

Prototyping a Nationwide Scopus-indexed International Conference WebGIS Application

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Abstract: The amount of people that have been participating in an academic conference has been increasing every year, this also applies to the academic conferences itself where currently a considerable amount of people has been having difficulties finding a specific conference that they are looking to join. Many people that are having difficulties believe that it is because of how very little tools that are available to be used to help them find the conference that they are looking for. From this research we used ArcGIS to help us in the making of an application that is able to help users to find conferences that are held within Indonesia that are equipped with an interactive map, and various features that help them find the conference that fit their needs. From this research we have received a huge amount of positive inputs from many respondents that have seen the application although there are still many rooms to improve from various perspective such as the design, and features (more features).

Keywords: *geospatial analysis, geodemographic, conferences, Indonesia*

1. Introduction

Conference is a meeting in order to state an opinion and share a new fact based on precise research. Conferences are important to share new facts and new research to improve and expand more information about various things and to help more researchers to do more research in the future [1]. Conferences can have many various formats, topics, and intentions. A lot of researchers want to present their research by joining an academic conference. As we all know academic conferences or also known as scientific conferences are one-day or multi day events during which researchers present their work to each other. Academic conferences are an important way researcher stay connected to others in their field and learn about cutting-edge scholarship [2]. An academic conference is a one-day or multi day event during which researchers present their work to each other. Conferences are an important way researcher stay connected to others in their field and learn about cutting-edge scholarship. In psychology, researchers typically present their work via poster or oral presentation [3]. Academic and scientific conferences are necessary for the dissemination of research, for networking, and to support professional development [4]. Academic conferences have been occurring throughout the world where researchers can all gather to discuss their research findings and exchange ideas and insights. Many

Researchers and students are willing to join academic conferences to share their ideas, and publicize their findings to solve various issues [5].

Recently, many people within Indonesia have been joining many academic conferences that occur throughout the world such as Japan, India, and even Indonesia itself. That is why we believe that there should be an application that helps users be able to sign up and participate for the conference in the future, while also being able to view the information of the conference all in 1 application. During the process of finding a conference, we have found out that many respondents from our questionnaires that range from students to lecturers have trouble finding a conference around 42% of our respondents believe that the reason on why they had trouble on finding a specific conference is because of the lack of information between Organizations, Schools, and Conferences.

By understanding this problem, we are developing a web application that can help researchers to find good and suitable conferences related to the topics of their papers, and the organizer who organizes the conference. The technology to build and create the application is using a geographic information system. By using this, we could get more visualization of the conference data, location distribution and aggregate data. A Geographic information system or also known as GIS is an efficient technique and a framework used to conduct and integrate many different kinds of spatial and geographic data [6].

GIS started in the 1960s that formalized research on key topics such as spatial analysis and visualization [7]. After a few years of research, the very first GIS system in Canada

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that is led by Roger Tomlinson, which is used mainly for making a manageable inventory of its nations resources. And since its first development until now, the GIS system keeps improving as the computer is being more sophisticated [8]. GIS is designed to support the production of maps; it can help users to read relationships and geographical information from the data that is available by being able to connect those data with the tools that is available in it [9].

GIS can use a lot of data related to locations such as longitude, latitude, etc. From there these data can be combined, correlated, and analyzed with another type of data like population, income, etc. to create many different maps depending on the data that is available and is used [10]. And by knowing so, the goal of this paper is to research and develop an application which we named 'Conferencemap', that can help BINUS students and lecturers, which is our first main target audience who wants to participate in an academic conference in the form of GIS. By using this app users are able to see various information within a specific conference such as acceptance rate, the month in which the conference happens, location, organizers, etc. They are also able to see the geographical location that is visualized by using the GIS system within the app. From this we expect that the user can have an easier time finding conferences that suit their needs and understand the data correlated with the conference. Thus, we expect that more people are able to join and participate in more academic conferences that occur throughout Indonesia. Our main goal that we aim to achieve after the development of the application is to make the process of finding an international conference easier for people. We expect that from our application many people will have a better understanding on topics related to the conference such as the time of conference, place of conference, and the topics of the paper. By using the GIS system, we believe that the user can have an easier time understanding while also being able to find a suitable conference that fits their criteria. Our main target is to help the researchers, the students, and organizations become more active in participating in various academic conferences.

