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Artificial Intelligence for Data Visualization of Lancang Kuning University Library

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ABSTRACT

Artificial Intelligence (AI) has a significant influence in various aspects. One of the impacts is the library. AI can be applied in various activities, such as data visualization, analysis of library usage trends, book recommendations based on user preferences, and predictions of future collection needs. It is hoped that the Lancang Kuning University Library can be more responsive to user needs and be able to provide excellent service. The method used is descriptive analysis. It aims to find factually relevant facts through data that is collected, processed, and analyzed. This study produces a description of the stages of library data visualization. There are three stages of library data visualization activities, namely; first, the database preparation stage, second, data processing, Third, visualizing data, data visualization using Google Looker Studio. Lancang Kuning University has initiated the implementation of AI in library data visualization. One of the initiatives is the development of an interactive dashboard that displays statistics on the use of library services in real time. This dashboard allows library managers to easily monitor book loans, daily visits, and other activities. The use of Artificial Intelligence (AI) technology for data visualization at the Lancang Kuning University Library is very significant in increasing the efficiency and effectiveness of information management in the form of statistics. By utilizing AI technology, libraries can present data more interactively and informatively, making it easier for users to access and understand the information available. This also helps library managers in monitoring and analyzing library usage, so that managers can make more informed decisions in developing collections and services.

Keywords: *Artificial Intelligence (AI); University Libraries; Data Visualization ; Statistics*

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1. INTRODUCTION

The development of information technology has brought significant changes in various aspects of life, including in the world of education (Rahmatullah et al., 2022). One of the technological advances that is growing rapidly is Artificial Intelligence (AI) or artificial intelligence (Raj & Kos, 2023). AI is a branch of computer science that focuses on developing computer systems capable of performing tasks that usually require human intelligence (Sarker, 2022), such as speech recognition, vision, natural language understanding, and decision making (Vinothkumar & Karunamurthy, 2023).

In this digital era, university libraries not only serve as a repository for books and other reading materials (Winata et al., 2021), but also as an information center that supports academic and research activities (Kato et al., 2021). Along with the increasing amount of data that must be managed by libraries, there is a need for technology that is able to optimize the management and presentation of these data (Eiriemiokhale & Sulyman, 2023). This is where the role of AI becomes very relevant (Asemi et al., 2021). Based on observations of the official web page of the University Lancang Kuning Library on the page *https://pustaka.unilak.ac.id/, the* data display is only in the form of *Ms Excel* or in the form of a *google spreadsheet*, there is no visualization display of the data - the data. So that it makes it difficult for visiting users to find out public data on both services, the number of visitors, lending collections and so on at University Lancang Kuning Library.

Lancang Kuning University, as one of the higher education institutions committed to improving the quality of academic services, has begun to adopt AI technology to help manage library data. One of the most prominent applications of AI is in data visualization (Liu et al., 2023) Data visualization using AI allows libraries to present data in a more interactive, informative, and easily understood manner by users (Firat et al.,2022). With AI-based data visualization, information about book collections, journals, research, and library usage statistics can be presented in the form of graphs, diagrams, or interactive maps (Chen & Chen, 2021). This not only makes it easier for library managers to monitor and analyze data, but also helps students and lecturers find the information they need more quickly and efficiently (Hamad et al., 2022). In addition, AI can also be used for library usage trend analysis, book recommendations based on user preferences, and prediction of future collection needs (Narendra et al., 2025).

Thus, the Lancang Kuning University library can become more responsive to user needs and be able to provide better services. The implementation of AI in library data visualization also reflects Lancang Kuning University's commitment in keeping up with the latest technological developments and improving the quality of education. The use of AI not only accelerates data processing, but also opens up new opportunities in the development of more sophisticated and user-friendly information systems. With this background, this article aims to dig deeper into how AI can be applied in library data visualization at Lancang Kuning University, the benefits that can be obtained, as well as the challenges that may be faced in the implementation process. Hopefully, this article can provide a comprehensive insight for academics, library managers, and other related parties regarding the potential of AI in advancing the library world in the digital era.

2. LITERATURE REVIEW

AI is defined as the ability of machines to mimic human cognitive functions, such as learning, problem solving, and decision making (Russell & Norvig, 2020). In the context of libraries, AI can be used to automate routine tasks, provide recommendation services, and perform complex data analysis. Data visualization is the process of transforming data into visual forms such as graphs, diagrams, or maps,

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which facilitate the understanding of the information contained in the data (Few, 2013). With the help of AI, data visualization can be done more efficiently and produce more interactive and informative output. Various studies have shown how AI can be applied in library management. Fu et al. (2018) examined the use of AI to improve library cataloging systems, which allows for faster and more accurate searching of books and other reading materials. In addition, AI is also used in the analysis of library user behavior, which can help in the design of services that better suit user needs (García-Silva et al., 2019).

