Implementation Of Decision Support System For The Determination Of Tax Nominal And Supervision Of Reclame Licenses

I Putu Arich Arthawan[1], Made Sudarma[2], Nyoman Pramaita[3]

[1](Magister Program of Electrical and Computer Engineering, Udayana University Graduate Program, Sudirman Denpasar, Bali-Indonesia)

[2,3](Department of Electrical and Computer Engineering, Faculty of Engineering, Udayana University Jimbaran Campus, Bali-Indonesia)

Abstract: *Denpasar's Licensing and Spatial Planning Office is a service office that regulates all matters concerning Denpasar city planning, specifically the placement and monitoring of billboards throughout the city of Denpasar. The Office of Licensing and Spatial Planning of Denpasar City has difficulty monitoring billboards in Denpasar City, this can hamper the performance of the department, to improve the monitoring performance of existing billboards, the agency needs a system that is able to assist in the supervision of permits at each advertisement point in Denpasar, to meet these needs the author will conduct a needs analysis, design using UML and system implementation that will utilize the GIS dashboard, this dashboard will later use a google map to display the visualization of the advertisement location . From these problems in this study using the entropy algorithm and k-means in terms of classification and GIS as data visualization. From the tests carried out, the results obtained 83% accuracy and 17% error for algorithm testing, blacbox testing produces 100% accuracy with the expectation that the user and the system can be implemented perfectly.*

Keywords: *entropy, k-means, GIS, Billboard*

I. Introduction

The development of information technology motivates organizations to use information technology as a solution to improve performance. Many organizations that have used information technology hope to improve efficiency, effectiveness, means of communication and also the integration of one technology with another, and to improve the organization's competitive strategy. One of the means used is by installing billboards.

The billboard contains advertisements intended to be seen by pedestrians and motorists who pass by. Billboards generally contain large and attractive illustrations, accompanied by slogans. In Indonesia, there is a tendency to distinguish billboards and advertisements based on placement categories so that billboards are used to mention outdoor advertising media [1] [2] .

The Denpasar City Licensing and Spatial Office is a service office that regulates all matters concerning the Denpasar City layout, specifically the placement and monitoring of billboards that exist throughout the Denpasar City area. Information on billboards today, especially billboards, is important in publicizing an industry. In its application not many people know the location of any location that can be used or installed a billboard .

The Office of Licensing and Spatial Planning of Denpasar City has difficulty monitoring billboards in Denpasar City, this can hamper the performance of the department, to improve the monitoring performance of existing billboards, the agency needs a system that is able to assist in the supervision of permits at each advertisement point in Denpasar, to meet these needs the author will conduct a needs analysis, design using UML and system implementation that will utilize the GIS dashboard, this dashboard will later use a google map to display the visualization of billboard locations and information in graphical form to provide an overview of the status of each existing billboard with GIS-based applications in addition determine where the location of a billboard also determines the nominal value of taxes to be paid by taxpayers in accordance with the strategic layout that has been determined by the criteria in Denpasar city regulations.

The use of maps server and the use of map technology is very applicable to display information on the locations of scattered advertisement locations so that they can be known by officers when checking to the location according to the recorded data [4] [5] . The method used in the implementation of the system will be made using the K-Means method to determine clusters so that the classification of advertisement data can be according to

---

class level which certainly distinguishes the value of the nominal tax paid, and henceforth uses the Entropy method in supporting the decision to determine the tax nominal.

II. Literature Review

2.1 Collection
The meaning of collection according to Article 1 Number 13 of Law Number 34 of 2000 concerning Amendment to Law Number 18 of 1997 concerning Regional Taxes and Regional Levies is a series of activities starting from collecting data objects and subjects of taxes or levies, determining the amount of taxes or levies owed to activities tax collection or levies to taxpayers or levies as well as supervision of deposit [1] [2].

2.2 Billboards
The meaning of the advertisement according to Bandung City Regulation Number 08 of 2003 concerning Regional Taxes is objects, tools, deeds or media which according to their forms and patterns for commercial purposes, are used to introduce, encourage or praise an item, service or person, or to attract attention general to goods, services or people who are placed or can be seen, read and / or heard from a place by the public, except those done by the Government, whereas according to the Law of the Republic of Indonesia Number 28 Year 2009 regarding Regional Taxes and Regional Retribution, Referred to as a billboard is an object, tool, act or media which according to its forms and features for commercial purposes, is used to introduce, encourage or compliment an item, service or person, or to draw general attention to an item, service or person who placed or which can be seen, read and / or heard from somewhere o leh general [12] [14] [18].

