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**Submission date:** 11-Jan-2022 10:11AM (UTC+0700)

**Submission ID:** 1739905580

**File name:** 3. Sentiment Analysis of Religious Moderation in Virtual Public Spaces during the Covid-19 Pandemic.pdf (800.45K)

**Word count:** 5007

**Character count:** 29190



## Sentiment Analysis of Religious Moderation in Virtual Public Spaces during the Covid-19 Pandemic

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### Article History:

Received: April 8<sup>th</sup>, 2021

Revised: May 20<sup>th</sup>, 2021

Accepted: June 2<sup>nd</sup>, 2021

Published: June 29<sup>th</sup>, 2021

### Keywords:

Covid-19,  
Determining moderating factor,  
Faith moderation literacy,  
Islamic education,  
Sentiment analysis

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**Abstract:** In Indonesia, the COVID-19 pandemic has resulted in the virtualization of most social and educational activities, including discourse on the dynamics of Islamic education, which is colored by contextual differences in *manhaj*, ideology, and religious practice. Social media has evolved into a new role as a multicultural public space that reflects the Indonesian people's religious literacy diversity. As a subsystem of national education, Islamic education plays a critical role in internalizing the Indonesian people's competencies. Religious moderation literacy will lead Indonesian people who are multicultural to a more accepting and inclusive attitude while reducing social conflicts. The purpose of this research is to ascertain public sentiment toward religious literacy in Indonesia during the 2020 Covid-19 outbreak. Twitter was chosen as the virtual public space to study in this context because, according to previous research, it is a social media platform widely used by Indonesians to discuss serious topics in education and religion. The researcher employs a type of quantitative exploration as a statistical testing technique. The data collection technique was crawling through open public data associated with Twitter's Application Programming Interface (API). This research generated findings in a word cloud labeling graph containing data on religious moderation participation. The sentiment analysis score obtained is - 0.9183, which is higher than 0.4588 on religious moderation content. The combined score is 0.565, which is higher than 0.333. The results are also contained in a sentiment analysis heat map visualization. The researchers recommend future researchers compare the ratio of religious moderation material on Islamic religious education subjects in online learning.

## INTRODUCTION

According to the most recent Indonesian Internet Service Providers APJII (2020) survey, the number of internet users in Indonesia has increased significantly. Between June 2 and June 25, 2020, researchers filled out questionnaires and interviewed 7,000 random people with a margin of error of 1.27 per cent, resulting in an 8.9 per cent

increase compared to the amount percentage in 2019. Numerous factors have contributed to Indonesia's significant increase in internet use, one of which is the increasing prevalence of broadband infrastructure facilities in various regions (Bappenas, 2018), as well as the pandemic era. Covid-19 legitimizes Indonesia's systematic exclusion of the community of social activity educators

from offline public spaces, including the social space for Islamic education.

The world of education should be constantly updated to meet the needs and environmental conditions (Munifah et al., 2019). Islamic education must be developed to meet the challenges (Tauhidi, 2001). The implication is that if there is no development, Islamic education's activities will cease to be relevant, will cease to exist, and will revert to a symbolic process (Amin, 2015). In other words, Islamic educational materials serve as a reminder that the Islamic religious spirit, its activities, culture, and existence continue to exist in Indonesia.

A religious spirit is capable of appropriately providing meaning, enlightening, and changing the students' futures. Such a paradigm is critical for understanding the dynamics of education as a whole, all the more so given that the problem of Islamic education has thus far been constrained by a limited perspective (Salsabila, 2019). For example, it is only concerned with the cognitive abilities of graduates.

The acceptance of Islamic education learning outcomes is still prioritized by Muslims' dogmatic-religious egos, not for the benefit of the people (Amin, 2015). This assumption must, of course, be examined further in the context of moderation, as mainstreaming the value of moderation is critical for the development of an inclusive and tolerant Indonesian society (Agus, 2019).