AI-based data visualization has proven to be effective in presenting complex information in a way that is easier to understand. According to Chen et al. (2020), AI can be used to analyze big data in libraries and present it in visually appealing forms, such as interactive dashboards and infographics. This not only improves the user experience but also helps library managers in making data-driven decisions. The adoption of AI in library data visualization offers various benefits. Among them are increased efficiency of data management, clearer and more attractive presentation of information, and the ability to perform predictive analysis (Jia et al., 2021). However, there are also some challenges that need to be overcome, such as the need for adequate technology infrastructure, training for library staff, and user data privacy issues (Marr, 2018).

3. RESEARCH METHOD

The method in this research uses descriptive analysis. Which has the aim of finding facts that are relevant in factual through data that is collected, processed, and analyzed. The steps of the method carried out in this research are determining problems, studying literature, collecting data, processing data, implementing data, and analyzing data. The methods used in the following research are shown in Figure 1 below.

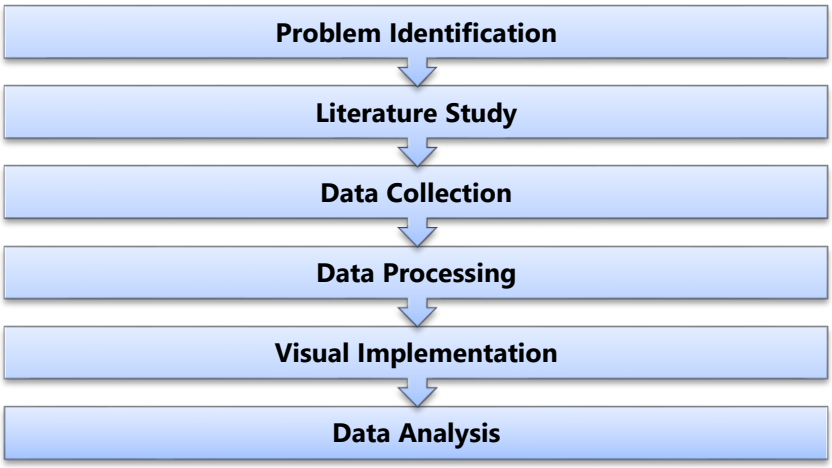

Chart 1. Research Methods

4. RESULTS AND DISCUSSION

Condition

Dataset retrieval in the form of data is a database taken from the service of *google spreadsheet* and slims application which is converted into the form of *google spreadsheet*. The first step is to export the database with the *xls* file format on the *slims* system then the data set is imported into Google *spreadsheet*.