2.3 Entropy algorithm
Entropy is a term in the law of thermodynamics which indicates a measure of the uncertainty of a system. In an Entropy study used as a weighting method. Entropy weighting method is a decision-making method that gives a group of criteria, and estimates the preference of a weight according to management's assessment to determine the priority level of advertisements / advertisements owned by applicants for advertisement permit [6] [15].

2.4 K-Means algorithm
K-Means algorithm is a distance based non-hierarchical clustering method that divides data into clusters and this algorithm works on numeric attributes. The K-Means algorithm is included in partitioning clustering which separates data into separate k regions. The K-Means algorithm is very well known for its ease and ability to cluster large data and outliers very quickly [17].

2.5 WebGis
Geographic Information System (GIS) is a system designed to work with spatially referenced data or geographic coordinates. GIS has the ability to perform data processing and perform certain operations by displaying and analyzing data. GIS applications are currently growing not only in number of applications but also in terms of the variety of applications. The development of GIS applications in the future leads to Web-based applications known as Web GIS. This is because the development of applications in the network environment has shown great potential in relation to geo information. An example is the online map of a city where users can easily search for a desired location online through an intranet / internet network without knowing the geographical boundaries of its users [12] [13] [14]
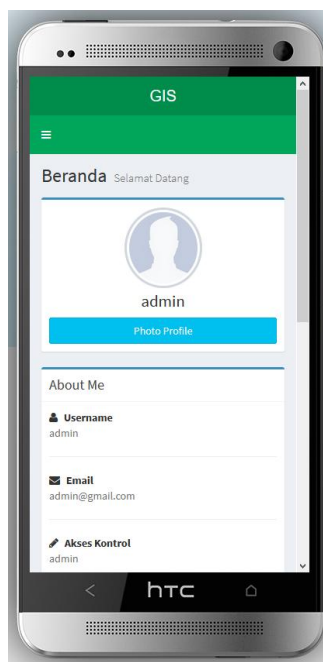
III. Implementation
from this study using the PHP programming language with conversions for mobile applications using Android studio tools. The results of system implementation can be seen as follows :

A. Login System
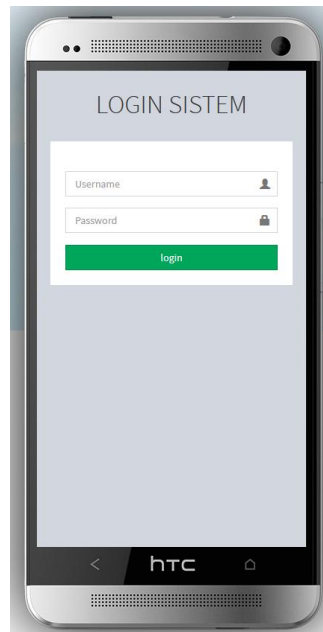
The picture above is an implementation of the system login, login on this system is intended for authorized officers and has the authority in managing advertisement data.

B. Beranda

The picture above is an implementation of the home page or home page of the system, after the user has logged in the system will point to this view. This view serves to provide information related to user data and system usage.

C. Add Billboard Data
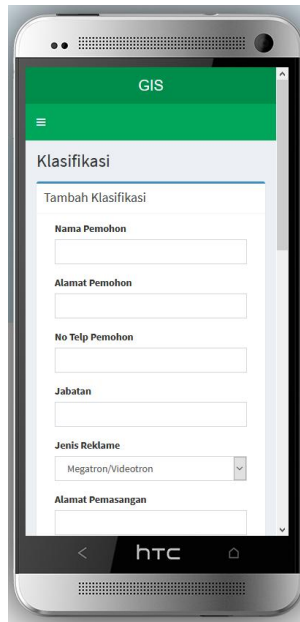
The picture above is an implementation of adding advertisement data. Add data billboards is the initial process before the data classification is done. To add data billboard data - data that must be filled in by the user is data related to the billboard identity and installation location of the billboard.

D. Advertisement Classification Results
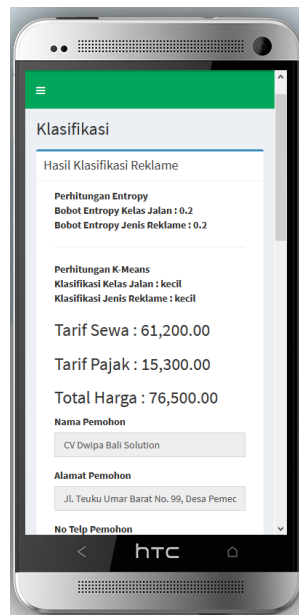
The picture above is an implementation of the advertisement classification results, the classification results obtained after the user through the advertisement data input and the system will run an entopy algorithm and k-means to be able to determine the billboard rental rates, tax rates and the total price of the billboards.

