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PEDESTRIAN APPLICATION DEVELOPMENT TO INCREASE THE NUMBER OF PEDESTRIANS MAKE USE OF TECHNOLOGY AND GEOFENCING FEATURE GAMIFICATION

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ABSTRAK

The provision of infrastructures and means of pedestrian network is one of the things that must be considered in planning space. According to the regulation of the Minister of public works no. 03 year 2014 contains about guidelines the planning, provision, Utilization, Infrastructure, Network and means of Pedestrian in urban areas, infrastructure or means of pedestrian network that aims to facilitate the movement of a number of pedestrians from one place to another easily, safely, comfortably. Walk is a person who is engaged in one room, Shirvani (1985) says its users require special line commonly called pedestrian or pavement, is one of the means of development regions that determine the success of the development process in an area of the city. Based on the results of the online questionnaire obtained approximately 71.6% of the community who likes to walk pedestrians, 62.7% of society often doing walks, when he wanted to go somewhere with a distance of more than 200 m about 70.1% community more choose by foot, 53.7% of society prefer to go to the cafe, but approximately 14.8% community who walk away not knowing how many calories already burned, to service the existing Cafe promotion now about 25.4% satisfactory, and 64.2% was satisfactory. In order to attract the attention of society of Bandung city to walk on the sidewalk or pedestrian that you have prepared, then android mobile applications created by using Geofencing technology and features of Gamification. Geofencing is a feature of a program component that utilizes Global Positioning System (GPS) to determine the geographical limitation virtually.

Keywords: walk, android, smartphone, Geofencing, Gamification

1. INTRODUCTION

1.1 Problem Identification

The provision of infrastructures and means of pedestrian network is one of the things that must be considered in planning space. According to the regulation of the Minister of public works no. 03 year 2014 contains about guidelines the planning, provision, Utilization, Infrastructure, Network and means of Pedestrian in urban areas, infrastructure or means of pedestrian network that aims to facilitate the movement of a number of pedestrians from one place to another easily, safely, comfortably.

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Based on the results of the online questionnaire obtained approximately 71.6% of the community who likes to walk pedestrians, 62.7% of society often doing walks, when he wanted to go somewhere with a distance of more than 200 m about 70.1% community more choose by foot, 53.7% of society prefer to go to the cafe, but approximately 14.8% community who walk away not knowing how many calories already burned, to service the existing Cafe promotion now about 25.4% satisfactory, and 64.2% was satisfactory.

In order to attract the attention of society of Bandung city to walk on the sidewalk or pedestrian that you have prepared, then android mobile applications created by using Geofencing technology and features of Gamification. Geofencing is a feature of a program component that utilizes Global Positioning System (GPS) to determine the geographical limitation virtually. This application is built that utilize the android-based mobile GPS and features the Gamification is a solution that can help its users who were walking on the sidewalk or pedestrian city.

Based on the background of this research, it will lift the title "application development Appedestrian To increase the number of Pedestrians on the sidewalk and Geofencing Technology Utilizing the features of Android-based Gamification".

1.2 Goal and Purpose

Based on the problems examined then the intent of the research is to build a pedestrian application development to increase the number of pedestrians on the sidewalk and geofencing

technology utilizing the features of android-based gamification.

While the goals to be achieved in this research are:

1. To encourage users so that want to walk on the sidewalk, then during the walk the user will be given bonus points.
2. To find out the result of activities such as walking speed and calories burned when running away.
3. To find out the result of activities such as walking speed and calories burned while giving a complete Cafe information such as location, business hours, phone numbers and the location of the route on foot.

2. THE CONTENT OF RESEARCH

2.1 Pedestrian Paths

In the modern era, in the spatial city pedestrian path is instrumentality which is very important. In addition to providing space for pedestrians, the pedestrian lane also provides security and comfort for its users that cross the line. "It's very pedestrian space, was instrumental in creating a comfortable environment [2].

A pedestrian is a person who is engaged in one room or several spaces. Within walking distance, Shirvani (1985) says its users require specific line called also with the pedestrian, who is one of the means of development area that can determine the success of the process of development in a region the city. According to Dharmawan (2004) says the pedestrian comes from the latin, namely pedestres, can be interpreted as someone who is running away. First known pedestrian lanes in 6000 BC in Khirokitia, Cyprus, where the streets are made of limestone rocks, then its surface at the ground against elevate (Kostof, 1992) [2].