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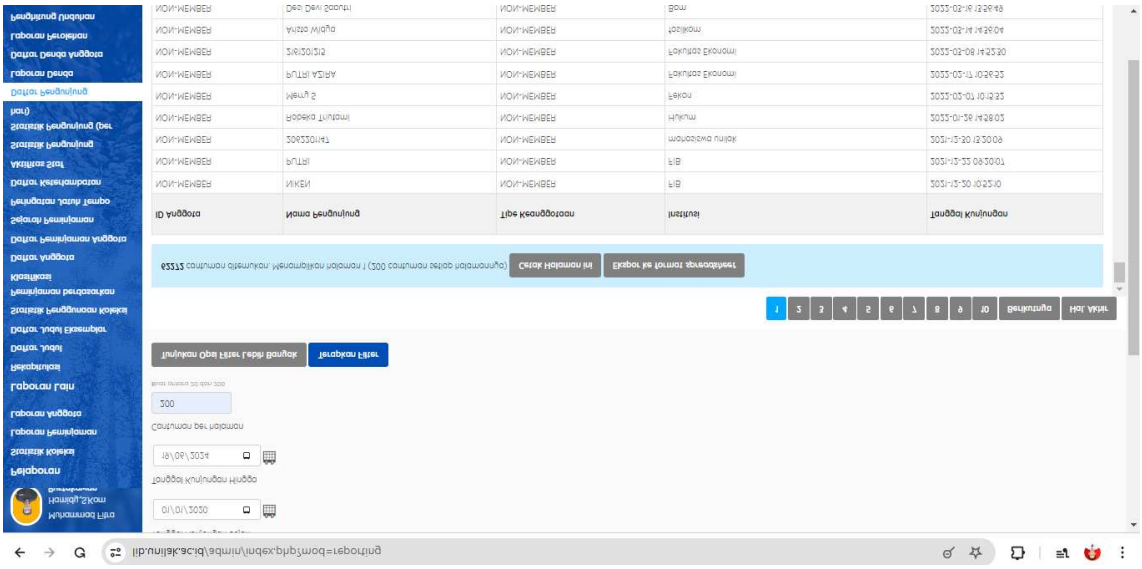
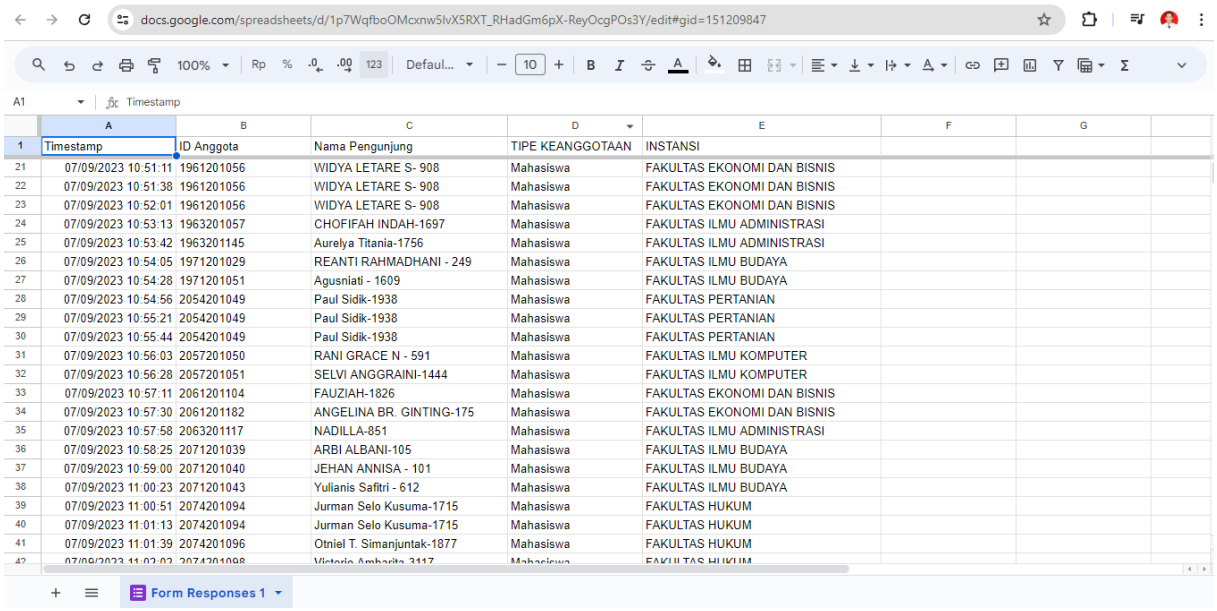


Source: lib.unilak.ac.id

Figure 1. Data set

Then if it has been imported into *Google Sheets*, select the columns and rows that you want to display on the visualization in *Looker Studio.*



	A	B	C	D	E	F	G
1	Timestamp	ID Anggota	Nama Pengunjung	TIPE KEANGGOTAAN	INSTANSI		
21	07/09/2023 10:51:11	1961201056	WIDYA LETARE S- 908	Mahasiswa	FAKULTAS EKONOMI DAN BISNIS		
22	07/09/2023 10:51:38	1961201056	WIDYA LETARE S- 908	Mahasiswa	FAKULTAS EKONOMI DAN BISNIS		
23	07/09/2023 10:52:01	1961201056	WIDYA LETARE S- 908	Mahasiswa	FAKULTAS EKONOMI DAN BISNIS		
24	07/09/2023 10:53:13	1963201057	CHOFIFAH INDAH-1697	Mahasiswa	FAKULTAS ILMU ADMINISTRASI		
25	07/09/2023 10:53:42	1963201145	Aurelya Titania-1756	Mahasiswa	FAKULTAS ILMU ADMINISTRASI		
26	07/09/2023 10:54:05	1971201029	REANTI RAHMADHANI - 249	Mahasiswa	FAKULTAS ILMU BUDAYA		
27	07/09/2023 10:54:28	1971201051	Agusniati - 1609	Mahasiswa	FAKULTAS ILMU BUDAYA		
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29	07/09/2023 10:55:21	2054201049	Paul Sidik-1938	Mahasiswa	FAKULTAS PERTANIAN		
30	07/09/2023 10:55:44	2054201049	Paul Sidik-1938	Mahasiswa	FAKULTAS PERTANIAN		
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34	07/09/2023 10:57:30	2061201182	ANGELINA BR. GINTING-175	Mahasiswa	FAKULTAS EKONOMI DAN BISNIS		
35	07/09/2023 10:57:58	2063201117	NADILLA-851	Mahasiswa	FAKULTAS ILMU ADMINISTRASI		
36	07/09/2023 10:58:25	2071201039	ARBI ALBANI-105	Mahasiswa	FAKULTAS ILMU BUDAYA		
37	07/09/2023 10:59:00	2071201040	JEHAN ANNISA - 101	Mahasiswa	FAKULTAS ILMU BUDAYA		
38	07/09/2023 11:00:23	2071201043	Yulianis Safitri - 612	Mahasiswa	FAKULTAS ILMU BUDAYA		
39	07/09/2023 11:00:51	2074201094	Jurman Selo Kusuma-1715	Mahasiswa	FAKULTAS HUKUM		
40	07/09/2023 11:01:13	2074201094	Jurman Selo Kusuma-1715	Mahasiswa	FAKULTAS HUKUM		
41	07/09/2023 11:01:39	2074201096	Otniel T. Simanjuntak-1877	Mahasiswa	FAKULTAS HUKUM		