E. Geographical Information System Advertisement.
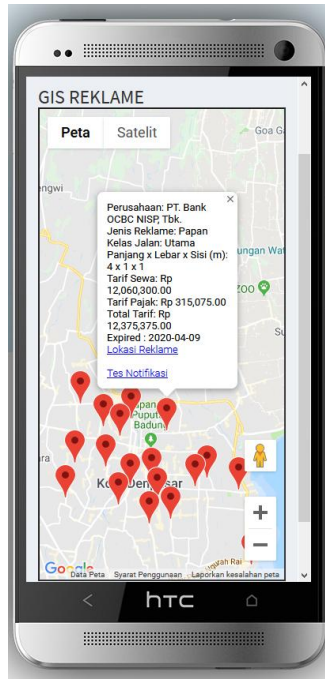
The picture above is an implementation of the geographical information system of the billboards in this study. The geographical information system displays markers from the billboard position and information related to the billboards. The information displayed is the identity and tariff results of the classification.

D. Testing the Algorithm Accuracy

No	System Billboard Rates	Manual Billboard Rates	Conclusion
1	61,200.00	61,200.00	Valid
2	12,060,300.00	12,060,300.00	Valid
3	12,060,300.00	12,060,300.00	Valid
4	61,200.00	61,200.00	Valid
5	12,060,300.00	12,060,300.00	Valid
6	12,060,300.00	12,060,300.00	Valid
7	960,300.00	860,300.00	Not Valid
8	12,060,300.00	12,060,300.00	Valid
9	12,060,300.00	12,060,300.00	Valid
10	12,060,300.00	12,060,300.00	Valid
11	32,000.00	32,000.00	Valid
12	12,060,300.00	11,060,300.00	Not Valid
13	12,060,300.00	12,060,300.00	Valid
14	960,300.00	960,300.00	Valid
15	12,060,300.00	12,060,300.00	Valid
16	1,110,300.00	1,110,300.00	Valid
17	12,060,300.00	11,060,300.00	Not Valid
18	12,060,300.00	12,060,300.00	Valid
19	1,110,300.00	1,110,300.00	Valid
20	1,110,300.00	1,110,300.00	Valid
21	1,692,500.00	1,792,500.00	Not Valid
22	29,600.00	29,600.00	Valid
23	13,750,000.00	13,750,000.00	Valid
24	12,060,300.00	12,060,300.00	Valid
25	1,692,500.00	1,692,500.00	Valid
26	1,292,500.00	1,292,500.00	Valid
27	1,110,300.00	1,110,300.00	Valid
28	960,300.00	960,300.00	Valid
29	1,492,500.00	1,392,500.00	Not Valid
30	1,692,500.00	1,692,500.00	Valid

The above table is the result of testing the accuracy of the entropy algorithm and k-means on system implementation. Testing is done by comparing 30 data from the system with data that has been previously classified manually by the officer. From the table it can be seen the results obtained are there are 5 errors or errors from the system which are declared invalid, the error occurs because of the difference between the value of the classification system with a manual value. Valid or not valid value is 25.

E. Black Box Testing

Blackbox testing consists of 3 components in accordance with the implementation of the system. The results of blackbox testing can be seen in the following table

No	Unit Name	Scenario	Outcome of expectation	System Results
1	Login	Invalid username and password	Error message appears	Error message appears
		Correct username and password	Enter the main system page	Enter the main system page
2	Classification of billboards	Data not complete	Error Message Appears	Error Message Appears
		Complete data	The billboard was classified successfully	The billboard was classified successfully
3	Location with geographic information systems	Test the intended location	The system directs to the advertisement location	The system directs to the advertisement location

It can be seen in the table above that the results of the black box test on 3 main components of the system namely login, classification and advertisement location. With each scenario tested the results obtained are all the processes in the system are running in accordance with user expectations.

IV.   Conclusion

The conclusions resulting from this study Implementation of classification systems using entropy algorithms and k-means can be utilized with PHP programming and conversion to mobile applications, Testing the accuracy of the algorithm produces 83% accuracy with 25 data precisely classified from 30 data and an error of 17% with 5 data not properly classified, Blackbox testing with 3 main components and 5 scenarios produce 100% accuracy of the system results with expected results.

References

[1]   Djumiarti, T. W., Endah Rahayu; Larasati, Endang. (2013). Analisis Pengelolaan Reklame Pada Dinas Penerangan Jalan Dan Pengelolaan Reklame Kota Semarang. Journal of Public Policy and Management Review, (Volume 2, Nomor 2, Tahun 2013), 521–530.

[2]   Gandika S. , M. Sudarma, M. Wiharta. (2019). Sistem Informasi Geografis Pemetaan Persebaran Alumni dengan Analisa ClusteringMajalah Ilmiah Teknologi Elektro, Vol. 17, No. 3, September - Desember 2018 DOI: https://doi.org/10.24843/MITE.2018.v17i03.P12.

