DEVELOPMENT OF HYPERLAPSE TRACK FRAME APPLICATION BASED ON GOOGLE MAPS API

Rommy Taufik Hidayat[1], Muhammad Rozahi Istambul[2]
[1,2]Departement of Information System, Widyatama University, Bandung, Indonesia
[1,2]Jl. Cikutra No.204A, Sukapada, Kec. Cibeunying Kidul, Bandung City, West Java, Indonesia

*Corresponding author
rommy.hidayat@widyatama.ac.id,
rozahi.istambul@widyatama.ac.id

Abstract
Yogyakarta as one of the busiest cities in Indonesia is visited by many domestic and foreign tourists. Yogyakarta is a province on the island of Java with an area of about 3,186.80 km^2 with a population of around 4.5 million. Yogyakarta is not only called a tourist city, but Yogyakarta has the title of the largest tourist area with a tourist attraction that is very popular with tourists in Indonesia. Every tourist spot in Yogyakarta has a great distance. The number of tourist attractions with various routes that can be traversed can only be described by satellite, or a hybrid to travel to a tourist spot and many are not known about the type of trip that will be taken on that route. The application design in this study was built using the prototype method. The result of this research is a design document for the Hyper-lapse Track application based on Google Maps API which describes the Hyper-lapse Google Maps Street View to show the conditions, environmental conditions/trips that will be taken on this route to the desired tourist attractions for Yogyakarta tourists.

1.0 INTRODUCTION

Yogyakarta is one of the busiest cities in Indonesia and is one of the provinces on the island of Java with an area of about 3,186.80 km^2. With a population of around 4.5 million people [1]. Yogyakarta is not only called a tourist city, but Yogyakarta has the title of the largest tourist area with a tourist attraction that is very popular with domestic and foreign tourists in Indonesia. The number of tourist attractions that have cultural viscosity in their historical heritage and the culture of the Javanese cultural community that is still thick makes the tourist attractions visited have their charm and characteristics [2]. Every tourist spot in Yogyakarta has a long-distance, such as the distance from the tourist attraction of Prambanan Temple to Parang Tritis Beach with a distance of 42.8 km. With various routes that can be traversed can only be described on Google Maps with satellite maps, or a hybrid for traveling so that many people do not know the type of trip that will be taken on that route, not a few tourists experience errors in taking routes/directions and turns until they get lost. on the way to the tourist spot. The number of tourists who get lost is because there is no description of the journey of the route that will be taken on the way to Prambanan Temple to Parang Tritis Beach. With this problem, the researcher built a Hyper-lapse Track application design based on Google Maps Street View to help users recognize the path or route to be traversed in the form of a walking 360-degree image interaction [2].

Several studies are used as references, such as cultural research, that the use of Google Maps produces an application media that can be used by natural tourism managers to

manage tourist destinations and can be used by visitors to find recommendations for popular tourist objects [3]. Likewise, research conducted by Masykur discusses the use of Google Maps is showing that the existence of the Faculty of Engineering, Muhammadiyah University of Ponorogo is still limited to the Karisidenan Madiun, East Java [4].

Another research conducted by Kusuma produced an information system that presents tourism information in Sidoarjo district based on WebSIG with satellite and terrain map views equipped with features such as adding locations, searching for tourist objects, and providing research on web pages [5]. Meanwhile, research conducted by Winoto produced an application using the Google Maps API to help users find the location of city parks and thematic villages in the city of Semarang [6]. Likewise, what was done Guranti in producing a GIS application by utilizing the Google Maps API to display a distribution map containing the number of students and tables and bar charts to be used in considering the target area for promotional purposes [7].

