communications on social media using contextual dimensions: religion, ideology, and hate. *Proceedings of the ACM on Human-Computer Interaction*, 3(CSCW), 1–22.
- Kusnandar, V. B. (2019). Indonesia, Negara dengan Penduduk Muslim Terbesar Dunia. Retrieved November 25, 2019, from [Databoks website: https://databoks.katadata.co.id/datapublish/2019/09/25/indonesia-negara-dengan-penduduk-muslim-terbesar-dunia](https://databoks.katadata.co.id/datapublish/2019/09/25/indonesia-negara-dengan-penduduk-muslim-terbesar-dunia)
- Kusnandar, V. B. (2021). Penetrasi Internet Indonesia Urutan ke-15 di Asia pada 2021. Retrieved October 3, 2021, from [Databoks website: https://databoks.katadata.co.id/datapublish/2021/07/12/penetrasi-internet-indonesia-urutan-ke-15-di-asia-pada-2021](https://databoks.katadata.co.id/datapublish/2021/07/12/penetrasi-internet-indonesia-urutan-ke-15-di-asia-pada-2021)
- Lee, I. (2018). Social media analytics for enterprises: Typology, methods, and processes. *Business Horizons*. <https://doi.org/10.1016/j.bushor.2017.11.002>
- Lin, B., Zampetti, F., Penta, M. Di, Oliveto, R., Bavota, G., & Lanza, M. (2018). Sentiment Analysis for Software Engineering: How Far Can We Go? *2018 ACM/IEEE 40th International Conference on Software Engineering 117*. <https://doi.org/10.1145/3180155.3180195>
- Liu, B. (2012). Sentiment analysis and opinion mining. *Synthesis Lectures on Human Language Technologies*, 5(1), 1–184. <https://doi.org/10.2200/S00416ED1V01Y201204HLT016>
- Macnair, L., & Frank, R. (2018). The mediums and the messages: Exploring the language of Islamic State media through sentiment analysis. *Critical Studies on Terrorism*, 11(3), 438–457.
- Malihah, A. I. (2019). *Tinjauan Hukum Islam Terhadap Jual Beli Emas Online Dengan Pembayaran Berkala (Studi: PT. Tamasia Global Sharia)*.
- Mardani. (2015). *Hukum Islam; Pengantar Ilmu Hukum Islam di Indonesia*. Yogyakarta: Pustaka Pelajar.
- Mardani, M. (2017). Hukum Islam Dalam Sistem Hukum Nasional. *Jurnal Hukum & Pembangunan*, 38(2), 175. <https://doi.org/10.21143/jhp.vol38.no2.170>
- Marimuthu, K., Shankar, A., Ranganathan, R., & Niranchana, R. (2018). Product opinion analysis using text mining and analysis. *International Journal of Smart Grid and Green Communications*, 1(3), 227. <https://doi.org/10.1504/IJSGGC.2018.091351>
- Marsyaf, M. I. (2021). Jumlah Pengguna Internet Sedunia Mencapai 4,66 Miliar. Retrieved October 3, 2021, from [sindonews.com website: https://tekno.sindonews.com/read/316920/207/jumlah-pengguna-internet-sedunia-mencapai-466-miliar-1611820860](https://tekno.sindonews.com/read/316920/207/jumlah-pengguna-internet-sedunia-mencapai-466-miliar-1611820860)
- Marzuki. (n.d.). *TINJAUAN UMUM TENTANG HUKUM ISLAM*. Retrieved from <http://staffnew.uny.ac.id/upload/132001803/lainlain/Dr.+Marzuki,+M.Ag.+Tinjauan+Umum+tentang+Hukum+Islam.pdf>
- Materan, M. (2012). Rekonstruksi Metodologi Hukum Islam Kontemporer. *Mazahib*, 10(1), 46–54. Retrieved from <https://journal.iain-samarinda.ac.id/index.php/mazahib/article/view/109>
- Maulidizen, A. (2017). Pemikiran Dan Kontribusi Tokoh Ekonomi Islam Klasik Dan Kontemporer. *Deliberatif*, 1(1), 42–62.