Source: *visitor spreadsheet of Lancang Kuning University Library*

Figure 2. Data set

Processing the Database

To facilitate the implementation of data in this study, the data obtained in the previous stage is then entered into an xls file and the data obtained is then recapitulated into Google Sheets. This stage shows the process of filtering data from hundreds to the amount of data needed. The results of the data filtering are saved in an xls file format before finally being visualized using Google Looker Studio.

Next, enter the *lookerstudio.com* website page and connect the *database* that will be *visualized* in the *Google spreadsheet* file that was previously created.

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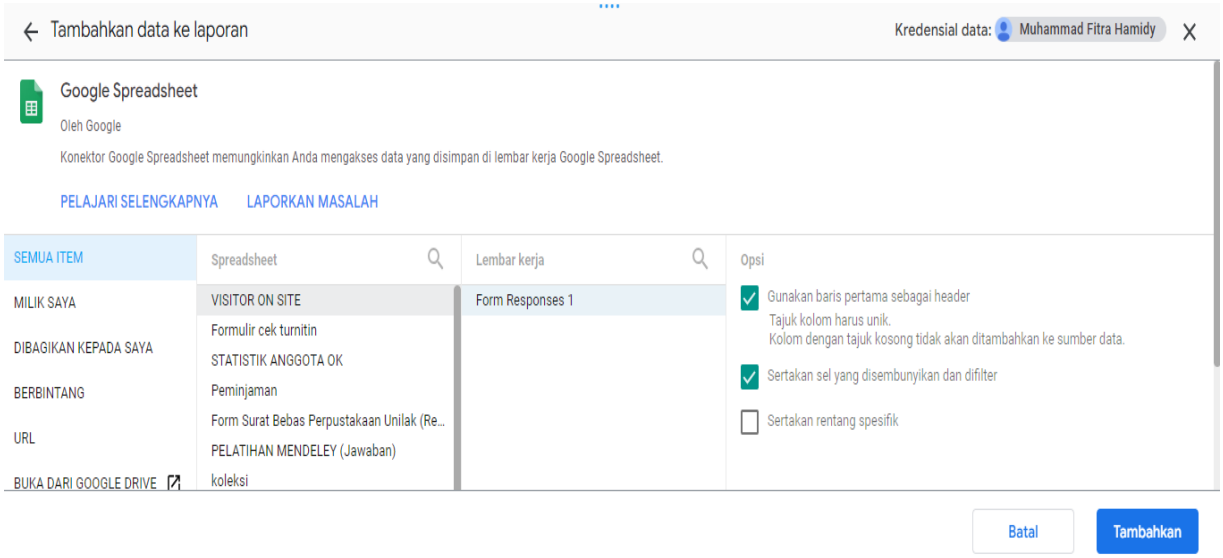
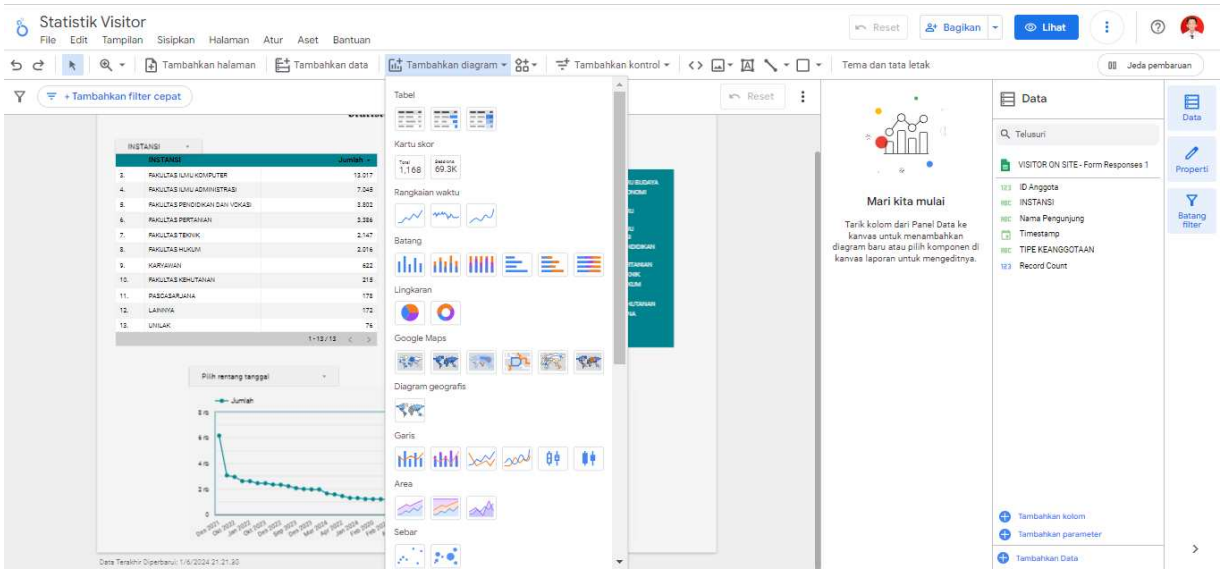