According to Wibowo (2019), the latter social media interaction is also increasingly in demand by Islamic preachers to convey material educating the *bil-kitabah* and *bil-kalam* that is subjectively tailored to the preacher's passion, and the predictive trend is the use of digital platforms by netizens. Muhtada (2020) describes similar data obtained from the phenomenon of the proliferation of online Islamic studies organizations due to the segmentation of moderate

Islamic preachers who are defined by their tolerance and inclusiveness in their preaching methods.

If reality resumed its role as system education and Islamic education as a subnational educational system with multicultural characteristics (Irham, 2018), the placement of literacy competence in the context of religion moderation became one of the fundamental manners that Muslims in society should control when socializing in virtual public spaces (Cholil, 2016).

Literacy is a life skill that enables humans to function optimally in society. The life skills acquired through literacy will be reflected in problem-solving and critical thinking abilities. Besides, literacy is a reflection of competence and cultural awareness. A cultured society instils positive values as a means of self-actualization. Self-actualization can only be accomplished through strong literacy abilities (Irianto et al., 2017).

Transferring social activities from offline to online, including Islamic education services, is undoubtedly risky if religious moderation, which initially developed as a basic competency in offline social interactions in response to Indonesia's multicultural reality, must now be socialized and internalized as a distinct strategy (Siswanto, 2020).

So that individuals can maintain control over them while interacting socially online during the Covid-19 pandemic. To become a viable solution for addressing Indonesia's reality of diversity (Chen, 2015), the multicultural character of all aspects of national education services must constantly be elevated as a national discourse through various systemic and bureaucratic activities. Suppose internalization occurs manually, individually, partially, and conventionally in both concept design and implementation. In that case, the role of Islamic education in transforming the normative and substantive values of

religious moderation becomes increasingly important.

Rather than that, reading the reality of moderation dynamics in the virtual public sphere remains exceedingly rare. Suppose contextual curriculum materials and educational services are precise in their selection and categorization of specific value internalization strategies. In that case, they must take a comprehensive look at the field conditions. Similarly, the value of religious moderation must be understood in terms of its dynamic fluctuations within the larger community before designing and developing relevant and contextual moderation practices (Dahlberg, 2000).

One of the assessment strategies is to integrate moderation with natural social settings to see the reality of moderation dynamics in the Covid-19 era. The majority of educated individuals spend their time virtually interacting to implement health protocols (Nahdi et al., 2020). In this context, the popularity of social media platforms among netizens can only serve as a comprehensive representation of the need for such information media.

Given the calibre of their research, it's unsurprising that a growing number of academics have begun to investigate the reality of religious moderation disparities in Indonesia's virtual public spaces, as Arenggoasih & Wijayanti (2020) did in their study on the effectiveness of social media in influencing public opinion. Additionally, Kosasih et al., (2020) researched the importance of social media literacy during a pandemic, and Gumilar et al., (2017) researched smart ways to control social media hoaxes.

The study examined the popularity of hashtags on the official Instagram account of the Republic of Indonesia's Ministry of Religion. Lim (2005) examined how the internet contributes to radical Islamism and anti-American sentiment in Indonesia. Djelantik (2019) also conducted a similar study to

determine the effectiveness of portal no-man (anonymous sharing portals) in achieving the internal agendas of religious communities specified in the homeland.

They concluded from a review of the literature that studies focused on sentiment analysis via social media platforms focusing on religious object moderation are still being conducted by a small number of academics with an emphasis on Islamic education. This conclusion demonstrates the lack of literature on sentiment analysis and religious moderation when viewed through Islamic studies and educational services. The majority of sentiment analysis research has concentrated on developing tests and optimizing machine learning designs from a mathematical and informatics perspective on social media, especially Twitter, as in Buntoro (2016) study of hate speech content.

Twitter has developed into an attractive tool for various groups to track users' desires in real-time for any situation. This is a potential data source for millions of people (Dijk, 2012). Everything on Twitter is accessible as a data stream that can be mined using stream mining techniques, such as public opinion on a universally accepted topic or issue.

