

# A Dashboard System for Social Media Analytics of Pandemic Relief

Nur Insyirah Abdul Rahim, Mohamed Ali Saip\*, Nurnasran Puteh

<sup>1,2,3,4</sup>School of Computing, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

\*Corresponding Author: mdali@uum.edu.my

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**Abstract:** Social media is known as a prominent digital platform for communicating and sharing content all over the world. Facebook, Instagram, and Twitter are the most popular social media platforms used to interact among online users. As the pandemic of the coronavirus disease 2019 (COVID-19) hit the world, many users shared their current conditions and opinions that affect their daily lives. The extensive and increasing use of social media will continue to generate massive user-generated content. The growing body of user-generated content presents numerous opportunities for the government and stakeholders to understand the affected groups. However, the stakeholders have not yet utilized the potential of this data. One of the reasons is the lack of mechanisms and tools to analyze this new data format. Thus, this study aims to develop a social media analytics toolkit (SMAT) that can be applied to analyze social media data. A prototyping model was used in the development of this study. The final toolkit was tested with empirical data from one of the social media platforms to evaluate its impact in actual practice. The findings of this study indicated that the toolkit named SMAT was ready to be used and could assist participants in easing their work.

**Keywords:** *Social Media, Social Media Analytics, Dashboard, Covid-19*

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## 1. Introduction

Social media growth has changed the global perception of interaction. Social media refers to internet-based services for individuals to share and discuss information [1]. Social media also allow people to connect easily due to highly accessible and scalable publishing mechanisms such as Facebook, Instagram, and Twitter. The ever-increasing use of social media in everyday life provides valuable data resources for analyzing specific situations. For example, during the coronavirus disease (COVID-19) that hit Malaysia in early 2020, social media became a medium for the community to update news about this disease. Government agencies worldwide have been experimenting with using social media to stimulate citizen participation in crisis management [2] to ensure all citizens get the new update about COVID-19. It is because social media can spread the news quickly and widely to all countries, especially Malaysia.

In Malaysia, 745,703 confirmed cases of COVID-19 and 5108 deaths had been recorded by the World Health Organization (WHO) until 30 June 2021. COVID-19 has significantly affected Malaysian citizens as many people have become jobless and need help to improve their lives. However, Malaysia has many stakeholders who are always willing to lend their hand to help these incapable people and low-income families. People affected by the disease could ask for help from the stakeholders' official websites on their own time. Unfortunately, not everyone was privileged enough or had good facilities to seek help. Furthermore, Phase 1 of Movement Control under the National Recovery Plan (NRP) has been announced and extended because the number of Covid-19 cases in the country had not fallen below the 4,000 required to go to the next step [3]. Hence, it has become an issue not only for the needy people to seek help but also for the stakeholders to track and help them due to the limitation of their movement to help people in need.

**Corresponding Author:** Mohamed Ali Saip, School of Computing, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia, +6049285114

Therefore, this study addressed this problem by formulating a new method for stakeholders to track and help these unable people. A social media analytics toolkit (SMAT) dashboard system was developed to visualize the dataset scraped from social media using keywords such as “Mangsa banjir”, “Mangsa kebakaran” and “Sumbangan derma” to demonstrate the solution to this problem. People tend to write and share posts about a post they love to read or a post that contains information about seeking help from others. By getting the information from the posting, we detected the issues or problems that needed a solution. In this study, Facebook was chosen as a social media platform because it brought new opportunities for users to share news stories, allowing them to function as opinion leaders in their networks, promote conversation, and potentially expand their involvement in current events [4]. Even though Facebook is not the most popular place to read and get the latest news, the potential to use it as a discussion forum might make it a beneficial platform for news distribution for various reasons.

By conducting this study, SMAT helped stakeholders track and help people in need among Malaysian citizens faster and easier via social media platforms. The dataset scrapped from Facebook helped the stakeholders to search and read in a single dashboard. In addition, information such as names, locations, and numbers of affected people could be easily tracked using social media data that the SMAT dashboard system has visualized. This innovation also gives the stakeholders the benefit of using social media instead of depending on an offline method, which requires more time to complete one case.