Source: Looker Studio visitor of Lancang Kuning University Library

Figure 3. Display of adding data to the report

Next, enter the worksheet view on *Google Looker Studio*, click the *add chart menu* then select Table to display the Faculty and number then, then add a score card to display the total amount, Line chart to display the line graph.



Source: Looker Studio visitor of Lancang Kuning University Library

Figure 4. Looker studio worksheet display

Then for the next stage, set the dimensions and *matrix,* for example as in Figure 5. The dimension is the institution and the matrix is the amount.

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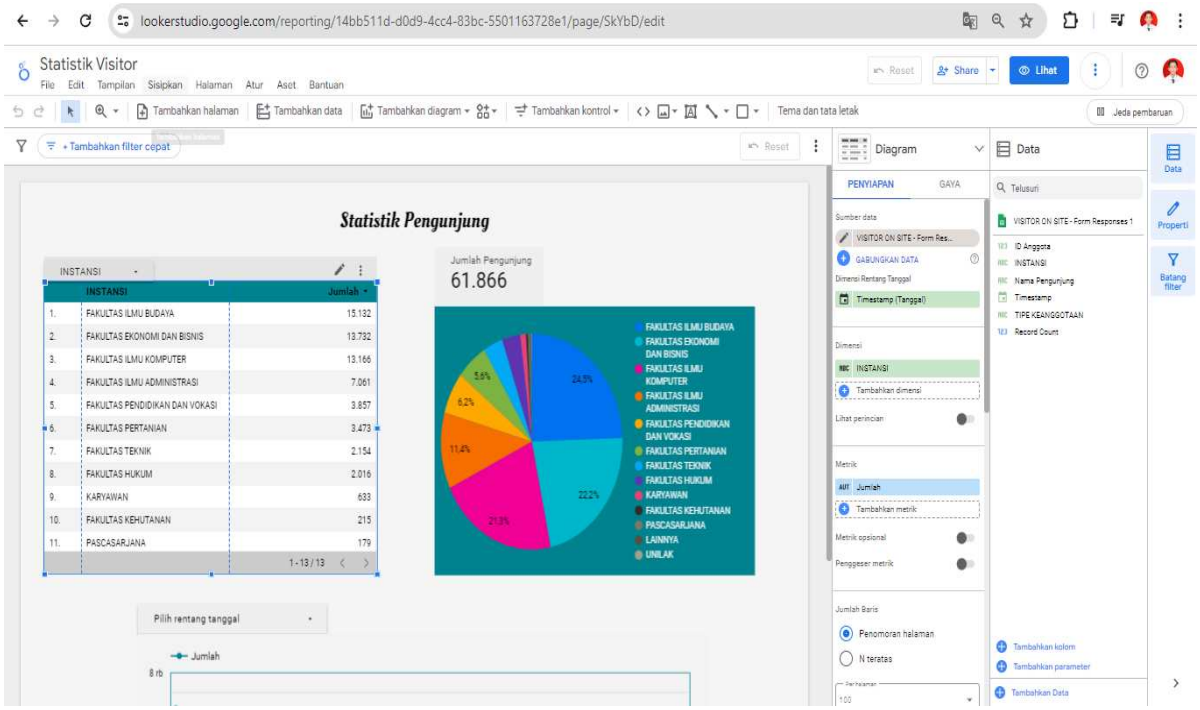
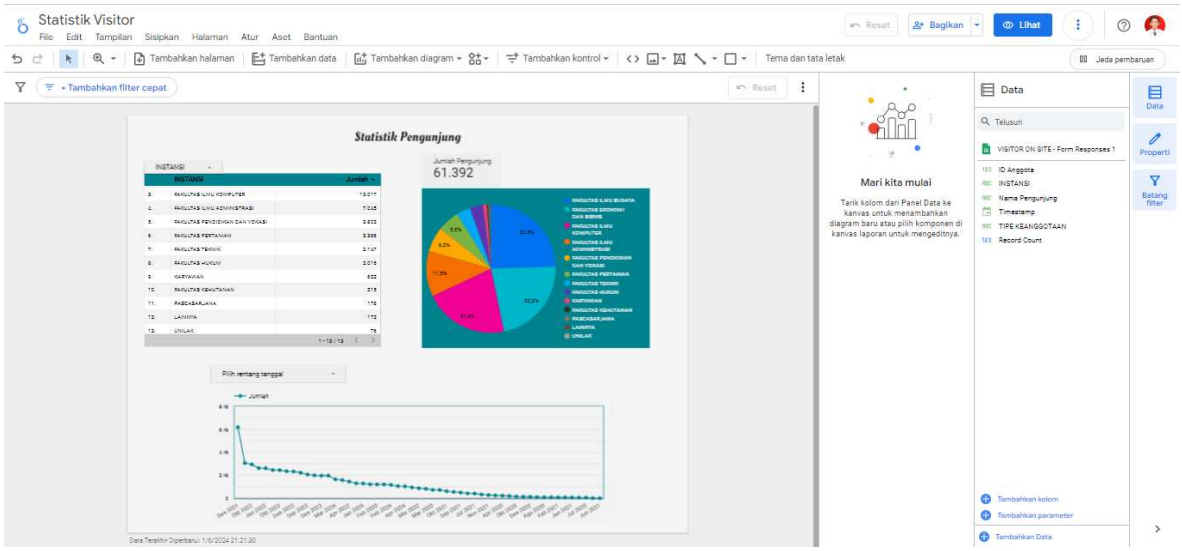