2. Methods

First, we will examine the technology used in this research. The technology which we had used is ArcGIS Online, which is the cloud version of ArcGIS Enterprise. ArcGIS Online is a cloud-based mapping and analysis solution. It is used to make maps, analyze data, and to share and collaborate. [11]. There are a few reasons as to why we chose to use ArcGIS for our project, one of them is because of the many features that are available within ArcGIS that help our team greatly when making the map, dashboard, and Storymap. Another reason is because of how friendly it is towards new users since our team has never had any experience on making a

map, dashboard and Storymaps by having a simple and clear user interface that helps its user to navigate and understand each feature that is available without overwhelming them in the process.

There are a few features within ArcGIS that we used for this project which is the Map feature that lets us use the data that is collected and put within a CSV file to make a hosted layer which then can be turned into a map that is able visualize and to point the location based on the longitude and latitude that is available within the data [12]. After that we used the map analyzer feature which is a series of tools that enables us to analyze the data even further. For this project we are using the join tool that can join the data of the conferences with a shapefile of the provinces in Indonesia. The reason is because by doing so we are able to view the map in another way, which is where if a certain province has more conferences the color of that conference will be darker on the map. Another feature that we used is also the dashboard feature. A dashboard is a kind of a graphical user interface which is used to analyze and display the key performance indicators, metrics and important data points associated with a business process or an application. [13] where we are able to create a dashboard with our map and customize it to be able to display the map that we have created, alongside the information contained within the data, while also enabling the user to interact with the dashboard which in this case where the user is able to interact with the map within the dashboard and also filter the contents of the map.. But with just a dashboard many users might not understand the purpose of our dashboard as they need more information to understand why the application was developed. That is why by creating a Storymap, the user will easily understand the purpose of the development of this application.

ArcGIS Storymaps is an online digital storytelling platform centered on situating digital datasets in a narrative format [14]. Story maps combine interactive maps (created in ArcGIS Online) with content, such as text, photographs or videos, to tell the story of a place, event, issue or pattern in a geographic context [15]. Story Maps could enrich existing instruction, it was critical to uncover their views of Story Maps as having interdisciplinary applicability. Thus, the final feature we used for this project is the ArcGIS Storymaps. The Storymap can be accessed by users and is able to redirect the user to the dashboard that we have created.

After discussing the technology we use, we will then discuss the Questionnaire used in this research. As we all know, quality data collection methods improve the accuracy or validity of study outcomes or findings [16]. The research approach we are using is the quantitative approach which is the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect [17]. We will

use a questionnaire to gather our data. A questionnaire is simply a list of mimeographed or printed questions that is completed by or for a respondent to give his opinion [18]. Questionnaires may be in paper form and mailed to participants, delivered in an electronic format via email or an Internet-based program [19]. We made a questionnaire consisting of 15 questions. The reason behind the use of questionnaires is to understand how important and how urgent the situation is, and how difficult it is for the users to find a suitable conference. We also try to understand the user's opinion about our application's effectiveness, in order to improve our application. The reason behind choosing this method is because of its high efficiency, and the data that we need is not a type of data that requires too many varying answers. The data we need is already classified into specific sections, limits, and approaches compared with other methods such as survey and ask questions. This is due to our data target being more can be measured such as nominal scale [20]. To receive the information we need, we decided

to collect all the data by using questionnaire format.

The process to interpret the data is to gather data from respondents, and then categorize and analyze it into diagrams. Lastly, we interpret the data result and diagrams into conclusions which we can conclude [21]. Besides the suggestion question, the data which we analyze from our questionnaire is being analyzed qualitatively.