## 2. Related Studies

Social media is a popular communication platform among users around the world. One of the reasons for social media’s success is the ability to receive, create, and share public communications at minimal cost and from anywhere [5]. The fastest delivery offered by social media made people more tended to use this platform to communicate with people instead of using the traditional method. Social media refers to communication systems created and supported by people’s interpersonal interactions via a specific technique or device [10]. Social media also acts as a social networking site that can spread information faster than traditional news [7] to the community. Data generated in social media can be utilized for future studies on several issues in our community.

As social media usage keeps increasing daily, the data from social media is being studied in various fields. The activity of obtaining data from social media platforms and analyzing the data to assist decision-makers in addressing specific problems is known as social media analytics [8]. Previous studies show that data discovery, gathering, preparation, and analysis are all processes in the social media analytics process [5,6]. Social media analytics has been widely used among employees, social scientists, and managers of an organization to analyze issues that need to be

focused on as it encourages a very exploratory approach to data and analysis [6]. Even though social media analytics has a complex process, it is significantly valuable in decision-making. Findings generated from the social media analytics process can be visualized in the dashboard to be utilized by the decision-making teams.

The dashboard system is a simple, easy-to-read, and easy-to-use tool for keeping track of the summary data and information of the system. The dashboard system was used to enhance decision-making as many data sources in a specific area of an organization or agency are valuable in supporting and defining policy and decision direction [7,8]. These dashboards display quantitative and multidimensional data in real-time [9] and visualize representation to achieve the goals of the SMAT dashboard system. In addition, a visual analytics dashboard for a decision support system for disaster management is critical [9] because it can save cost and time in tracking and helping people in need.

## 3. Methodology

The prototyping model was used in the development of this study. It involved an agreement between the developer and the stakeholders to achieve the system’s requirements. In addition, stakeholder feedback was used as a guideline to develop and improve the social media analytics tool. There were six processes for developing the SMAT dashboard system: identification of the requirements, initial design creation, prototype development, user evaluation, prototype refinement, and implementation and maintenance. Figure 1 shows the process of prototyping applied as this study’s methodology.

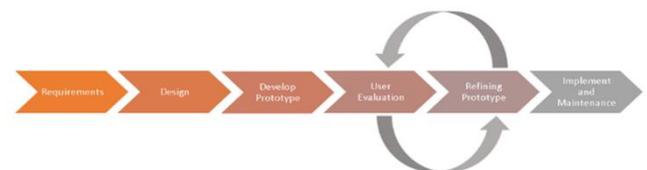


Figure 1. Process of the prototyping model

In the initial phase, the stakeholders participated in the requirement-gathering process. A series of interviews and discussion sessions were conducted that involved the stakeholders. The development team recorded all the requirements and reviewed them with the stakeholders. A list of requirements was documented at the end of this phase. In the second phase, requirement models were developed and visualized using Unified Modeling Language (UML). Finally, a prototype of the system was developed in the third phase to represent the requirements. Details of the requirements models and the prototype development are discussed in section four.

The proposed prototype was presented to the stakeholders for evaluation in the fourth phase. During the evaluation process, the stakeholders had experienced using the system and a set of questionnaires was given to record their feedback.

The developer recorded all the comments to improve the tools. Based on the stakeholders' feedback, the developer determined the issue in the prototype and worked accordingly. This process was repeated until the prototype met all the stakeholders' requirements. Finally, the tool was ready to be delivered to the stakeholders once it was tested. The developer kept maintaining the system and documenting the stakeholders' experience to minimize the issues.