- Maylawati, D. S. (2018a). Analisis Perbandingan Algoritma FP-Growth dan CP-Tree untuk Data Teks.

- 
- Jurnal Algoritma*. <https://doi.org/10.33364/algoritma/v.15-1.1>
- Maylawati, D. S. (2018b). The Concept of Frequent Itemset Mining for Text. *AASEC 2018*.
- Maylawati, D. S. (2018). The concept of frequent itemset mining for text. *IOP Conference Series: Materials Science and Engineering*. <https://doi.org/10.1088/1757-899X/434/1/012043>
- Maylawati, D. S. A., Ramdhani, M. A., Rahman, A., & Darmalaksana, W. (2017). Incremental technique with set of frequent word item sets for mining large Indonesian text data. *2017 5th International Conference on Cyber and IT Service Management, CITSM 2017*. <https://doi.org/10.1109/CITSM.2017.8089224>
- Maylawati, D. S., Aulawi, H., & Ramdhani, M. A. (2018). The Concept of Sequential Pattern Mining for Text. *AASEC 2018*.
- Maylawati, D. S., Aulawi, H., & Ramdhani, M. A. (2018). The concept of sequential pattern mining for text. *IOP Conference Series: Materials Science and Engineering*. <https://doi.org/10.1088/1757-899X/434/1/012042>
- Maylawati, D. S., Aulawi, H., & Ramdhani, M. A. (2019). Flexibility of Indonesian text pre-processing library. *Indonesian Journal of Electrical Engineering and Computer Science*. <https://doi.org/10.11591/ijeecs.v13.i1.pp420-426>
- Maylawati, D. S., Kumar, Y. J., Kasmin, F. B., & Ramdhani, M. A. (2019). An idea based on sequential pattern mining and deep learning for text summarization. *Journal of Physics: Conference Series, 1402(7)*, 77013. IOP Publishing.
- Maylawati, D. S., Kumar, Y. J., Kasmin, F. B., & Raza, B. (2019). Sequential pattern mining and deep learning to enhance readability of Indonesian text summarization. *International Journal of Advanced Trends in Computer Science and Engineering*. <https://doi.org/10.30534/ijatcse/2019/78862019>
- Maylawati, D. S., Mudyawati, M. N., Wahisyam, M. H., & Maulana, R. A. (2021). Comparison of Classification Algorithms for Sentiment Analysis on Movie Comments. *Gunung Djati Conference Series, 3*, 68–80.
- Muala, A. (2020). Reposisi Ekonomi Islam di Era Globalisasi Perspektif Maqashid Syari'ah. *JIL: Journal of Islamic Law, 1(1)*, 45–63.
- Muhaki, M. (2020). URGENSI KAJIAN FIQH DALAM PROBLEMATIKA HUKUM KONTEMPORER. *Jurnal Studi Islam: Pancawahana, 15(2)*, 127–145.
- Nadkarni, P. M., Ohno-Machado, L., & Chapman, W. W. (2011). Natural language processing: An introduction. *Journal of the American Medical Informatics Association: JAMIA*. <https://doi.org/10.1136/amiajnl-2011-000464>
- Nafi'an, M. I. (2018). Saat Halal Menjadi Gaya Hidup. Retrieved December 9, 2019, from Dream.co.id website: <https://www.dream.co.id/lifestyle/jakarta-halal-things-2018-sarana-masyarakat-belajar-produk-halal-181126e.html>
- Nanda, C., Dua, M., & Nanda, G. (2018). Sentiment Analysis of Movie Reviews in Hindi Language Using Machine Learning. *Proceedings of the 2018 IEEE International Conference on Communication and Signal Processing, ICCSP 2018*, 1069–1072. <https://doi.org/10.1109/ICCSP.2018.8524223>
- Negara, M. Z., Shidik, G. F., Fanani, A. Z., & Noersasongko, E. (2018). Sentiment Analysis of Indonesian News Using Deep Learning (Case Study: TVKU Broadcast). *2018 International Seminar on Application for Technology of Information and Communication*, 261–265. IEEE.