The questionnaire begins with 4 introduction questions asking the definition of conference. We use the result of this data to understand how well the respondent's general knowledge about conferences. The questions are shown in Table 1. The next part is about the dashboard. From this part we want to know the user's opinion about our dashboard. To gain user's opinion we used a score input where users can give a score to measure our dashboard from its effectiveness, and comfortability. The questions are shown in Table 2.

Table 1: Introduction

No.	Analysis	
	Question	Goals
1	Do you know about conferences?	To know user's knowledge about conference
2	Have you ever joined a conference?	To understand user's experience in relation with conference
3	Have you ever had difficulties finding suitable conferences?	To know how many users has a problem in finding a conference
4	If the answer is yes, can you describe it?	To understand better about user's problem

Table 2: Dashboard

No.	Analysis	
	Question	Goals
1	How easy is the dashboard used?	To know user's opinion about our dashboard ease of use and comfortability
2	Is the information given informative?	To know user's opinion about our dashboard's information
3	From the information above, which feature had the most influence?	To know user's opinion about which feature is most effective
4	Is the information given in the dashboard easy to comprehend?	To know how easy to understand the information in the dashboard

Table 3: Storymap

No.	Analysis	
	Question	Goals
1	How easy and convenient to operate the Storymap?	To know user's opinion about our Storymap's ease of use and comfortability

2	What would you rate based on the looks and design from the Storymap above?	To know user's opinion about our Storymap design and views in general
3	Is the information inside the Storymap already informative?	To know how informative the information provided on our Storymap

Table 4: Closure

No.	Analysis	
	Question	Goals
1	How would you rate our dashboard?	To know user's overall opinion about our dashboard usability and advantages
2	Can you give us suggestions to improve our dashboard?	To get any useful advice and opinion from user to improve our application's dashboard
3	How would you rate our Storymap?	To know the user's opinion about our Storymap's usability and advantages.
4	Can you give us suggestions to improve our Storymap?	to get any useful advice from users to improve our application's Storymap

In the next part, we want to know the user's opinion about our Storymap. The question is intended to gain information about the user's opinion in relation with the Storymap's design, the effectiveness, and the conformability. We also used a score input where the users can give a score to measure our Storymap from its design and comfortability. The questions are shown in Table 3.

The final part of our questionnaire consists of 4 questions which we use to close the questionnaire and to understand the user's overall score about our application. We also ask user's advice and overall opinion about our application. We used a score input for the question that asks the user's opinion about our dashboard and our Storymap. And to ask for the user's advice we used text input to gain user's advice about our dashboard and our Storymap. The questions are shown in Table 4.

After discussing the technology and questionnaire used in this research, next we will discuss the Building Process. We will review the Database Gathering Method. The data is collected has a sizable impact on the data is managed, and ultimately how the research is performed. [22] To gather our data, we search from the internet for the main data, specifically the conference's official website. From the website we then take the conference name as the primary key in data searching. After gathering the main data, we begin to search the conference attributes such as conference date, conference place, etc. within the website.

Our main focus is on gathering as much accurate data from the internet and websites about conferences. Then, we validate the data by checking the conference attributes based on other official websites, and by visiting the conference's websites itself. We are doing it by searching through the

internet and many websites. The analyzing process is done by using the concept of Regression Analysis. We are very concerned about the relation between the primary key, its latitude and longitude, and the implication between all conference's attributes. We analyze the data and finally put the data into the dashboard database to show the user the result of our data categorization.

After discussing the Database Gathering Method, next we will examine the Building Application in this research. The building process of the application that we have developed is basically done within four main processes which are repeated multiple times for each component that we made. The process takes 4 main steps. First, we make a design of our whole application, and for each revision and correction that we make, we redesign the application while discussing and rescheduling the application building process timeline. Second, create a database. After all the categories and the data type were made, followed by the main content, which is the conference data, from the conference name, annual, acronym, date, place, website link, paper submission, organizer, and coordinate. Third, we make the map and dashboard.