#### 4. Design and Development

This section discusses the design and development of the SMAT dashboard system from the requirements gathering to the prototype. The SMAT dashboard system is a dashboard system that allows employees and managers to do the main tasks in this dashboard system. Firstly, requirement gathering was carried out by conducting an interview with staff from *Pejabat Zakat Negeri Kedah*. Several questions have been asked, such as "What is the medium they have used to distribute the donation to the community?" and "How did they manage and save information about the donation?". Functional requirements and non-functional requirements were the aspects that were followed to achieve this project's purpose.

For functional requirements, this dashboard system allowed the manager and employee to access the dashboard system by registering an account or logging in to avoid unknown users entering this dashboard system. To ease employees, work in managing donations, the employee was given the option to choose any provided keyword to track tweets about people in need. Besides, to ensure the tweets were up to date, this dashboard system provided a calendar where employees select the date they want to track. Furthermore, this SMAT dashboard system helped the employees make an approval request to the manager, and the manager could approve the system in a short time. In the previous method of viewing feedback, the manager had to manually check on their social media to view feedback based on comments and likes, but this dashboard system automatically showed all feedback about their organizations in one dashboard. Table 1 lists the functional requirements of the SMAT dashboard system.

Table 1. The functional requirements definition of SMAT Dashboard System.

No.	Requirement ID	Requirements Definition	Priority
1	SMA1	Register Account	
	SMA11	The SMAT dashboard system provided a simple form for managers and employees to fill in before logging in to the dashboard system.	Mandatory
2	SMA2	Login Account	
	SMA21	The SMAT asked the manager and employee to fill in their username and password before	Mandatory

		logging in.	
3	SMA3	Search Tweets	
	SMA31	The SMAT provided suitable keywords related to donation tweets to be chosen by the employees.	Mandatory
	SMA32	The SMAT displayed related tweets based on a keyword chosen by the employees.	Optional
4	SMA4	Manage Data	
	SMA41	The SMAT allowed the employees to manage the related tweets before sending it to the manager.	Mandatory
5	SMA5	Manage Request	
	SMA51	The system sent a notification to the manager. Then the manager had to decide whether to approve or reject it.	Mandatory
6	SMA6	View Feedback	
	SMA61	The SMAT allowed the manager to choose any provided keyword related to feedback tweets.	Mandatory
	SMA62	The SMAT displayed all feedback based on a chosen keyword.	Optional

The functional requirement from Table 1 has been transformed into a computer model using Unified Modeling Language (UML). UML is a general-purpose modelling language that is intended to provide a standard way to visualize the design of a software system [11,12]. In this study, the diagram was visualized by using the Star UML tool. In addition, use Case Diagrams were used to represent the functional needs of the system under development and the interaction between the system and the outside world [13]. Furthermore, the Use Case Diagram was required to understand more and make a meaningful contribution to the project development process. Hence, the development of the SMAT dashboard system could also be visualized in a sequence diagram. Figure 2 shows the use case diagram of the SMAT dashboard system.

A class diagram also was developed in this study. A class diagram's purpose was to describe a system's structure by displaying the system's classes, attributes, operations, and object relationships. Figure 3 displays the class diagram of the SMAT dashboard system.

