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# Visualisation Application Development for Mosque Financial Report Using Linked Data and Crowd-sourcing

Nur Aini Rakhmawati, Radityo Prasetianto Wibowo, Muh. Idil Haq Amir

*Department of Information System, Institut Teknologi Sepuluh Nopember Surabaya, Indonesia*

**Abstract**

Indonesia is a country with the largest Muslim population in the world. In 2014, the number of mosques is 850 thousands. The lack of financial information of the mosques for public is the main problem. As a result, the funds cannot distribute evenly to each mosque. Therefore, a centralised mosque financial report to collect and publish mosque financial information is developed in this research. Collecting mosque financial information from all mosques is not easy task. Thus, we use crowdsourcing method for getting input from citizens who often come to mosque. These collected data will then be compiled into a relational database. We generate public data in the Linked Data format every month. Through the Linked Data technology, the financial data can be accessed by anyone for a particular application development using financial data mosque.

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*Keywords:*

Mosque, Financial report, Linked Data, Crowdsourcing

## 1. Introduction

Indonesia is a country with the largest Muslim population in the world where the Muslim population in Indonesia reached 88% of the total population[1]. Thus, Indonesia would also have a lot of mosques as a place of worship for Muslims. In 2014 there were approximately 850.000 mosques[2]. As one of public services, management of a mosque is mostly carried out by a group of local volunteers A mosque funding generally is obtained from its local community. The mosque board generally publish the financial information at a traditional whiteboard and speech during Friday prayer. Donors who are not located around the mosque, get difficulty to distribute their funds to certain mosques because of the unavailability of public and real time mosques financial information. As a result, the mosque fund distribution sometimes is only populated in a certain area. Therefore, the mosque should submit public financial reports. However, to the best of our knowledge, there is no a centralised mosque financial report to collect and publish mosque financial information. Collecting mosque financial information from all mosques is not easy task. Thus, we use crowdsourcing method for getting input from citizens who often come to mosque. According to a survey conducted by TNS Infratest, Yahoo and e-Marketer about online activities carried out by mobile internet users in Indonesia in mid quarter of 2012 , activity for accessing social media website is in the first rank (76%) . Thus, it is a great potential to use data from social media to produce useful information. In this work, Twitter is used for collecting data from user since as of 4th quarter 2014 Twitter penetration in Indonesia was 11% [3]

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These collected data will then be compiled into a relational database. We generate public data in the Linked Data[4] format every month. By utilising the Linked Data technologies, mosque financial data will be easily accessible by other applications connected to various other external data sources. For instance, we can see the role of mosque in term of welfare improvement by combining the mosque financial report and poverty rate.

The primary contributions of our work are: 1) Propose a centralised mosque financial report ; 2) publishing the mosque financial report in the Linked Data format. In the remainder of this paper starts with reviewing related works in Section 2 followed by our methodology in Section 3. The system is evaluated in Section 4. Finally, we conclude it in Section 6.

## 2. Related works

MosqueLife [5] and Masjeed [6] are two mosque social medias that allow its user to report about mosque activities. MosqueLife is a web based application, while Masjeed is an Android application. These social media focus only on mosque activities, they do no provide the mosque financial report. Fikri [7] developed an accounting information system for a mosque in Lampung. Likewise, Nico [8] proposed a web accounting information system for a group of registered mosques. These applications depend on mosque board which does not often update the financial information.

There are several noteworthy crowdsourcing applications such as Peta Jakarta[9] and [10] PetaJakarta.org is an application that presents real time information about flooding in Jakarta area. The crowdsourcing input is from twitter. Netcitizen who reports the flooding information must mention @petajkt following by #banjir hashtag. This application shows the user reports through a Jakarta map. [10] presented crowdsourcing appliations for Haiti disaster relief namely CrisisCamp Haiti, OpenStreetMap, Ushahidi, and GeoCommons.

## 3. Methodology

This section describes our methodology for gathering and visualising data.

### *3.1. Preliminary*

We initially define terminology used in our work. There are three main components in this work namely *mosque*, *user* and *financial report* which can be explained as follows.

A list of mosques that is published by Ministry of Religion Affairs of Indonesia in `http://simbi.kemenag.go.id/simas/index.php/profil/` is stored in this stage. In addition, the application allows user to input the frequently visited mosque. To sum up, the set of mosque data can be formally defined as follows

**Definition 1.** M is a set of registered and unregistered mosques data, which can be defined $M = \{m_1, m_2, \cdots, m_n\}$, where each m consists of name of the mosque and address of the mosque.

In order to avoid data redundancy, the Jaro-Winkler [11] is implemented for checking the similarity between the existing mosque data and the user input. The threshold level of Jaro Winkler for mosque name and mosque address are 0.8 and 0.85 respectively.

This application receives an input either from the Twitter platform or web application. If a user report through web application interface, he must login using either his Facebook, Twitter or Google account.

**Definition 2.** U is a set of users that report either from Twitter or web application, which can be defined $U = \{u_1, u_2, \cdots, u_n\}$

The last main component is a mosque financial report that can be defined as follows:

**Definition 3.** r is a financial report, which can be represented as a tuple $(u, m, i, e, t)$ , where u is the user, m is the mosque, i is the mosque income, o is the mosque expense and t is time stamp where the data is reported.

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