This step is done by making the map first, then adding it to the dashboard. The process of making the map is by importing the database first which then with the help of the map creation tool provided by ArcGIS, it will read the longitude and latitude of each data and will generate a map with points for each data that symbolizes the conference that is held there. From there we can customize the map by changing the colors, changing the symbol that is shown in the map, and also changing the properties of the map. Then, we design the dashboard. After designing the dashboard, we build the dashboard by adding the map and the database into

it. The ArcGIS system will automatically configure the data types and categorize it based on our database categorization. Fourth, we make the Storymap. The creation of the Storymap is done by first designing its concept. then we build all the content by following the design that we already

made, and lastly, we input our dashboard link and screenshots in it which also contains all explanations about our application and our building method in general. The whole process is shown in the diagram as shown in “Fig. 1”.

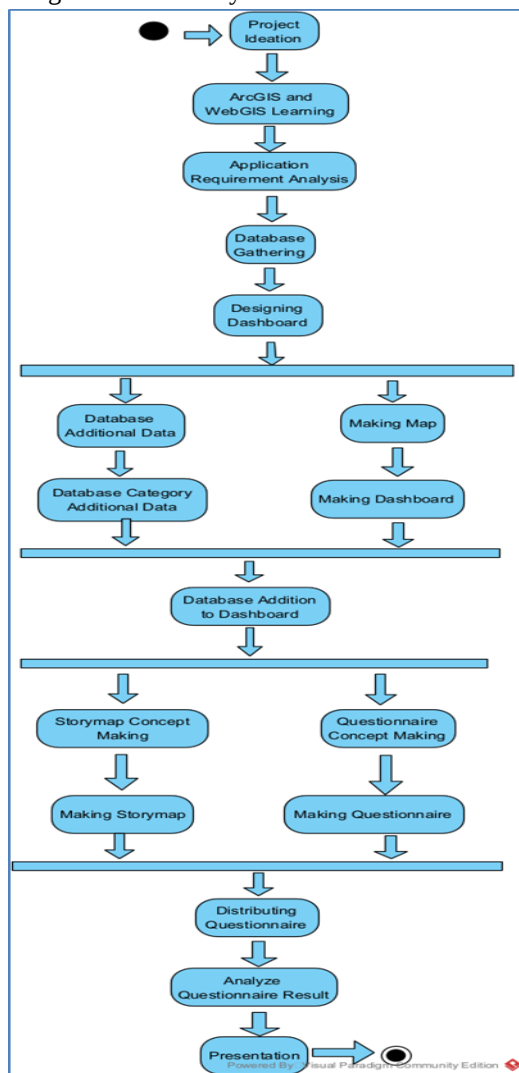


Fig 1. Visual Diagram : Workflow

3. Results and Discussion

First, we will discuss Features and Displays. The first main feature of our Storymap is the explanation, which begins with the introduction. The whole introduction part is

interactive. We design it in a way so that the picture and the information that is shown can be changed by scrolling the page, and based on the user's screen. As shown in “Fig. 2” and “Fig. 3”, we explain the basic information about what is a conference, and the conference history.

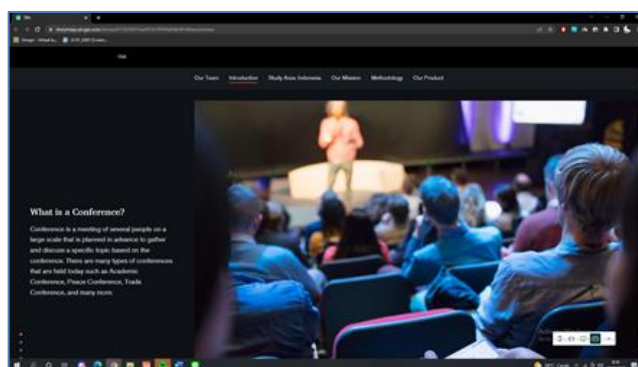


Fig. 2. Introduction: What is a Conference?