In general, these circumstances should heighten our awareness of the influence of public opinions, including the public debate over the content of religious moderation. Due to the country's high proportion of intense social media users, about 85.4 percent, a sentiment analysis study on religious moderation content in Indonesia should produce results with a high degree of curative validity (Prihono & Sari, 2019).

To make a significant contribution to the treasures of Islamic studies, particularly in the area of national religion moderation, the researcher conducted a sentiment analysis study that combines normative religious terms with



contemporary technological realities in virtual public spaces.

Hopefully, the outcome of sentiment analysis of the dynamics of religious moderation within the context of a virtual community will serve as a legitimate source of referral data for developing strategies to support the Islamic education system's nationwide multicultural character.

## METHOD

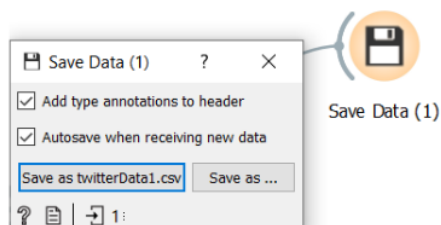
This research employs a quantitative approach (Pak & Paroubek, 2010) to describe the characteristics of the content and draw inferences about the content from each object under investigation. This research involves the exploration (Singh, 2015) of data without testing concepts on the studied reality. The descriptive-statistic analysis was performed to illustrate the phenomenon without elucidating the connections or relationships between the objects (Gerstein et al., 1988).

Meanwhile, in this research, the sentiment analysis test determines whether the text in documents, sentences, or opinions contains positive or negative aspects. The researchers attempted to comprehend the various inter-dimensional relationships or variables that emerged from the quantitative data discovered in this research without first developing a hypothesis, as is customary in quantitative research. In addition, the researcher presents the data in the form of a visual graph and describes it exploratively using inductive reasoning. In this regard, the study used Twitter API data from 1000 account users to conduct statistical tests.

Quantitative data is displayed using word cloud tagging and heat map graphs created with University of Ljubljana (2020) as a consequence. The researcher then describes the graph in an exploratory manner from the perspective of Islamic education. The stages of sentiment analysis used in the study are as follows.

## Crawling Data Collection

This research takes the topic of sentiment on religious moderation content, a social domain study, and employs a virtuoso interpretation of text mining (DiMaggio et al., 2013) from an Islamic studies perspective.



**Figure 1.** Distribution of Tweets in the Form of Comma Separated Values (CSV) Corpus Data.

To analyze text, a Twitter data crawling step is required. The crawling process is designed to collect responses from 1000 active users. Respondents were chosen based on the popularity of religious moderation-related hashtags containing the terms, “toleransi”, “moderansi”, “agama”, “multikultural”, “persatuan”, “nasional”, and “pendidikan”.

The crawling data was collected between March and December 2020 and resulted in the distribution of tweets in the form of Comma Separated Values corpus data as shown in Figure 1 (Hipp: Doc: RFC 4180: Common Format and MIME Type for Comma-Separated Values (CSV) Files, n.d.). Meanwhile, Figure 2 illustrates the corpus display resulting from data crawling for the distribution of tweets via the Twitter Application Programming Interface (API) data.

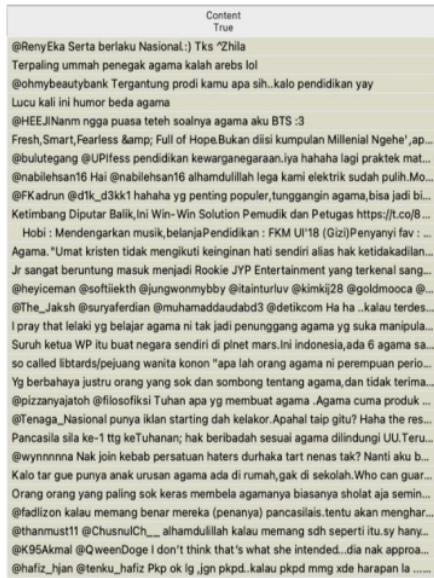


Figure 2. Corpus Data Visualization based on the Results of Crawling.