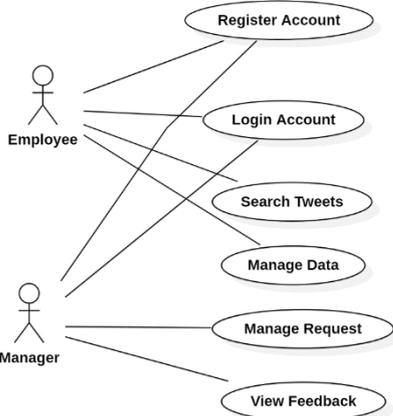


Figure 1. Use Case Diagram for Social Media Analytics Toolkit

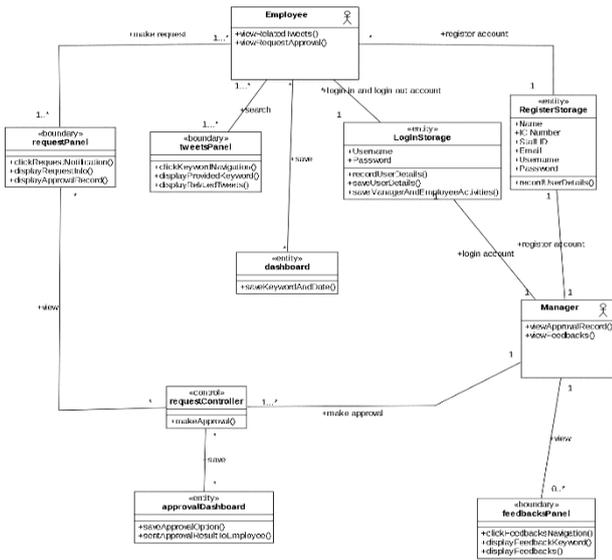


Figure 3. Class diagram for SMAT dashboard system

The prototype of the SMAT dashboard system has been developed based on the requirements. The NetBeans and MySQL were employed to develop the system. Figures 4 to 8 show interfaces of the primary function of the SMAT dashboard system.