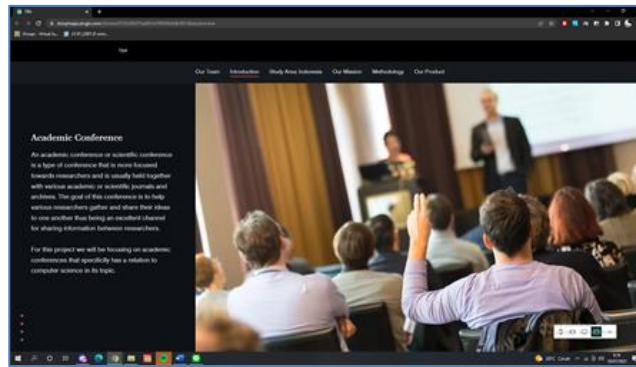


Fig. 3. Introduction: Academic Conference

Next in the introduction part, as shown in “Fig. 4”, “Fig. 5”, and “Fig. 6”, we add information about Our study area which is Indonesia that introduces and familiarizes the reader on our study area, we also add information about the history of conferences that happened within Indonesia, and which area in Indonesia that have held the highest number of international academic conferences.

To satisfy the application requirement, we also add the map we have created within ArcGIS, as shown in “Fig. 7”. The map is interactive and shows how many international conferences occur in the form of dots, and by color per area. the user can swap around the display simply by dragging the line left or right.

The second main feature is the dashboard. In the Storymap, we have placed a dashboard in the form of a button that is

able to redirect the user to the dashboard. Thus, users can click the link, and login to see the whole dashboard. Although we already made a user account and placed the link on our Storymap, we also added a video preview of our dashboard that is placed below the button that shows the features that are available within the dashboard as shown on “Fig. 10”.

In the methodology section, we explain how we build our application, by using explanation text and flow chart diagrams, as shown in “Fig. 8” and “Fig. 9”. The explanation text and diagram explain in detail about our method of building this application. We also explain our database gathering method. Therefore, users can understand the method we choose to gain the database.

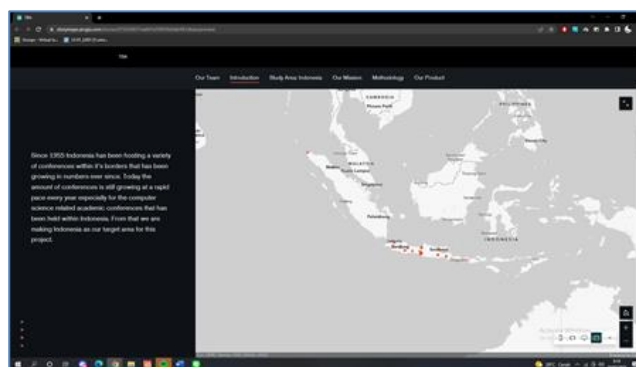


Fig. 4. Introduction: Conferences within Indonesia

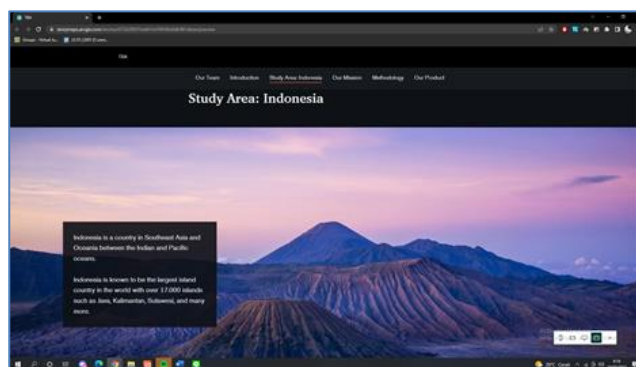


Fig. 5. Study Area: Indonesia (Part 1)



Fig. 6. Study Area: Indonesia (Part 2)