Pedestrian is the movement or circulation of the transfer of a person/user path pedestrian from one place heading into other places on foot [2].

2.2 Android

Android is an operating system for linux - based mobile devices that includes an operating system, middleware and applications. Android provides an open operating system for developers to create applications. Android is launched to the public in 2008. Android is very rapidly growing in the industry because the two main aspect i.e. are open source and architectural models. As a project that is open source, android allows for fully understood and analyzed regarding features, settlement on the bugs of the program to the hardware [3].

2.3 GAMIFICATION

Gamification is the utilization of techniques in game design, games that are thought or game mechanics that can increase the content of non-games.

Gamifikasi itself is valid for applications that are based on non-games that could affect or how they are utilized. In addition gamifikasi works by making a very interesting technology, with invited users or players to engage in the desired behavior, by showing the way or plot a mastery, by taking advantage of the tendency of a person's psychological ' addictive or to engage in a game in play. This gamification technique can push someone to do the work they are usually boring into fun [4].

2.4 Global Positioning System

The Global Positioning System is a device or system that is commonly used to inform the user to the presence of the location was somewhere on the surface of Earth by utilizing a satellite. Data sent from the satellite radio signal is in the form of digital data. Where positions are currently located, then the GPS can help to indicate the direction of the intended location [5].

2.5 Analisis Metode Appedestrian

In this study using several methods including :

1. Data dissemination bonus pedestrian, as follows:

Example:

id	nilai	latitude	longitude
1	5	-6.885485	107.614288
2	10	-6.885568	107.614418
3	10	-6.885649	107.614498
4	15	-6.885785	107.614592
5	15	-6.885896	107.614648
6	15	-6.885889	107.614659
7	5	-6.886017	107.614705
8	10	-6.88615	107.614755
9	15	-6.886322	107.614807
10	10	-6.88646	107.614854
11	20	-6.886636	107.61492
12	30	-6.886833	107.614991
13	20	-6.886967	107.615037
14	15	-6.88728	107.615143
15	25	-6.887626	107.615273
16	20	-6.887817	107.615341
17	10	-6.887998	107.615403
18	20	-6.888182	107.615466
19	20	-6.888301	107.615513
20	5	-6.888545	107.615595
21	10	-6.888705	107.615656
22	10	-6.888874	107.615718
23	25	-6.889083	107.615816
24	10	-6.889199	107.61587
25	15	-6.889344	107.615943
26	30	-6.889465	107.616004

Then taken 10 random bonus location data from the data above. Randomization data retrieval by using the following query:

SELECT * FROM bonus

ORDER BY RAND()
LIMIT 10
Then get a bonus location data for each user as follows:

id	nilai	latitude	longitude
13	20	-6.886967	107.615037
24	10	-6.889199	107.61587
6	15	-6.885889	107.614659
16	20	-6.887817	107.615341
15	25	-6.887626	107.615273
17	10	-6.887998	107.615403
22	10	-6.888874	107.615718
3	10	-6.885649	107.614498
18	20	-6.888182	107.615466
19	20	-6.888301	107.615513

1. Calorie Burned Counter, as follows:
the number of calories that can be trimmed with the walk fit individual body weight range, alerts you of the page Good HouseKeeping (27/11/2017).
• Weight 54 – 63 Kg
Road Distance (3 mph)
-15 menit : 50 kalori
-30 menit : 100 kalori
-1 jam : 200 kalori
Walk Faster (4-5 mph)
-15 menit : 95 kalori
-30 menit : 185 kalori
-1 jam : 370 kalori
• Weight 72 – 81 Kg
Road Distance (3 mph)
-15 menit : 65 kalori
-30 menit : 127 kalori
-1 jam : 255 kalori
Walk Faster (4-5 mph)
-15 menit : 120 kalori
-30 menit : 245 kalori
-1 jam : 485 kalori

1. Haversine Formula
Haversine method is used to calculate the distance between a point on the surface of the Earth using latitude (longitude) and longitude (latitude) as the input variable. By assuming that the Earth is round-shaped with RADIUS R: 6371 Km, with the slope of the field 10:0.0174533 radians and the location of the 2 point koordinant ball (latitude and longitude) of each is lat1, lon1, and lat2, lon2. The following table 3.2 longitude and latitude as much as 5 Cafe has been in surveys by researchers.