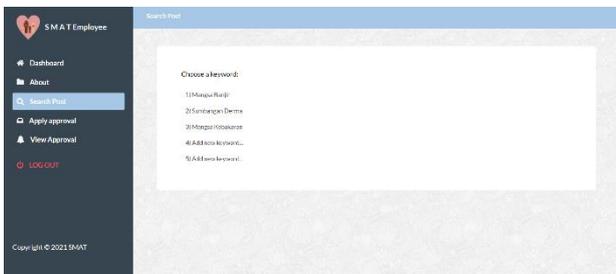


Figure 4. Employee 'Search post' page

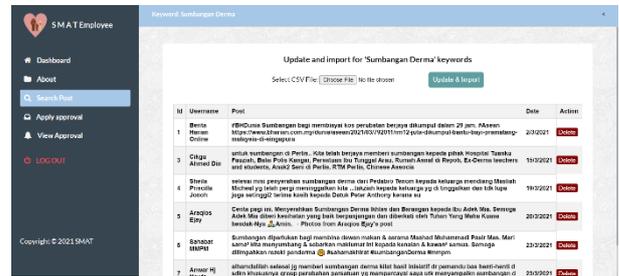


Figure 5. Employee reads and uploads post page

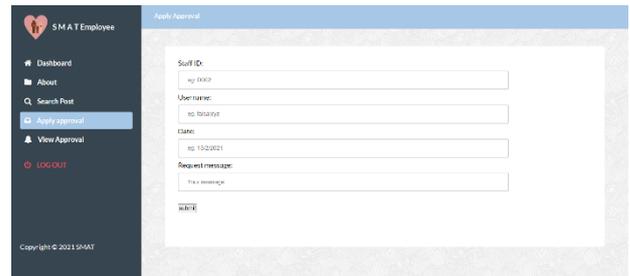


Figure 6. Employee 'Apply approval' page

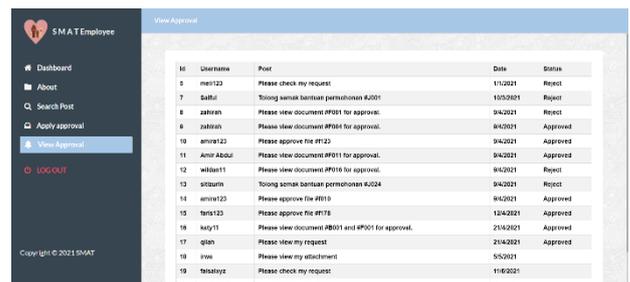


Figure 7. Employee 'View approval' page

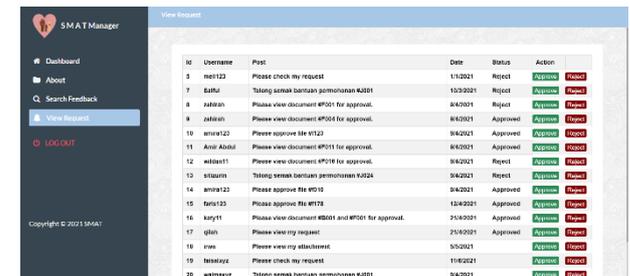


Figure 8. Manager 'View request' page

## 5. Evaluation

The objectives of the evaluation were to obtain user feedback on usability issues and to validate the system's usability. A usability evaluation was conducted by collecting 32 respondents to answer the survey using the Google Form questionnaire. The participants were required to use an online medium such as the WhatsApp application. The consent form was given to the participants before they participated in this survey. The post-test questionnaire was the instrument for this SMAT dashboard system evaluation where the participant must run the SMAT dashboard system before they answer the questionnaire. There were two

sections in this post-task questionnaire: Section A was about the demographic and background information, while Section B was about the usability of tracking and managing tasks in the SMAT dashboard system. Section A consisted of seven questions about demographics, while Section B was a Likert scale question which consisted of 25 questions about the SMAT dashboard system. A simple instruction was given out to the participants before they started answering the questionnaire. The findings obtained from this evaluation were used to help improve the SMAT dashboard system to make sure the dashboard system was ready to be used and met the user requirements.

Thirty-two participants have participated in this study. The participants were primarily female (75%) and male-only (25%). Furthermore, for the next question, all participants answered ‘daily’ for the question, ‘How often do you use social media?’ from the questionnaire. The most used social media was Twitter, which was (43.8%) compared to Facebook with only (25%), followed by Instagram, which

was (31.3%). From the evaluation, only (40.6%) of participants had heard about Social Media Analytics, followed by (37.5%) who were unsure about it and only (21.9%) said they had never heard about Social Media Analytics. However, 31.3% of the participants used social media to track posts about people in need, and only (9.4%) of participants were not sure about it.

The participant tested the SMAT dashboard system by following the provided instructions. If they had any problems during the testing, the participant could contact the developer to ask questions about the system. The purpose of conducting this evaluation and testing the usability of tracking and managing tasks in the SMAT dashboard system was to collect participant feedback. By collecting the results, users’ satisfaction was measured and implemented in the SMAT dashboard system to meet the user requirements. Table 2 shows the details of the user satisfaction with tracking and managing the SMAT dashboard system.