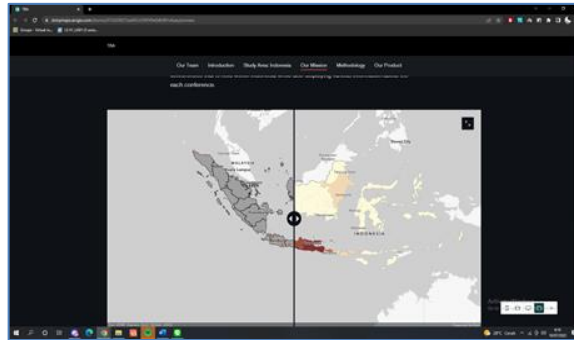


Fig. 7. Indonesia Maps

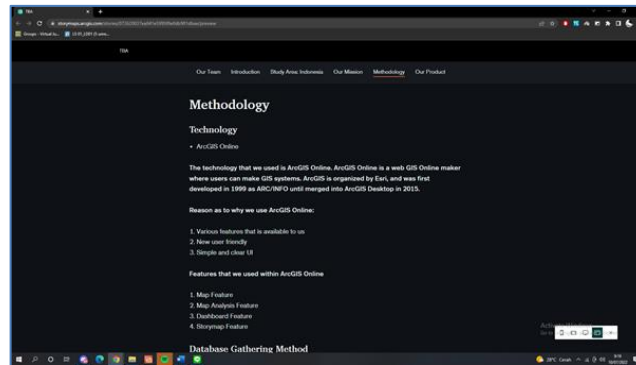


Fig. 8. Methodology: Technology

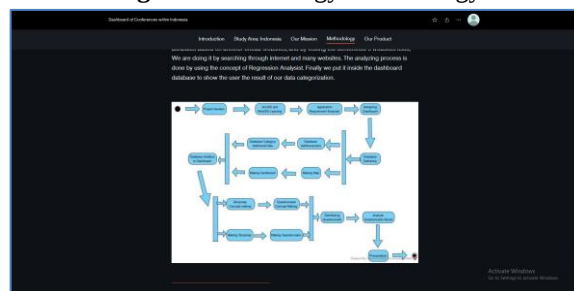


Fig. 9. Flowchart

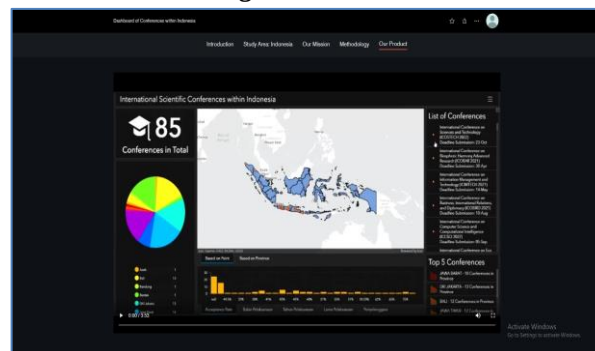


Fig. 10. Video Demo of the Dashboard

The dashboard itself shows data about international conferences in Indonesia in the form of dots, and can be changed into colored areas based on the user's preference. The dashboard also shows diagrams and a list of International academic conferences that occur that year. The diagram is highly interactive and clickable. It can filter the data and show it to the user based on the particular part of the diagram or list which the user clicked.

After discussing Feature and Display, next we will discuss Questionnaire Result Analysis. To fill out our questionnaire we asked 50 people. Based on our questionnaire, as shown in “Fig. 11”, about 66% of our respondents understand conferences and 52% of them often join a conference at least

once a year, which means our respondent is knowledgeable enough about the academic conference. After knowing it, we found out that based on the diagram shown in “Fig. 12”, 40% of people are having trouble finding a suitable conference. By understanding that, we assume that the respondents very much understand the problem and many things related to finding a suitable conference. So, the next step is to understand their point of view about their problem in relation to finding a suitable conference, and their opinion about how our application can help users to find a suitable conference. 96% of our respondents think that our overall dashboard is useful with a score at least 4 out of 5, and 90% of our respondents think that our Storymap is useful with a score at least 4 out of 5.