2.0 THEORETICAL

In previous journals, several studies were used as references to conduct this research, including:

Muhammad Sholeh research discusses the implementation of the Goa tourism information system which is specifically located in Yogyakarta and displays website-based Goa information using Google Maps. Meanwhile, what distinguishes this research is based on the tourist route/route in Yogyakarta which can be accessed in the form of Google Maps Hyper-lapse Track [8]. Soepomo research discusses the builder of a tourism mapping system in Yogyakarta using Google Maps with an android system which makes it easier for users to find locations, as well as a tour guide. Meanwhile, what distinguishes this research is its focus on tourist routes/routes in Yogyakarta which can be displayed in the form of Google Maps Hyper-lapse Street View [9]. Aldabbagh research discusses the process of building and implementing a Google Maps fire-based android application, where users can add, delete and view certain locations on an online map, as well as provide navigation, such as showing directions, calculating driving distance and time. Meanwhile, what distinguishes this research is that it focuses on tourist routes/routes in Yogyakarta which can be displayed in the form of Google Maps Hyper-lapse Track [10].

Anguelov's research discusses the street view camera system, navigation, and the presentation of images/imaginations to users. Meanwhile, what distinguishes this research is its focus on routes/roads to tourist attractions in Yogyakarta which can be displayed in the form of Google Maps Hyper-lapse Track [11]. According to Kelana Hyper-lapse is a filmmaking technique by combining images to produce a video. Hyper-lapse video consists of a camera that is constantly moving and at a constant distance, which results in the effect of a moving camera. Hyper-lapse combines Google Street View technology, 360-degree photography, and time-lapse techniques [12].

According to Soepomo, the Google Maps API is a service from Google for users to build or develop an application that is equipped with google maps. This Google Maps API service will be used as a list of system requirements to design the Hyper-lapse Track application for the Prambanan Temple tourist destination to Parang Tristis Beach [13]. According to Ariyanti, the Geographical Information System is a computer-based information system used to process and store geographic data or information. The geographic information system processing that will be used in the design of this application is the spatial/coordinate data of the Prambanan Temple and Parang Tritis Beach attractions [14].

From the results of a number of these studies, it can be concluded that the use and utilization of the Google Maps API are only providing information about the location of a place/object in the form of satellite maps, or terrain, without providing an overview of the trip that will be taken when going to that location. . From this problem, the researchers created a design and application that can provide users with an overview of the journey, by utilizing Google Maps API to use the Google Street View service. In this case, it will form a moving image media in each frame/image, which is called Hyper-lapse. Hyper-lapse is an image that runs automatically by combining a collection of images/frames obtained from Google Street View from the journey that will be taken.

3.0 METHODOLOGY

According to Purnomo, the prototype method begins with requirements gathering, which involves system developers and users to determine the objectives, functions, and operational requirements of the system [15]. The author's stages in this study include:

1. Collection of needs

The data requirements needed in designing the Hyper-lapse Track application include spatial data for the tourist attraction of Prambanan Temple and Parang Tritis Beach, the route from Prambanan Temple to Parang Tritis Beach, the unique Google Maps API code for taking frames/pictures/stock shot, the need for the number of frames. In that area, the requirements for hardware and software specifications, data on domestic and foreign tourist visitors of tourist objects are based on the Yogyakarta tourism statistics book.

2. System design process/prototype

The design system or prototype or mock-up for designing the Hyper-lapse Track application requires the function of showing the location of the Prambanan Temple and Parang Tritis Beach attractions, displaying the path to be followed from the two tourist objects, control to adjust hyper-lapse such as play, pause, next frame, previous frame, and Google Street View.