- Nistanto, R. K. (2021). Berapa Lama Orang Indonesia Akses Internet dan Medsos Setiap Hari? Retrieved from Kompas.com website: <https://tekno.kompas.com/read/2021/02/23/11320087/berapa-lama-orang-indonesia-akses-internet-dan-medsos-setiap-hari?page=all#:~:text=Dari total populasi Indonesia sebanyak,3 persen dibandingkan tahun lalu.>
- NUR, S. (2020). *PEMIKIRAN FIKIH SATRIA EFFENDI TENTANG TEKNOLOGI INFORMASI DALAM PERWALIAN AKAD PERNIKAHAN*. Universitas Islam Negeri Sultan Syarif Kasim Riau.
- Oktaviani, K. (2019). Halal atau Tidak? Ini Kandungan Kosmetik yang Wajib Diwaspadai Muslimah.
- Pandey, V. K., & Rajput, P. (2020). Review on natural language processing. *Journal of Critical Reviews, Vol. 7*, pp. 1170–1174. <https://doi.org/10.31838/jcr.07.10.230>
- Pei, J., Han, J., Mortazavi-Asl, B., Wang, J., Pinto, H., Chen, Q., ... Hsu, M. C. (2004). Mining sequential patterns by pattern-growth: The prefixspan approach. *IEEE Transactions on Knowledge and Data*

- Engineering*, 16(11), 1424–1440. <https://doi.org/10.1109/TKDE.2004.77>
- Pew Research Center. (2017). The Changing Global Religious Landscape. Retrieved October 3, 2021, from [pewforum.org](https://www.pewforum.org/2017/04/05/the-changing-global-religious-landscape/) website: <https://www.pewforum.org/2017/04/05/the-changing-global-religious-landscape/>
- Pratama, A. P., Disemadi, H. S., & Prananingtyas, P. (2019). Existence and Position of Islamic Economic Laws In Indonesia. *Legality: Jurnal Ilmiah Hukum*, 27(2), 222–231.
- Puspaningtyas, L. (2019). Potensi Halal Daerah Dipetakan. Retrieved December 9, 2019, from [Republika.co.id](https://republika.co.id/berita/prjw0s440/potensi-halal-daerah-dipetakan) website: <https://republika.co.id/berita/prjw0s440/potensi-halal-daerah-dipetakan>
- Putri, W. (2016). Indonesia dan “Halal LifeStyle.” Retrieved December 9, 2019, from [Islampos](https://www.islampos.com/indonesia-dan-halal-lifestyle-2982/) website: <https://www.islampos.com/indonesia-dan-halal-lifestyle-2982/>
- Rahayu, T. (2020). *Tinjauan hukum ekonomi syariah terhadap jual beli emas ANTAM melalui aplikasi online Tokopedia Emas di Tokopedia*. UIN Sunan Gunung Djati Bandung.
- Rasidin, M., Sidqi, I., & Witro, D. (2020). Drop Shipping in Islamic Economic Law Perspective: E-Commerce Study Inter Marketplace Drop Ship in The Industrial Revolution Era 4.0. *Nurani: Jurnal Kajian Syari'ah Dan Masyarakat*, 20(1), 97–106.
- Rathore, A. K., Kar, A. K., & Ilavarasan, P. V. (2017). Social media analytics: Literature review and directions for future research. *Decision Analysis*, 14(4), 229–249.
- Ridwan, M. (2018). Inilah 5 Ulama Paling Berpengaruh di Indonesia. Retrieved October 10, 2021, from [kabar24.bisnis.com](https://kabar24.bisnis.com/read/20181114/15/859796/inilah-5-ulama-paling-berpengaruh-di-indonesia) website: <https://kabar24.bisnis.com/read/20181114/15/859796/inilah-5-ulama-paling-berpengaruh-di-indonesia>
- Rizky, M. H., Shohibudin, A., Junianto, A. D., Mubarakah, A., & Aulia, F. N. (2020). *Fenomena Pernikahan Online Dikala Pandemi dalam Pandangan Fiqh*.