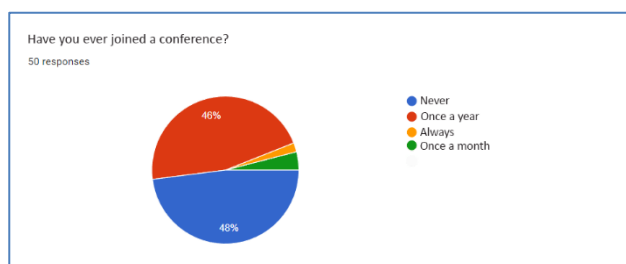


Fig. 11. Questionnaire’s question no. 2 result

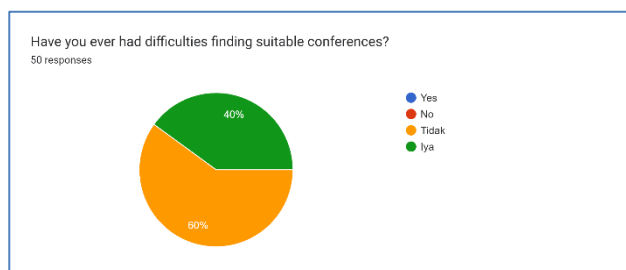


Fig. 12. Questionnaire’s question no. 3 result

Finally, we analyze the user’s opinion about our dashboard and Storymap design, so we can understand what’s missing or what things that we can improve. We are also asking this question to understand the user's opinion about our application’s effectiveness, and our application usability. By asking this, we want to make our application more comfortable, simpler to use, and more effective. At the end of our questionnaire, we asked the respondent’s opinion on whether the application is useful or not and finally ended with a question that asks the respondent’s advice on what to add, or what to change, to make our application better. From our questionnaire, we receive that a considerable amount of

people actually have difficulties finding conferences that fit their needs and that most of it is because of how many people have no idea on where to start, or how there are very few tools that help on finding one. We also found out that 78% of our respondents believe that our dashboard is easy enough to use and to understand, and that the information within the dashboard is neat and easy to understand with a score at least 4 out of 5. According to respondents, the map as the most useful feature in the dashboard (30% of respondents). The user’s opinion about which feature is found more useful is shown in “Fig. 13”.

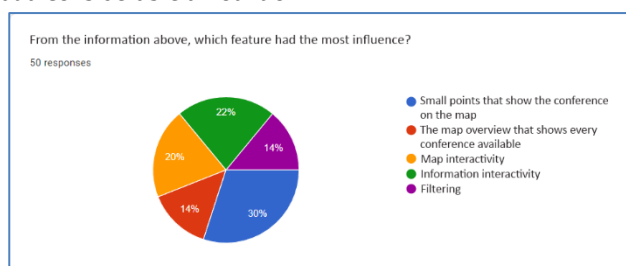


Fig. 13. Questionnaire’s question no.7 result

From the result of the questionnaire as shown in “Fig. 14” and “Fig. 15”, we found out that our Storymap is easy enough and comfortable to use (48% of respondents) with a score 4 out of 5. 40% of them gave a score 5 out of 5. From design perspective, our respondents (76% of our respondents) gave a score at least 4 out of 5. With 30% of them gave a full score 5 out of 5.

As shown in “Fig. 16” and “Fig. 17”, we also found out that from respondent’s opinion about our dashboard’s content, 38% of respondents gave a score 4 out of 5 and 42% of respondents gave a score 5 out of 5, state that the information within our dashboard is clear and neat. Then, 52 % of respondents gave a score 4 out of 5, and 32% of respondents gave a score 5 out of 5, state that the information within our dashboard is informative.