3. Design an evaluation system

The Hyper-lapse Track system will be evaluated based on the results of the design that has been made and readjust the needs again in order to facilitate further development such as evaluating the determination of the number of frames based on device specifications and features to control Hyper-lapse.
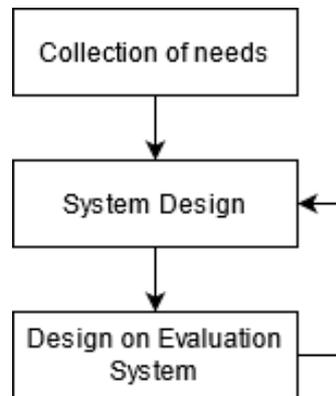

Figure 1. Prototype Method

4.0 RESULANTS AND DISCUSSION

4.1. Analysis

Based on data from the Yogyakarta Tourism Statistics Agency in 2019, Yogyakarta tourist attractions that are very much in demand by domestic and foreign tourists are Prambanan Temple with a total of 2,509,655 tourists visits and Parang Tritis Beach with 2,789,354 tourists visiting [16]. Based on Google Maps geographic spatial data, the location of the Prambanan Temple tourist attraction is at coordinates -7.751871763347596, 110.491478125791 which is located on Jl. Raya Solo - Yogyakarrta No. 16, Kranggan, Bokoharjo, Kec. Prambanan, Kab. Sleman, Yogyakarta Special Region and Parang Tritis Beach are located at coordinates -8.024591750514515, 110.32981201677384 which are located in the Special Region of Yogakarta. The distance between Prambanan Temple and Parang Tritis Beach is 45.2 km.

The number of tourism application development using the Google Maps API at this time (reference research), is not fully understandable by users when using the application. The information provided in the application still lacks the depiction of a tourist attraction and the distance. The visualization shown in the existing application is only in the form of a satellite map so that the user does not know the terrain (image display along the journey) that will be taken when going to that location. The absence of images or visualization of the terrain of the journey that is taken will only cause doubts for the user to visit a destination. With this problem, we need an application that provides information on a collection of images that are used as a collection of running frames to provide images or visualization of trips for the user.

The Google Maps service can only provide an overview of the visualization of the form of a trip, but users have to manually search for the journey to be traversed by clicking frame by

frame, which is so many that they take up a lot of memory usage. As a result, there will be overload when processing the trip visualization and spend a lot of time just searching for the trip visualization. Analysis of the problem will be solved through an application, which can describe the visualization of the journey determined by the user from the starting point to the endpoint of the location. This visualization will move automatically with a time frame of 1 second/frame, with the number of frames that can be adjusted according to the size of the available memory, so that there is no overload and it will not take a lot of time when browsing the trip visualization.

Figure 2 Collection of multiple Hyperlapse Track Frames

In the Figure above it can be explained that these frames are a picture of the journey from the starting point of the location to the endpoint of the location. Each frame taken is a visualization or description of the trip related to the field of travel, where each frame will travel 1 second/frame from the initial frame to the end frame.

For example in making a collection of frames from the journey to be taken. The frame taken is a Google Street view image that can see and rotate 360 degrees. The first point for the start of taking the frame is the location of Prambanan Temple then for the endpoint of taking the frame is the location of Parang Tritis Beach. Between the starting point and the endpoint in making a hyperlapse, a midpoint frame is needed. The center point is at the coordinates -7.888485429563318, 110.41472972208761. The Google Maps API will process the existing frames on the route by adjusting the number of frames needed by the user to become a Hyperlapse Track. Hyperlapse tracks can be controlled such as starting a hyper-lapse, moving forward 1 frame, moving back 1 frame, and pause.

Figure 3. Frame Control

The control feature can be used to control Hyper-lapse such as the number of frames to be used, the hyper-lapse motion speed from frame to frame, camera position, and others. When the frame is in pause, the user can control/direct the position of the camera/view in all directions using the control feature or can drag directly on the screen area.

Based on Google Services in designing Google Street View, each frame has a distance of 3 meters/frame. If you confuse the tourist objects of Prambanan Temple and Parang Tritis Beach which are 45.2 km away, then the number of frames on the route is 15067 frames. Based on the observations of researchers in designing the Hyper-lapse application, the number of frames processed will depend on the RAM size. 2 Gb RAM on hardware specification can process Hyper-apse totaling 100 frames. The more frames to be used, the larger the RAM size needed to process Hyper-lapse performance. If the number of frames on the route is reported based on the results of the researcher's analysis of RAM usage, 300 Gb is required to process all the frames on the route or provide a distance between frames of 452 meters / frame if the frames used on the trip are 100 frames.