Tabel 2.1 Longitude dan Latitude Kafe

Nama Kafe	Latitude	Longiitude
Upnormal	-6.916686	107.609187
EatBoss	-6.897272	107.613063
Cabe Rawit Café	-6.891616	107.615047
Mujigae Resto	-6.960156	107.580948
The Joint	-6.904598	107.620434

For example at this research site users are on the sidewalks around the campus of UNIKOM Jln. Si Bandung and want to go to Cafe location closest to the campus of UNIKOM.
With the haversine formula as follows:
x = (Lon2 – Lon1) * cos ((Lat1 + Lat2) / 2)
y = (Lat2 – Lat1)
d = sqrt (x*x + y*y) * R
Keterangan :
x = Longitude
y = Latitude
d = Jarak
R = Radius Bumi = 6371 km
1^0 = 0.0174532925 radian

1. Unikom – Upnormal
Lokasi 1 : Lat1 = -6.886825, Long1 = 107.615295
Lokasi 2 : Lat2 = -6.916686, Long2 = 107.609187
Lat1 = -6.886825 * 0.017453293 radian = -0.120197771 radian
Long1 = 107.615295 * 0.017453293 radian = 1.878241221 radian
Lat2 = -6.916686 * 0.017453293 radian = -0.120718944 radian
Long2 = 107.609187 * 0.017453293 radian = 1.878134616 radian

x = (long2 - long1) * cos ((lat1 + lat2) / 2)
= (1.878134616 - 1.878241221) * cos ((-0.120197771 + (-0.120718944) / 2))
= -0.000106605 * cos -0.1204583575
= -0.000106605 * 0.9927536606
= -0.0001058325
y = (lat2 - lat1)
= (-0.120718944 - (-0.120197771))
= -0.000521173
d = sqrt (x*x + y*y) * R
= sqrt (-0.0001058325 * -0.0001058325 + -0.000521173* -0.000521173) * 6371
= sqrt (0.00000028282) * 6371
= 0.00053180823 * 6371
= 3.388150272

Based on the results of the haversine formula is the formula obtained distance from UNIKOM to Upnormal is 3.388150272 Km.

2. Unikom – Eat Boss
Lokasi 1 : Lat1 = -6.886825, Long1 = 107.615295
Lokasi 2 : Lat2 = -6.897304, Long2 = 107.613196
Lat1 = -6.886825 * 0.017453293 radian = -0.1201977746
Long1 = 107.615295 * 0.017453293 radian = 1.878241275

Lat2 = -6.897304 * 0.017453293 radian = -0.1203806676
Long2 = 107.613196 * 0.017453293 radian = 1.87820464

x = (long2 - long1) * cos ((lat1 + lat2) / 2)
= (1.87820464 - 1.878241275) * cos ((-0.1201977746 + (-0.1203806676) / 2))
= -0.000036635 * cos -0.1803881084
= -0.000036635 * 0.9837741358
= -0.00003604056
y = (lat2 - lat1)
= (-0.1203806676 - (-0.1201977746))
= -0.000182893
d = sqrt (x*x + y*y) * R
= sqrt (-0.00003604056 * -0.00003604056) + (-0.000182893 * -0.000182893) * 6371
= sqrt (0.00000003474) * 6371
= 0.00018638669 * 6371
= 1.187469633

Based on the results of the haversine formula is the formula obtained distance from UNIKOM to Upnormal is 1.187469633 Km.

3. Unikom – Cabe Rawit Kafe

Lokasi 1 : Lat1 = -6.886825, Long1 = 107.615295
Lokasi 2 : Lat2 = -6.891613, Long2 = 107.615012
Lat1 = -6.886825 * 0.017453293 radian = -0.120197775
Long1 = 107.615295 * 0.017453293 radian = -0.120281341
Lat2 = -6.891613 * 0.017453293 radian = 1.878241275
Long2= 107.615012 * 0.017453293 radian = 1.878236336

x = (long2 - long1) * cos ((lat1 + lat2) / 2)
= (1.878236336 - 1.878241275) * cos ((-0.120197775 + (-0.120281341) / 2))
= -0.000004939 * cos -0.120239558
= -0.000004939 * 0.9927799293
= -0.00000490334
y = (lat2 - lat1)
= (-0.120281341 - (-0.120197775))
= -0.000083566
d = sqrt (x*x + y*y) * R
= sqrt (-0.00000490334 * -0.00000490334) + (-0.000083566 * -0.000083566) * 6371
= sqrt ($2.40427431556x10^{-11}$ + $6.983276356x10^{-9}$) * 6371
= sqrt ($7.007319093156x10^{-9}$ * 6371)
= $8.37097311736x10^{-5}$ * 6371
= 0.5333147

Based on the results of the haversine formula is the formula obtained distance from UNIKOM to Cabe Rawit Kafe is 0.5333147 Km.