**Corpus Pre-Processing**

Before conducting text analysis on a corpus of data, perform pre-processing on the text, which includes a series of activities such as sorting the text into smaller units or tokens by default, transformation, tokenization, and normalization. In this case, the architecture of an information extraction system is depicted in Figure 3. It begins the document's raw text is divided into sentences using sentence separators and then further divided into words using a tokenizer. Following that, each sentence is assigned a part-of-speech tag, which will prove extremely useful in the following step, entity detection.

This step examines each sentence for potentially intriguing entity titles. Finally, the researcher employs relation detection to look for possible connections between the text's various entities. The pre-processing stage aims to minimize the size of each input data set required for sentiment analysis.

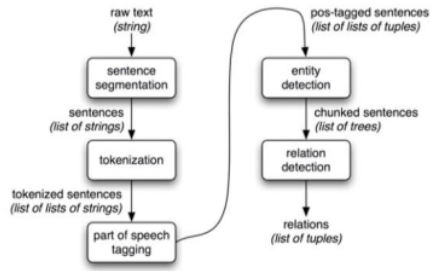


Figure 3. Extraction System with a Simple Pipeline Architecture.

**Selection of Features**

In this research, feature selection is a process that eliminates unnecessary words and symbols from the sentiment analysis process using Latent Blei et al., (2003) It uses contextual cues to classify related words and denote the use of ambiguous terms (polysemy).

After generating multiple topic allocations for the same term, the researcher created a term visualization to determine the correct topic label. The researcher used word clouds to present the findings of visual analysis in this research (DeNoyelles & Reyes-Foster, 2015). The process of selecting features and topic labelling in this research is depicted in Figure 4.



Figure 4. Selection and Marking Flow.

**Sentiment Analysis using Python**

Sentiment analysis was performed on Twitter user responses in this research using the Valence Aware Dictionary and Sentiment Reasoner or Vader model (Hutto & Gilbert, 2014). Vader can calculate sentiment by combining lexical features (e.g. words) that are typically categorized as positive or negative based on their semantic orientation. Thus, the analysis's results inform us of positive and negative sentiments and the degree to which these positive or negative sentiments are reflected in the findings.



The analysis of this initial interpretation continues to have flaws, as evidenced by the appearance of the word cloud graphic display of several less standard visual words from regional languages and slang languages. This is a flaw in the machine learning-based analysis model that is automatically translated into Indonesian.

While the graphic display is not without flaws, it is sufficient to represent the most frequently discussed discourse topics for religious moderation content in Indonesia during the Covid-19 pandemic in 2020. The reality of religious moderation dynamics in virtual public spaces can be examined further in light of implementing home-based learning (Kemendikbud, 2013). Especially in the aspects of learning Islamic education.

The introduction of the terms "pendidikan", "agama", "nasional", "toleransi", "Islam", "Indonesia", "negara", "sekolah", "belajar", and "persatuan" at the first and second levels of frequency indicates the establishment of certain factors in the public sphere relating to religious moderation.

These findings can be interpreted that Indonesian people have the potential to be open-minded to discourse and practice of religious moderation. Being receptive to new ideas and values is a necessary component of social and cross-cultural competence. These abilities are critical for success in the twenty-first century (Siti, 2016). In this context, all elements of national education can make a massive contribution to the process of internalizing the value of moderation.

The education system, which contains a multicultural character, systemically has the potential to build culture and at the same time change the paradigm of society towards the practice

of religious moderation (Asmuri, 2017). Meanwhile, from the community aspect, as a stakeholder in the education system, it allows for a process of acculturation and adaptation to the contextual concept of moderation.

This finding is consistent with Arafik (2019), which asserts that school serves as an effective vehicle for transforming students' attitudes, values, and interests. If the term "school" is interpreted definitively, it retains relevance for the term "education," thereby expanding the range of visualization quantities in the word cloud.