Source: Looker Studio visitor of Lancang Kuning University Library

Figure 5. Looker studio worksheet display

In Figure 6. It can be seen that the *dashboard* visualization display of visitor statistics at the University Lancang Kuning Library and Archives based on the Faculty from the following visualization can be seen the highest number of visitors from the Faculty of Cultural Sciences and the total and years that have increased from visitors visiting the University Lancang Kuning Library and Archives.



Source: Looker Studio visitor of Lancang Kuning University Library

Figure 6. Looker Studio Dashboard Display

Visualizing Data

This data visualization system uses one of the tools, namely Google Data Studio and Google Sheet to create a dashboard. Implementation by applying the google spreadsheet system and google looker studio that has been made. At this stage, all data that has been obtained and recapitulated in

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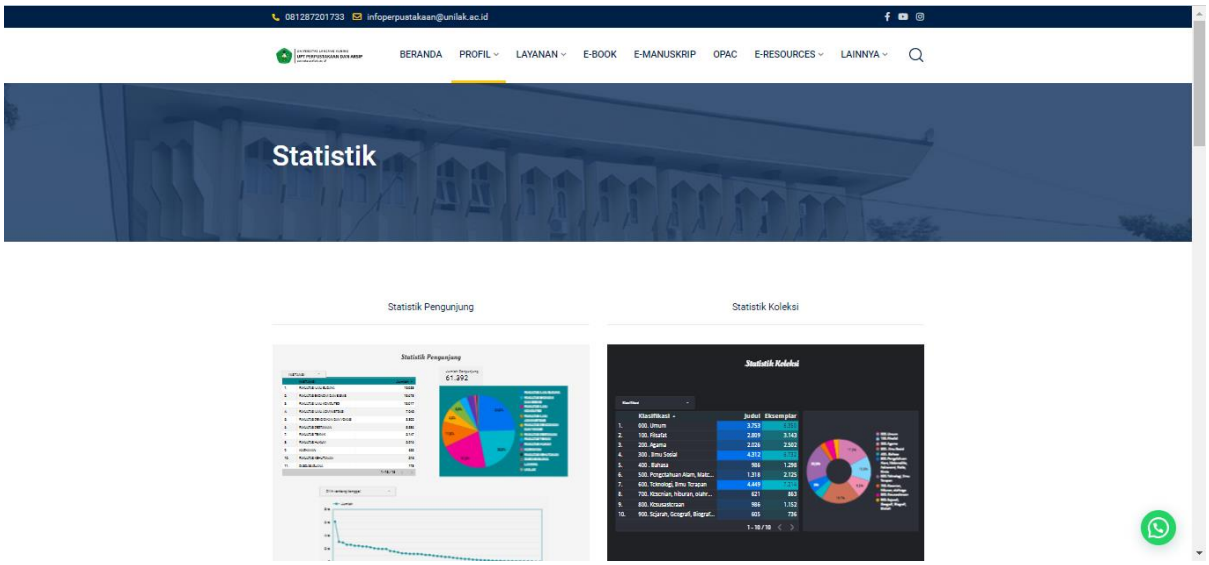
Google Sheets is then made into a data visualization using Google Looker Studio. Then, the visualization display is presented by publishing the dashboard on Google Looker Studio. Data analysis is carried out to produce results and conclusions from this research.