- Rodrigues, A. P., Rao, A., & Chiplunkar, N. N. (2018). Sentiment Analysis of Real Time Twitter Data Using Big Data Approach. *2nd International Conference on Computational Systems and Information Technology for Sustainable Solutions, CSITSS 2017*, 1–6. <https://doi.org/10.1109/CSITSS.2017.8447656>
- Rohidin. (2016). *Pengantar Hukum Islam (Dari Semenanjung Arabia Sampai Indonesia)* (1st ed.). Yogyakarta: Lintang Rasi Aksara Books. Retrieved from <https://fh.uui.ac.id/wp-content/uploads/2017/02/Pengantar-Hukum-Islam-buku-ajar-rohidin-fh-uui.pdf>
- Rosenthal, S., Farra, N., & Nakov, P. (2017). SemEval-2017 Task 4: Sentiment Analysis in Twitter. *Proceedings of the 11th International Workshop on Semantic Evaluation (SemEval-2017)*. <https://doi.org/10.18653/v1/S17-2088>
- Rusyidiana, A. A. M. S. (2018). Sentiment analysis of Islamic waqf: Evidence in Indonesia. *Maqdis: Jurnal Kajian Ekonomi Islam*, 3(2), 123–134.
- Ruz, G. A., Henríquez, P. A., & Mascareño, A. (2020). Sentiment analysis of Twitter data during critical events through Bayesian networks classifiers. *Future Generation Computer Systems*, 106, 92–104. <https://doi.org/10.1016/j.future.2020.01.005>
- Sa'Adillah Maylawati, D., Irfan, M., & Budiawan Zulfikar, W. (2017). Comparison between BIDE, PrefixSpan, and TRuleGrowth for Mining of Indonesian Text. *Journal of Physics: Conference Series*, 801(1). <https://doi.org/10.1088/1742-6596/801/1/012067>
- Safirra, A. R. (2020). *PERKAWINAN SIRI ONLINE MASA PANDEMI COVID 19 (PERSPEKTF KHI DAN UU NO. 1 TAHUN 1974)*. Universitas Bhayangkara.
- Sagioglu, S., & Sinanc, D. (2013). Big data: A review. *Proceedings of the 2013 International Conference on Collaboration Technologies and Systems, CTS 2013*. <https://doi.org/10.1109/CTS.2013.6567202>
- Shin, S. J., Lee, D. S., & Lee, W. S. (2014). CP-tree: An adaptive synopsis structure for compressing frequent itemsets over online data streams. *Information Sciences*, 278, 559–576. <https://doi.org/10.1016/j.ins.2014.03.074>
- Shobana, G., Vigneshwara, B., & Maniraj Sai, A. (2019). Twitter sentimental analysis. *International Journal of Recent Technology and Engineering*, 7(4), 343–346. <https://doi.org/10.46501/ijmtst061266>
- Sitepu, A. M. (2020). Analisis Hukum Investasi Emas Online (Ditinjau dari Teori Barang Ribawi). *Al-'Adl*, 13(2), 221–232.

- Smirnova, A., Laranetto, H., & Kolenda, N. (2017). Ideology through sentiment analysis: A changing perspective on Russia and Islam in NYT. *Discourse & Communication, 11*(3), 296–313.
- Solikhudin, M. (2017). Penerapan good governance Di Indonesia dalam tinjauan hukum Islam kontemporer. *Al-Daulah: Jurnal Hukum Dan Perundangan Islam, 7*(1), 163–187.
- Srikant, R., & Agrawal, E. (1996). Mining Sequential Patterns: Generalization and Performance Improvements. *5th International Conference on Extending Database Technology (EDBT '96)*, 3–17. <https://doi.org/10.1109/ICDE.1995.380415>
- Stansfield, C., O'Mara Eves, A., & Thomas, J. (2017). Text mining for search term development in systematic reviewing: A discussion of some methods and challenges. *Research Synthesis Methods, 8*(3), 355–365.