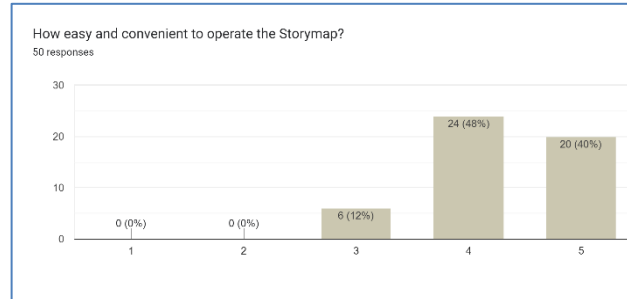


Fig. 14. questionnaire’s question no.9 result

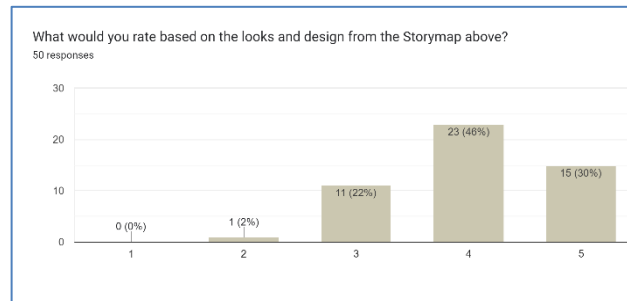


Fig. 15. questionnaire’s question no.10 result

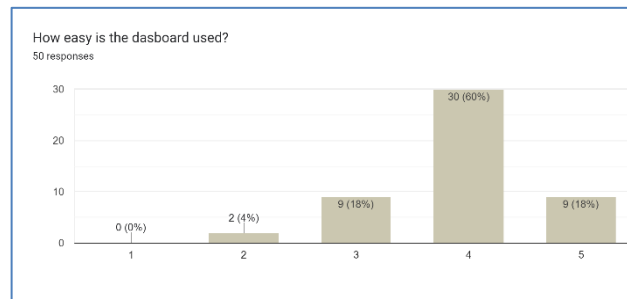


Fig. 16 Questionnaire’s question no. 5 results

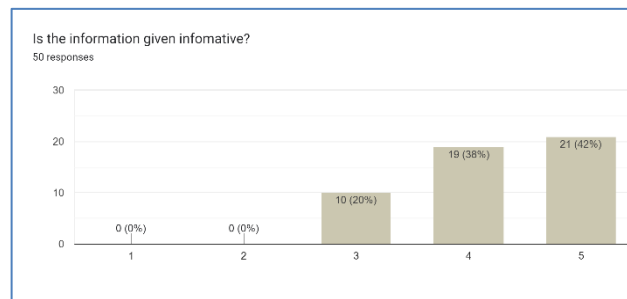


Fig. 17 Questionnaire’s question no. 6 results

Finally, From the questionnaire many people believe that our StoryMap and Dashboard is pretty useful but with room to improve in various places such as: search bar feature,

better color palette, better design placement, color within the StoryMap, and also to add more essential information.

4. Conclusion

From the result of our Questionnaire we have received that many Students and Researchers are having problems with finding a suitable academic conference. Most of them believed that the reason as to why they have this problem is due to the lack of information about the academic conference. Most information needed by researchers and students are majority based on the conference's time, place, and submission deadline. To solve this problem, we made an application named 'ConferenceMap'. To understand the effectiveness of our application, we asked many respondents to give their opinion about our application and its usability aspect. From the respondents, we received that overall, our application and also our dashboard is useful, effective, and informative but with room for improvement in various places such as design, and features.

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Author contributions

James Duykers, Jericho Santiago Salude, Tareq Abdurrashid Djalins: Methodology, Software, Field study; **Samsul Arifin, Bakti Amirul Jabar:** Conceptualization, Data curation, Writing-Original draft preparation, Software, Validation., Field study; **Fabian Surya Pramudya, Thomas Galih Satria:** Conceptualization, Visualization, Investigation, Writing-Reviewing and Editing.

Conflicts of interest

The authors declare no conflicts of interest.

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