The following is a visualization display of visitor statistics and collection statistics using *Google looker studio* on the University Lancang Kuning Library website.



Source: pustaka.unilak.ac.id/statistik/

Figure 7. Visualization of visitor statistics and looker studio collections on the website

In Figure 8. the following is a visualization display of turnitin service statistics and lending statistics utilizing *Google looker studio* on the University Lancang Kuning Library website

Source: Looker Studio visitor of Lancang Kuning University Library

Figure 8. Visualization display of turnitin service statistics and looker studio lending statistics on the website

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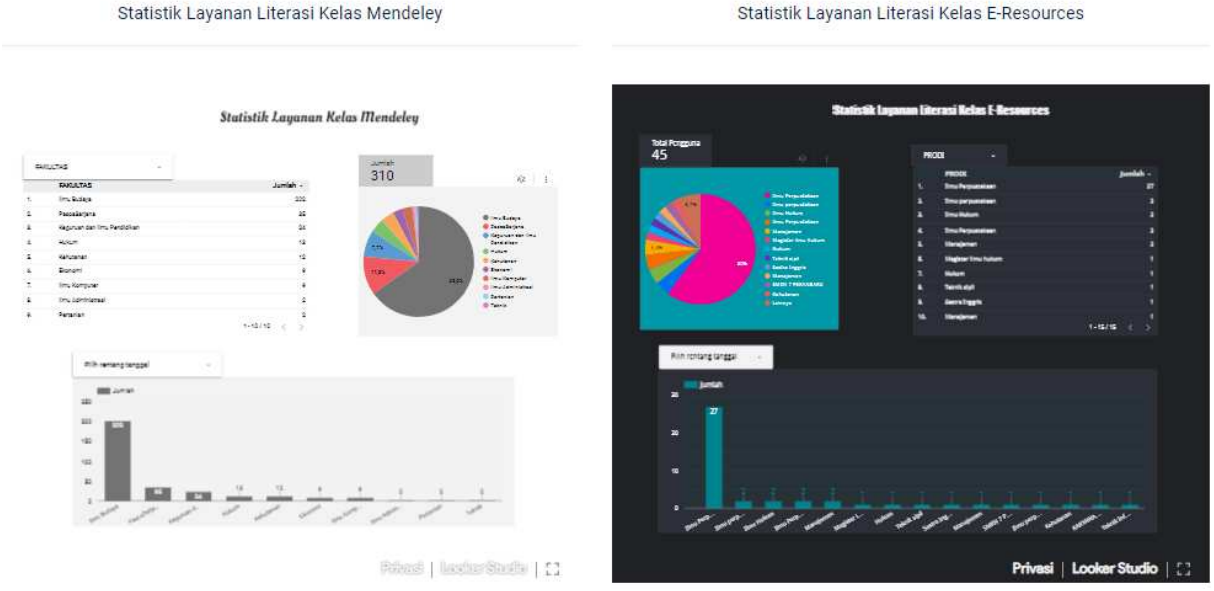
In Figure 9**.** the following is a visualization display of the statistics of the Library Exemption Certificate and Membership statistics using *Google looker studio* on the University Lancang Kuning Library website

Source: pustaka.unilak.ac.id/statistik/

Figure 9. Visualization display of Library Exemption Certificate statistics and *looker studio membership statistics on the website*

In Figure 10**.** the following is a visualization display of Mendeley statistics and E-Resources Class service statistics with *Google looker studio* on the University Lancang Kuning Library website.



Source: pustaka.unilak.ac.id/statistik/

Figure 10. Visualization display of Mendeley Service statistics and E-Resources Service statistics looker studio on the website

In Figure 11. the following is a visualization display of User Education statistics and Service Evaluation statistics with *Google looker studio* on the University Lancang Kuning Library website