- Stieglitz, S., Dang-Xuan, L., Bruns, A., & Neuberger, C. (2014). Socialmedia analytics. *Business and Information Systems Engineering*. <https://doi.org/10.1007/s12599-014-0315-7>
- Stieglitz, S., Mirbabaie, M., Ross, B., & Neuberger, C. (2018). Social media analytics: Challenges in topic discovery, data collection, and data preparation. *International Journal of Information Management, 39*, 156–168.
- Sukardani, P. S., Setianingrum, V. M., & Wibisono, A. B. (2018). Halal lifestyle: current trends in Indonesian Market. *1st International Conference on Social Sciences (ICSS 2018)*, 334–339. Atlantis Press.
- Vijayarani, S., Ilamathi, J., & Nithya, M. (2015). Preprocessing Techniques for Text Mining - An Overview. *International Journal of Computer Science & Communication Networks, 5*(1), 7–16. Retrieved from <http://www.ijcscn.com/Documents/Volumes/vol5issue1/ijcscn2015050102.pdf>
- Wahana, A., Maylawati, D. S., Irfan, M., & Effendy, H. (2018). Supply chain management using fp-growth algorithm for medicine distribution. *Journal of Physics: Conference Series*. <https://doi.org/10.1088/1742-6596/978/1/012018>
- Wang, J., & Han, J. (2004). BIDE: Efficient Mining of Frequent Closed Sequences. *Data Engineering, 2004. Proceedings. 20th International Conference on*.
- Wardani, A. S. (2021). Pengguna Internet Dunia Tembus 4,66 Miliar, Rata-Rata Online di Smartphone. Retrieved October 3, 2021, from liputan6.com website: <https://www.liputan6.com/tekno/read/4469008/pengguna-internet-dunia-tembus-466-miliar-rata-rata-online-di-smartphone>
- Widiyani, R. (2021). Agama Terbesar di Dunia 2021 Berdasarkan Jumlah Pemeluknya. Retrieved October 3, 2021, from detikEdu website: <https://www.detik.com/edu/detikpedia/d-5708636/agama-terbesar-di-dunia-2021-berdasarkan-jumlah-pemeluknya>
- Witro, D. (2020). Urgency Building Islamic Economic System In Indonesia Al-Quran Perspective. *Jurnal Ekonomi Islam, 11*(1), 65–74.
- World Population Review. (2021a). Muslim Population By Country 2021. Retrieved October 3, 2021, from worldpopulationreview.com website: <https://worldpopulationreview.com/country-rankings/muslim-population-by-country>
- World Population Review. (2021b). Religion By Country 2021. Retrieved October 3, 2021, from worldpopulationreview.com website: <https://worldpopulationreview.com/country-rankings/religion-by-country>
- Yan, X., Han, J., & Afshar, R. (2003). CloSpan: Mining Closed Sequential Patterns in Large Datasets. *Conference: Proceedings of the Third SIAM International Conference on Data Mining, San Francisco, CA, USA*, (0).
- Yanggo, H. T., & Muhaimin, A. W. A. (2019). *Problematika fikih kontemporer*. Gaung Persada Press.
- Yulianingsih, T. (2020). 2 Ulama Indonesia, AA Gym-Quraish Shihab Masuk Daftar Muslim Berpengaruh Dunia 2021. Retrieved October 10, 2021, from liputan6.com website: <https://www.liputan6.com/global/read/4433985/2-ulama-indonesia-aa-gym-quraish-shihab-masuk-daftar-muslim-berpengaruh-dunia-2021>
- Zuhrah, F., Ardiansyah, A., & Adly, A. (2020). Status of MUI's Recommendation in Facing Islamic Contemporary Issues in Indonesia. *INTERNATIONAL JOURNAL ON LANGUAGE, RESEARCH AND EDUCATION STUDIES, 4*(1), 54–65.