In designing the Hyper-lapse Track application, there are several system functions needed including:
1. The system built must display tourist attraction information.
2. The system built must be able to display travel routes from the starting point of the tourist attraction to the endpoint.
3. The system built must be able to process the distance between tourist objects.
4. The system built must display the Hyper-lapse Street View of the Prambanan Temple tourist attraction towards Parang Tritis Beach.
5. The system built must be able to display images from a 360 camera area.

4.2. System Design

The design system in designing a hyper-lapse track application requires several things such as a starting point and an endpoint, a unique Google Maps API code. the starting point is needed as the first frame capture and the endpoint is the destination end frame. In order for the route to be generated as a frame, the Google Maps API is required. The following is a hyper-lapse track application design system.
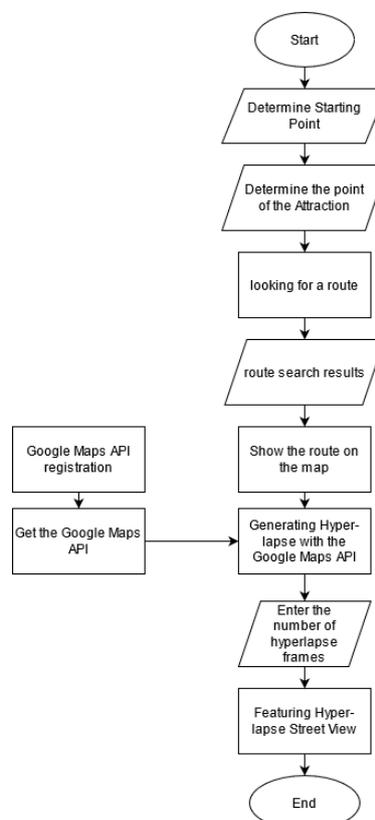

Figure 4. System Design Hyper-lapse Application

In Figure 4 it can be explained that the design is related to the Hyper-lapse application system workflow. The thing that must be done is to determine the main point where the user

then determines the point of the tourist attraction. The system will process the route to be followed and the route results will be displayed. Before processing the route to be used as Hyper-lapse, a developer must obtain the Google Maps API by registering first with the Google Maps service, then Google will provide a unique code to access the Google Maps API. The Google Maps API that has been obtained is then processed into Hyper-lapse Track, then the number of frames that need to be made is determined and the system will display Hyper-lapse Street View which can be controlled such as play, pause, next frame, and previous frame.

The system built is expected to be an alternative to describe the route that will be followed when heading to a tourist attraction and the advantages of the system in this design include:
1. The system built can be used by various platforms
2. The designed application system can be used as a guide for users who want to travel from Prambanan Temple to Parang Tritis Beach
3. The system built can display 100 frames with a RAM capacity of at least 2 GB.
4. The system built can display the surrounding environment because there is a 360-degree camera feature on each frame.

5.0 CONCLUSION
5.1. Conclusion
This research concludes that the high interest of tourists to visit the Prambanan Temple and Parang Tritis Beach attractions can be increased by the use of Geographic Information Systems applications such as the design of the hyper-lapse track (street view) application. The design of this application can assist users in getting to know the travel environment and the location of the route to be traversed. The route to be traversed will process the frame into a hyper-lapse which serves to provide an overview of the user's journey in the form of Google Street View. The more frames needed to describe the route, the more clearly it describes the route, but the more RAM is needed.

5.2. Suggestion
The design of this application system can not only be developed to see the route of the Prambanan Temple to Parang Tritis Beach but also the application of this system can be extended to access tourist attractions throughout Yogyakarta.

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