4. Unikom – Mujigae Resto

Lokasi 1 : Lat1 = -6.886825, Long1 = 107.615295
Lokasi 2 : Lat2 = -6.960156, Long2 = 107.580948
Lat1 = -6.886825 * 0.017453293 radian = -0.1201977746
Long1 = 107.615295 * 0.017453293 radian = 1.878241275
Lat2 = -6.960156 * 0.017453293 radian = -0.121477642
Long2 = 107.580948 * 0.017453293 radian = 1.877641807

x = (long2 - long1) * cos ((lat1 + lat2) / 2)
= (1.8776418066618 - 1.878241275) * cos ((-0.1201977746 + (-0.121477642) / 2))
= -0.0005950969
y = (lat2 - lat1)
= (-0.1203806676 - (-0.1201977746))
= -0.0012798674
d = sqrt (x*x + y*y) * R
= sqrt (-0.0005950969 * -0.0005950969 + (-0.0012798674 * -0.0012798674) * 6371
= sqrt (0.0000019922) * 6371
= 0.00141145315 * 6371
= 8.992368031

Based on the results of the haversine formula is the formula obtained distance from UNIKOM to Upnormal is 8.992368031 Km.

5. Unikom – The Joint

Lokasi 1 : Lat1 = -6.886825, Long1 = 107.615295
Lokasi 2 : Lat2 = -6.904598, Long2 = 107.620434
Lat1 = -6.886825 * 0.017453293 radian = -0.1201977746
Long1 = 107.615295 * 0.017453293 radian = 1.878241275
Lat2 = -6.904598 * 0.017453293 radian = -0.120507972
Long2 = 107.620434 * 0.017453293 radian = 1.878331

x = (long2 - long1) * cos ((lat1 + lat2) / 2)
= (1.878331- 1.878241275) * cos ((-0.1201977746 + (-0.120507972) / 2))
= 0.0000890437
y = (lat2 - lat1)
= (-0.120508 - (-0.1201977746))
= -0.0003101974
d = sqrt (x*x + y*y) * R
= sqrt (0.0000890437 * 0.0000890437 + -0.0003101974 * -0.0003101974) * 6371
= sqrt (0.00000010415) * 6371
= 0.00032272279 * 6371
= 2.056066903

Based on the results of the haversine formula is the formula obtained distance from UNIKOM to Upnormal is 2.056066903 Km.

The following is a table of distances between calculation results 2.2 cafes of Unikom.

Nama Kafe	Alamat	Latitude	Longitude	Jarak/km
Upnormal	Jl. Braga No.84 Bandung	-6.916633	107.609179	3.388150272
Eatboss	Jl. Ir. H.Djuanda No. 72 Bandung	-6.897304	107.613106	1.187469633
Café Cabe Rawit	Jl. Teuku Umar No.7 Bandung	-6.891613	107.615012	0.5333147
Mujigae Resto	Jl. Raya Kopo Bandung	-6.960156	107.580948	8.992368031
The Joint	Jl. Cimanuk No.12 Bandung	-6.904598	107.620434	2.056066903

2.6 Design Interface

1. Login Interface

The design of the interface of the login, as follows:



Figure 2.1 Login Interface

2. Registration Interface

The design of the interface of registration, as follows:

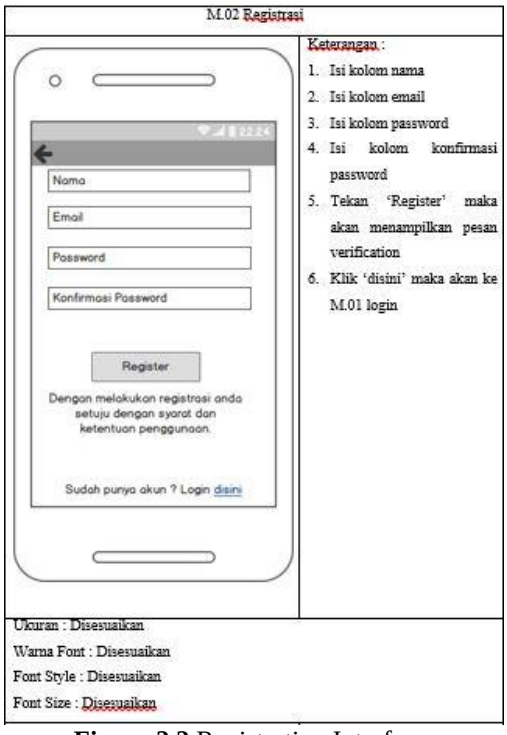


Figure 2.2 Registration Interface

3. Forgot Password

The design of the interface have forgotten the password, as follows:



Figure 2.3 Forgot Password Interface

4. The beginning Pedestrian Interface

The design of the interface of the beginning of the Pedestrian, as follows:



Figure 2.4 The Beginning Pedestrians Interface

5. The Display 2

The design of the interface display 2, as follows:



Figure 2.5 Display 2 Interface

6. Profile Interface

Interface design profile, as follows:



Figure 2.6 Profile Interface

7. Display The Check Point

The design of the interface of the check points, as follows:



Figure 2.7 Display The Check Point Interface

8. Display Info Street Pedestrians

The design of the interface info way pedestrian, as follows:

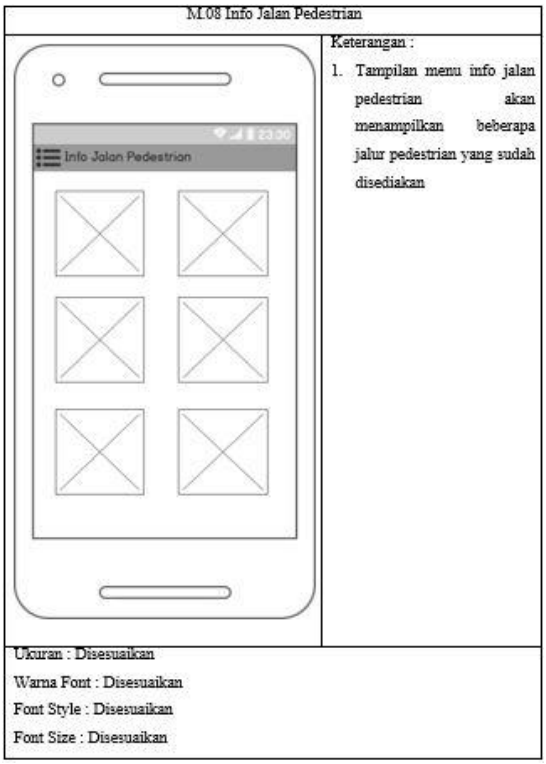


Figure 2.8 Info Street Pedestrians

9. Cafe Info

The design of the interface info Café, as follows:

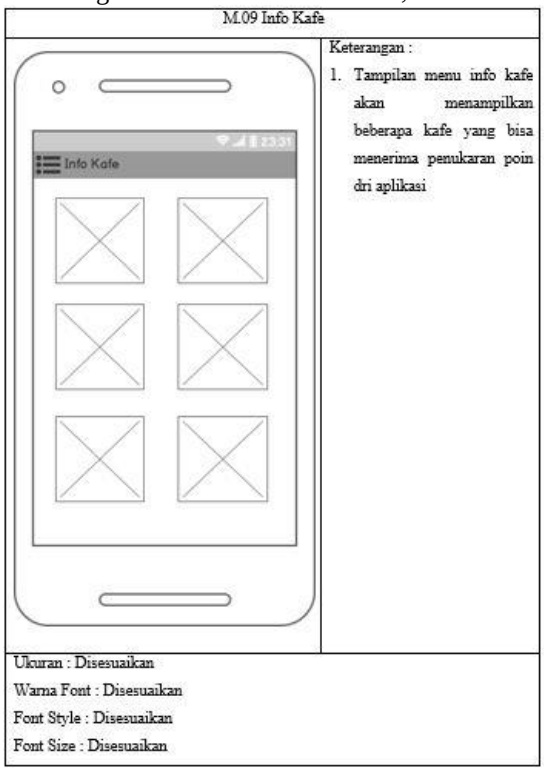


Figure 2.9 Info Cafe

10. Exchange Point

The design of the interface of exchange points, as follows:

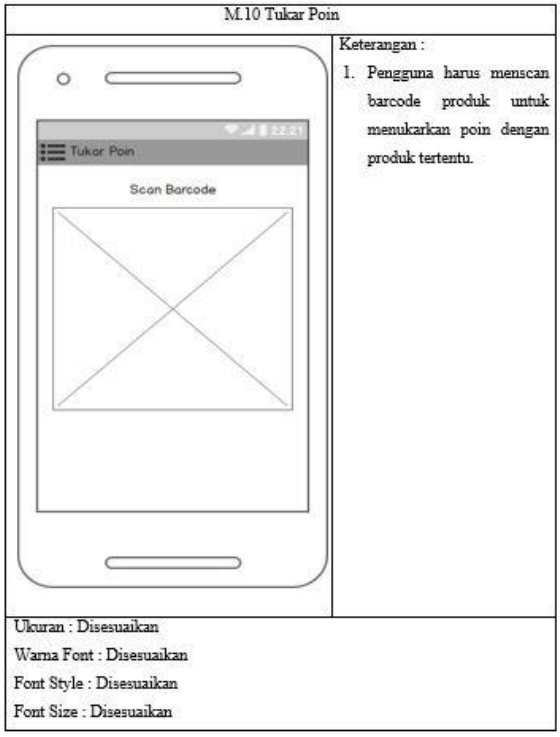


Figure 2.10 Exchange Point

11. Logout

The design of the interface of logout, as follows:



Figure 2.11 Logout

2.7 Semantic Network Design

Semantic network is the description of the graphic that shows knowledge of the relationships between objects (circle) and lines that describe the formation between those objects. As for the semantic network to devices that are built can be seen in Figure 2.12 and table 2.3.

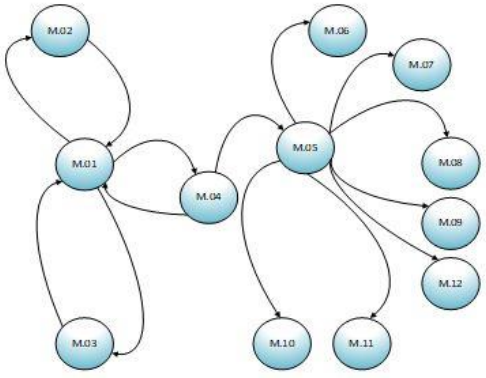


Figure 2.12 Semantic Network

Table 2.3 Code View

Kode Tampilan	Deskripsi
M.01	Login Page
M.02	Registrasi Page
M.03	Forgot Password Page
M.04	The Display 1 Page
M.05	The Display 2 Page
M.06	Profile Page
M.07	Check Point Page

M.08	Info Street Pedestrian Page
M.09	Info Cafe Page
M.10	Exchange Point Page
M.11	Logout Page

2.8 In Conclusion Alpha Testing

Based on the results of software testing that is done then it can be inferred that the software being built are already running as expected either in terms of validation or process error handling.

2.9 In Conclusion of The Beta Test

Based on the results of beta testing, the conclusion that can be drawn:

1. The user agrees that the application can already encourage users to walk on the sidewalk.
2. The user agrees that this application can help you easily get the information the number of calories burned while walking away.
3. The user agrees that this application can tell the information promotion efforts somewhere around you.
4. The user agrees that this application already present information the number of pace and distance traveled precise in your walk activities.
5. The user agrees that the application pedestrian it easy to understand.
6. Users agree that the application pedestrian is easy to use.

3. CLOSING

3.1 Conclusion

Based on the results of testing applications pedestrian then the obtained conclusions as follows:

1. The application can already encourage users to walk on the sidewalk.
2. This application can help you easily get the information the number of calories burned while walking away.
3. This application can tell the information promotion efforts somewhere around you.
4. This application is already present information the number of pace and distance traveled precise in your walk activities.

3.2 Advice

pedestrian application built to increase the number of pedestrian, find the points already spread across several lanes, pedestrian and get promotional information. Therefore there are some suggestions that can be used as a guide to software development towards a better growth in support of the user and the content on this pedestrian application. As for the suggestions are as follows:

1. The admin backend to add features to the cafe to add bonus points in the pedestrian.
2. Applications for the users can only run on one platform, namely android. We recommend that applications can also be developed in other platforms in order to expand the users in using the software.

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