[3]   Yudhamanik K., Linawati, Made Sudarma. (2017). Penentuan Pemanfaatan Aset Tanah Pemerintah Daer engan   Sistem   Informasi   Geografis   dan   Metode   *Anality Hierarchy Process* : Studi Kasus Pemprov Bali. Teknologi Elektro, Vol. 16, No.03,September -Desember 2017.

[4]   Fitriani, Sulistyarini, & Parijo. (2012). Kontribusi Pajak Reklame Dalam Meningkatkan Pendapatan Asli Daerah Pada Dinas Pendapatan Daerah. Jurnal Pendidikan dan Pembelajaran, (Vol 1, No 1 (2012): November 2012). Diambil dari http://jurnal.untan.ac.id/index.php/jpdpb/article/view/448

[5]   Hairah, U., & Budiman, E. (2017). Pemanfaatan Google Maps Api Dalam Pengembangan Media Informasi Pasar Malam Di Kota Samarinda, 9, 8.

[6]   Hartati, S. ., Jamila. (2011). Sistem Pendukung Keputusan Pemilihan Subkontrak Menggunakan Metode Entropy dan TOPSIS. IJCCS - Indonesian Journal of Computing and Cybernetics Systems, (Vol 5, No 2 (2011): IJCCS). Diambil dari http://journal.ugm.ac.id/ijccs/article/view/2013

[7]   Hati, G. M., & Suprayogi, A. (2013). Aplikasi Penanda Lokasi Peta Digital Berbasis Mobile GIS Pada Smartphone Android, 2, 15.

[8]   Haviluddin. (2011). Memahami penggunaan UML (Unified Modeling Language). Samarinda: Informatika Mulawarman.

[9]   Irawan, E. (2013). Utang Pajak Reklame Dan Upaya Penagihannya Dalam Perspektif Peraturan Daerah Kota Samarinda Nomor 04 Tahun 2011 Tentang Pajak Daerah. Jurnal Beraja Niti, (Vol 2, No 3 (2013)). Diambil dari http://e-journal.fhunmul.ac.id/index.php/beraja/article/view/74

[10]   Saritosa, P., & Mazharuddin, A. (2011). Sistem Informasi Geografis Untuk Mengelola Publikasi Informasi Reklame Kota Surabaya Menggunakan Mapserver.
[11]   Sasongko, A. (2016). Sistem Informasi Geografis Berbasis Web Untuk Pemetaan Jalan Dan Bangunan, 4(1), 12.
[12]   Setiawan, A. (2009). Kajian Faktor Nilai Strategis Lokasi Dalam Penempatan Reklame Di Kota Palu. JURNAL ARSITEKTUR, (Vol 1, No 1 (2009)). Diambil dari http://jurnal.untad.ac.id/jurnal/index.php/RUANG/article/view/717
[13]   Sholiq. (2006). Pemodelan Sistem Informasi Berorientasi Objek Dengan UML. Yogyakarta: Graha Ilmu.
[14]   Suwandono, D. W., Monang. (2013). Evaluasi Tata Reklame Pada Koridor Utama Kota Magelang. Ruang, (Vol 1, No 1 (2013): Jurnal Ruang), 131–140.
[15]   Wicaksono, B. S., Nasir Widha; Oktavianty, Oke. (2014). Analisis Kepuasan Pelanggan Pada Pelayanan Kesehatan Dengan Menggunakan Metode Potential Gain In Customer Value (PGCV) Dan Entropy (Studi Kasus: Rumah Sakit Mardi Waluyo Kota Blitar). Jurnal Rekayasa dan Manajemen Sistem Industri, (Vol 2, No 3 (2014)), p637-647.
[16]   Wikunurani. (2012). Sistem Pengawasan Atas Implementasi Pajak Reklame Kota Samarinda (Tinjauan Peraturan Daerah Kota Samarinda Nomor 04 Tahun 2011 Tentang Pajak Daerah). JURNAL BERAJA NITI, (Vol 1, No 12 (2012)). Diambil dari http://e-journal.fhunmul.ac.id/index.php/beraja/article/view/41
[17]   Yanti, C. P. (2017). Pengelompokan Peminatan Program Menggunakan Kmeans Clustering Berdasarkan Asal Sekolah. SISFO, (Vol 6 No 3 (2017)), 383–392.
[18]   Yulia, I. Y., Maulana; Haris, Deden Muhammad. (2011). Analisis Pemungutan Pajak Reklame Di Kota Serang. JAP, (Vol 2, No 2 (2011): JURNAL ADMINISTRASI PUBLIK).