The findings of this research also corroborate several of the findings of previous research conducted by Hasanah (2019) and Furqan (2019) on the content analysis of tolerance materials in the subject of Islamic Religious Education. Both of these studies discovered a predominance of content on moderation and tolerance in student textbooks.

These results also indicate that pandemic situations requiring people to remain at home do not seem to remove the emphasis on moderation and religious material in public discourse. A pandemic catastrophe that adds new pressures to different facets of life does not inherently diminish people's interest in national unity and honesty issues.

This is amply demonstrated by the findings of grouping Twitter discussion subjects, which continue to be heavily weighted toward religious content throughout the pandemic. New topics that gain considerable attention on Twitter have no discernible effect on the frequency score on the subject of religious moderation, which is between 100 and 500 tweets per day, one of which is depicted in Figure 8.



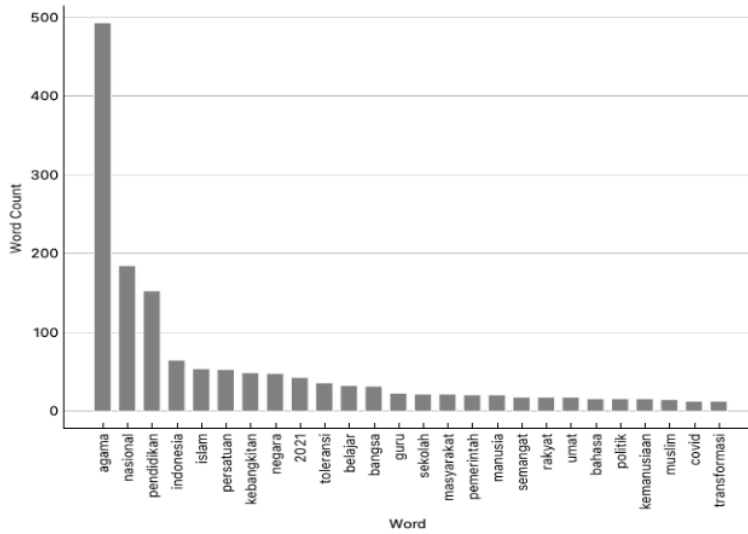


Figure 8. Average Number of Twitter Users Tweet about Moderated Religious Content Daily.

**Public Opinions of Twitter's Religious Moderation Content**

The Vader Sentiment Analysis algorithm was used to position the data in this report. Vader will assign a numerical value to each sentence (review). Positive, negative, and neutral scores are produced as a result. Both of the resulting scores will be added together to create a compound value.

All normalized scores between -1 and +1 are calculated using the matrix equation. Compound values less than zero (compound < 0) are designated as negative classes, while compound values

greater than zero (compound ≥ 0) are designated as positive classes.

Alternatively, it can be measured by the percentages of positive and negative terms in a sentence. If the percentage of positive words in a sentence is greater than the percentage of negative words, the sentence is classified as a positive class; conversely, if the percentage of negative words in a sentence is greater than the percentage of positive words, the sentence is classified as a negative class. Positive sentiment has a combined value of 0.4588 in this research, while negative sentiment has a combined value of -0.9183, as shown in Figure 9 and Figure 10.

title	Content True	pos	neg	neu	compound
741	@RenyEka Serta berlaku ...	0.333	0	0.667	0.4588
647	Terpaling ummah penagak...	0.318	0	0.682	0.4215
193	@ohmybeautybank Terga...	0.298	0	0.702	0.5267
130	Lucu kali ini humor beda a...	0.296	0	0.704	0.2732
997	@HEEJINanm ngga puasa ...	0.292	0	0.708	0.5106
214	Fresh, Smart, Fearless &am...	0.275	0	0.725	0.8856
861	@bulutegang @UPIfess pe...	0.265	0	0.735	0.5574
862	@nabilehsan16 Hai @nabil...	0.217	0	0.783	0.7269
662	@FKadrun @d1k_d3kk1 ha...	0.205	0	0.795	0.5574
612	Ketimbang Diputar Balik, In...	0.204	0	0.796	0.3182