Table 2. User Satisfaction of Tracking And Managing SMAT Dashboard System

The post-task questionnaire items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Overall, I am satisfied with the ease of completing this task	0 (0%)	0 (0%)	8 (25%)	12 (37.5%)	12 (37.5%)
Overall, I am satisfied with the amount of time it took to complete this task.	0 (0%)	0 (0%)	7 (21.88%)	11 (34.38%)	14 (43.75%)
SMAT dashboard system enhances my effectiveness in viewing all posts from the Facebook page in a single dashboard.	0 (0%)	0 (0%)	4 (12%)	15 (46.86%)	13 (40.63%)
SMAT dashboard system increases my productivity in managing all posts based on provided keywords.	0 (0%)	0 (0%)	5 (15.63%)	16 (50%)	11 (34.38%)
SMAT dashboard system makes it easier to update and import new posts into the provided keyword.	0 (0%)	0 (0%)	7 (21.88%)	13 (40.63%)	12 (37.5%)
SMAT dashboard system gives me greater control over my work.	0 (0%)	0 (0%)	5 (15.63%)	17 (53.13%)	10 (31.25%)
SMAT dashboard system enables me to accomplish tasks more quickly.	0 (0%)	0 (0%)	6 (18.75%)	14 (43.75%)	12 (37.5%)
SMAT dashboard system allows me to send an approval request to the manager in a simple way.	0 (0%)	0 (0%)	4 (12%)	16 (50%)	12 (37.5%)
SMAT dashboard system meets my needs.	0 (0%)	0 (0%)	9 (28.13%)	13 (40.63%)	10 (31.25%)
SMAT dashboard system does everything I would expect it to do.	0 (0%)	0 (0%)	7 (21.88%)	17 (53.13%)	8 (25%)
SMAT dashboard system is useful overall.	0 (0%)	0 (0%)	6 (18.75%)	16 (60%)	10 (31.25%)
SMAT dashboard system is easy to use.	0 (0%)	0 (0%)	4 (12%)	16 (50%)	12 (37.5%)
SMAT dashboard system is user friendly	0 (0%)	0 (0%)	7 (21.88%)	12 (37.5%)	13 (40.63%)
SMAT dashboard system required fewer steps to accomplish what I want to do with managing the Facebook post.	0 (0%)	0 (0%)	5 (15.63%)	16 (50%)	11 (34.38%)
SMAT dashboard system is easy to learn how to use it.	0 (0%)	0 (0%)	4 (12%)	12 (37.5%)	16 (50%)
I can use the SMAT dashboard system without written instructions.	0 (0%)	0 (0%)	5 (15.63%)	15 (46.86%)	12 (37.5%)
I can easily remember how to use it.	0 (0%)	0 (0%)	8 (25%)	13 (40.63%)	11 (34.38%)
I don't notice any inconsistencies as I use the SMAT dashboard system.	0 (0%)	0 (0%)	10 (31.25%)	11 (34.38%)	11 (34.38%)
I can track posts about people in need quickly and easily when using the SMAT dashboard system	0 (0%)	0 (0%)	6 (18.75%)	15 (46.86%)	11 (34.38%)
I can use the SMAT dashboard system successfully every time.	0 (0%)	0 (0%)	4 (12%)	18 (56.25%)	10 (31.25%)
I am satisfied with the SMAT dashboard system.	0 (0%)	0 (0%)	4 (12%)	17 (53.13%)	11 (34.38%)
I would recommend the SMAT dashboard system to my	0 (0%)	0 (0%)	6 (18.75%)	13 (40.63%)	13 (40.63%)

organizations.					
SMAT dashboard system works the way I want it to work.	0 (0%)	0 (0%)	8 (25%)	15 (46.86%)	9 (28.13%)
I feel I need to have a SMAT dashboard system to complete and easier my work.	0 (0%)	0 (0%)	6 (18.75%)	14 (43.75%)	12 (37.5%)
SMAT dashboard system is wonderful and pleasant to use.	0 (0%)	0 (0%)	5 (15.63%)	14 (43.75%)	13 (40.63%)

From the evaluation results, the participants suggested that the SMAT dashboard system was ready to be used and could help them ease their work. The participants also agreed that the SMAT dashboard system was easy and pleasant to use, even without written instructions. Furthermore, the SMAT dashboard system was also able to enhance the effectiveness and increase the productivity in managing all posts based on provided keywords as the design of the dashboard system was very simple and time-saving. Furthermore, the interface of the SMAT dashboard system was also user-friendly, with functioning navigation on the sidebar. Overall, participants were satisfied with the functions that the SMAT dashboard system provided because the dashboard system works as per their expectations and helps them track and manage posts about people in need.

## 6. Conclusion

In this paper, we offered a discussion of the development of the SMAT dashboard system. This SMAT dashboard system is an innovation that can help organizations and stakeholders ease their work and help the communities to receive help from them. This paper also identifies the readiness of this system to be delivered to the stakeholders by identifying its effectiveness and primary function. However, this study has several limitations, especially during the data collection process. For example, the tool used to extract the posts was the Facepager, which only allowed tracking and extracting posts from the Facebook page itself but not from the main posts of other pages or users. Another tool used was Web scraper, which also has issues with extracting posts with complete details such as name, post, and date.

The SMAT dashboard system can be enhanced in the future by adding more functions such as uploading a proof in word document format to request approval from the manager. By adding this function, it can help the manager to make the decision easier and faster. In addition, more features on the dashboard system, such as total pending requests and the total amount for the recipients, can also help improve the system's effectiveness to the user.

## 7. Acknowledgements

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