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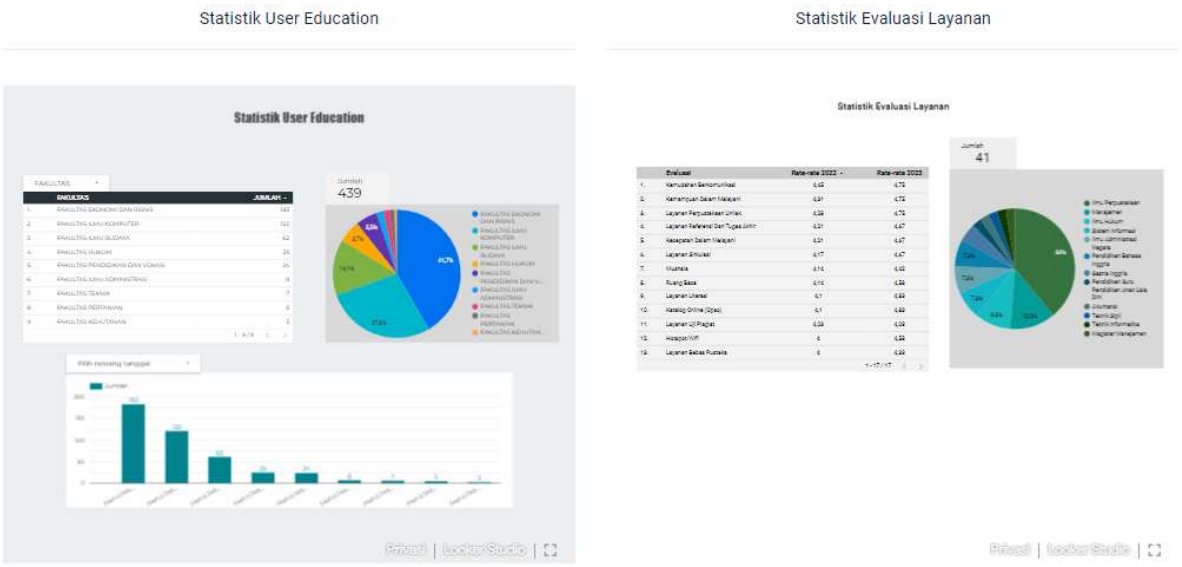

Source: pustaka.unilak.ac.id/statistik/

Figure 11. Visualization display of User Education statistics and Service Evaluation looker studio on the website

Discussion

The results of data analysis show that the implementation of Artificial Intelligence (AI) in data visualization at Lancang Kuning University Library is carried out through systematic stages, starting from data collection using SLiMS and Google Sheets, then continuing with data filtering and .xls format processing, to the final stage of visualization using Google Looker Studio. This process allows managers to interactively display various library statistics, such as the number of visitors by faculty, the use of services such as Turnitin and Mendeley, as well as loan and membership data. These visualizations provide a clear and easy-to-understand picture, and support data-driven decision-making.

Functionally, the application of AI in data visualization is proven to improve the efficiency of information management and transparency of services to users. The interactive dashboard displayed on the Unilak library website makes it easy to monitor daily library activities and collection usage in real-time. This not only helps library staff in service evaluation, but also provides more open access to information for users. Thus, AI technology is not just a technical tool, but also an important strategy in the digital transformation of library services that are more responsive and modern.

In the context of libraries, the application of AI in data visualization serves to improve the efficiency of information management and provide a better user experience. Lancang Kuning University Library, as an academic information center, utilizes AI technology to overcome challenges in managing complex data involving various types of collections, such as books, journals, and other digital materials. In addition, the interactive dashboard developed by Wang et al. (2019) can be used to monitor and analyze library usage in *real-time*. Lancang Kuning University has started the steps of AI implementation in library data visualization. One of the initiatives is the development of an interactive dashboard that displays real-time statistics of library service usage. This dashboard allows library managers to monitor book borrowing, daily visits, and other activities easily.

4. CONCLUSION

The use of Artificial Intelligence (AI) for data visualization in Lancang Kuning University Library makes a significant contribution in improving the efficiency and effectiveness of information management. Through AI technology, the library can present data in a more interactive and informative manner, making it easier for users to access and understand the information available. AI-based data visualization allows the management of book collections, journals, and other reading materials to be done more systematically. It also helps in monitoring and analyzing library usage, so that managers can make more informed decisions in collection and service development. In addition, AI supports the creation of more personalized book recommendations for users, based on analysis of their preferences and search history.

Predictions of library usage trends can also be made more accurately, allowing libraries to be proactive in meeting users' needs in the future. The implementation of AI in library data visualization also reflects Lancang Kuning University's commitment in adopting the latest technology to improve the quality of academic and educational services. However, challenges in implementing this technology, such as the need for skilled human resources and adequate infrastructure, must be overcome for the benefits of AI to be optimized. Overall, the adoption of AI in library data visualization not only accelerates the data processing process, but also opens up new opportunities in the development of a more sophisticated and *user-friendly* information system. Thus, Lancang Kuning University library can become more responsive and adaptive to technological developments and user needs, making it a more modern and efficient information center in this digital era.

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