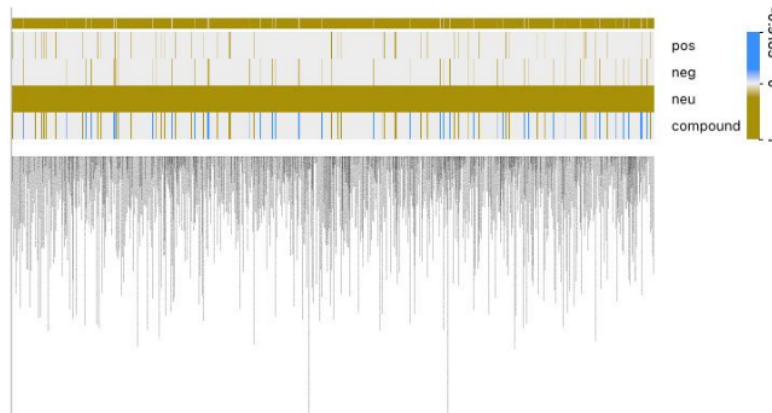
Figure 9. Positive Sentiment Labeling Results.

title	Content True	pos	neg	neu	compound
261	@TengkuHaslinda Lebais ...	0	0.565	0.435	-0.9183
781	@dmirrati Guru agama ;(T...	0	0.293	0.707	-0.4404
710	Islam agama damai itu bull...	0	0.275	0.725	-0.5859
955	@yazid_fadhlan @GUSDU...	0	0.208	0.792	-0.2732
497	Menteri malaysia ramai ya...	0	0.2	0.8	-0.5423
282	block lah aku kalau korang...	0	0.195	0.805	-0.4404
660	Cowo yg insecure sama p...	0	0.189	0.811	-0.4215
567	ada juga lo ngomong gitu ...	0	0.184	0.816	-0.4871
912	@dehadaud Nah itu...mere...	0	0.167	0.833	-0.1027
898	@wynnnnna Nak join keba...	0.113	0.165	0.722	-0.25

**Figure 10.** Negative Sentiment Labeling Results.

The highest positive sentiment score is 0.333, while the highest negative sentiment score is -0.565. This sentiment analysis confirms Mulkhan (2013) that contemporary society continues to undervalue the values of Islamic education, especially in the realm of

practical application in daily life. This is consistent with Abdullah Munir, Aisyahnur Nasution, Abd. Amri Siregar et al., (2020) over the lack of contextualization of the importance of religious moderation in the Islamic education curriculum.



**Figure 11.** Results of Sentiment Visualization using a Heat Map Chart

This circumstance is reflected in the high level of negative sentiment created by virtual public spaces during the pandemic. As illustrated in Figure 11, the heat map graph illustrates the high level of negative sentiment through the resulting colour density level.

## CONCLUSION

The sentiment and labelling analysis results found that group participation in the religious moderation topic in the social context, both terms of length and

frequency during the Covid-19 pandemic, were high. Furthermore, as a subsystem of national education, Islamic education seeks to textually reflect the importance of religious moderation in the curriculum by making appropriate teaching materials accessible. The complexities of public views of issues concerning religious moderation content reveal that the negative sentiment is higher than the positive sentiment. Also, public awareness of the religious moderation importance is inversely proportional to

the quantity of religious moderation teaching materials used in the national curriculum.

The researchers found several limitations in this research that future researchers can use to obtain much more accurate results. The number of Indonesian vocabulary words is used to classify sentiment data. Among these constraints, the researchers are most concerned with the number of new words and sentences that do not conform to the Kamus Besar Bahasa Indonesia or KBBI, the mixing of foreign languages, and the inclusion of emoji symbols in the form of a collection of strange characters that affect the researchers' subjectivity during statistical tests. Additionally, researchers frequently struggle to label the ambiguity of the meaning of a sentence extracted from tweet data. The researchers recommend future researchers compare the ratio of religious moderation material on Islamic religious education subjects in online learning.

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