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PREFACE

The activities of the International Conference is in line and very appropriate with the vision and mission of the UBL to promote training and education as well as research in these areas.

On behalf of the First International Conference of Engineering and Technology Development (ICETD 2012) organizing committee; we are very pleased with the very good responses especially from the keynote speakers and from the participants. It is noteworthy to point out that about 45 technical papers were received for this conference

The participants of conference come from many well known universities, among others: Universitas Bandar Lampung, International Islamic University Malaysia, University Malaysia Trengganu, Nanyang Technological University, Curtin University of Technology Australia, University Putra Malaysia, Jamal Mohamed College India, ITB, Mercu Buana University, National University Malaysia, Surya Institute Jakarta, Diponegoro University, Unila, Universitas Malahayati, University Pelita Harapan, STIMIK Kristen Newmann, BPPT Lampung, Nurtanio University Bandung, STIMIK Tarakanita, University Sultan Ageng Tirtayasa, and Pelita Bangsa.

I would like to express my deepest gratitude to the International Advisory Board members, sponsors and also welcome to all keynote speakers and all participants. I am also grateful to all organizing committee and all of the reviewers which contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector which give us endless support to these activities, such that the conference can be administrated on time.

Bandar Lampung, 20 Juni 2012

Mustofa Usman, Ph.D
ICETD Chairman

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The First International Conference in
Engineering and Technology Development
(ICETD 2012)

UNIVERSITAS BANDAR LAMPUNG
Bandar Lampung, Indonesia
June, 20-21 2012

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Table Of Content

| | |
|---|----|
| Organizing Committee..... | i |
| Table Of Content..... | v |
| Keynote Speaker | |
| 1. Zinc-Air Battery – Powering Electric Vehicles to Smart Active Labels Dr. Raihan Othman | 1 |
| 2. Enhancing Heat Transfer Using Nanofluids(abstract) Prof. Ahmad Faris Ismail | 6 |
| 3. Rapid Prototyping and Evaluation for Green Manufacturing RizaMuhida, Ph.D | 7 |
| 4. Indonesia’s Challenge to Combat Climate Change Using Clean Energy Rudi Irawan, Ph.D | 12 |
| 5. Paraboloid-Ellipsoid Programming Problem Prof.Dr. Ismail Bin Mohd | 15 |
| 6. Model Development of Children Under Mortality Rate With Group Method of Data Handling Dr. IingLukman | 27 |
| 7. The Modified CW1 Algorithm For The Degree Restricted Minimum Spanning Tree Problem Wamiliana, Ph.D | 36 |
| 8. The Fibre Optic Sensor in Biomedical Engineering and Biophotonics Prof. TjinSweeChuan | |
| Speaker | |
| 1. Web-Based Service Optimization with JSON-RPC Platform in Java and PHP WachyuHari Haji | 1 |
| 2. Trouble Ticketing System Based Standard ISO10002: 2004 To Improve Handling of Complaints Responsibility Ahmad Cucus, Marzuki, AgusSukoco, Maria ShusantiFebrianti, Huda Budi Pamungkas | 6 |
| 3. Design of Warehouse Management Application Tool for Controlling The Supply Chain Anita Ratnasari, Edi Kartawijaya | 10 |
| 4. Development Of Decision Related Engine Using Integration Of Genetic Algorithm And Text Mining EvianaTjaturPutri, Mardalena, Asmah | 15 |
| 5. Implementing CBR on The College Rankings Based on Webometrics with EPSBED’s Data and Webometrics Knowledge | |

| | | |
|-----|---|-----|
| | Marzuki , Maria Shusanti F, Ahmad Cucus , AgusSukoco | 19 |
| 6. | Paypal Analysis as e-Payment in The e-Business Development Nomi Br Sinulingga | 24 |
| 7. | Decision Support System for Determination of Employees Using Fuzzy Decision Tree Sinawaty#1, YusniAmaliah | 28 |
| 8. | Analysis of Factors Influencing Consumer Behavior Bring Their Own Shopping Bag (Case Study KecamatanTembalang) Aries Susanty, DyahIkaRinawati, FairuzZakiah | 33 |
| 9. | The Use of Edge Coloring Concept for Solving The Time Schedule Problem at Senior High School (Case Study at SMAN 9 Bandarlampung) RahmanIndraKesuma, Wamiliana, MachudorYusman | 41 |
| 10. | Analysis Of Web-Education Based on ISO / IEC 9126-4 For The Measurement Of Quality Of Use Marzuki, AgusSukoco, Ahmad Cucus, Maria ShusantiFebrianti, Lisa Devilia | 46 |
| 11. | The Used of Video Tracking for Developing a Simple Virtual Boxing David HabsaraHareva, Martin | 55 |
| 12. | M-Government as Solutions for E-Government problems in Indonesia Ahmad Cucus, Marzuki, AgusSukoco, Maria ShusantiFebrianti | 60 |
| 13. | Open Source ERP for SME Tristiyanto | 65 |
| 14. | Improvement in Performance of WLAN 802.11e Using Genetic Fuzzy Admission Control SetiyoBudiyanto | 70 |
| 15. | Cloud Computing: Current and Future TaqwanThamrin, Marzuki, Reni Nursyanti, Andala Rama Putra | 75 |
| 16. | Implementing Information Technology, Information System And Its Application In Making The Blue Print for The One Stop Permission Services Sri AgustinaRumapea, HumuntalRumapea | 80 |
| 17. | Integration System Of Web Based And SMS Gateway For Information System Of Tracer Study EndykNoviyantono, Aidil | 86 |
| 18. | Fuzzy Logic Applied To Intelligent Traffic Light EndykNoviyantono, Muhammad | 93 |
| 19. | Solving and Modeling Ken-ken Puzzleby Using Hybrid Genetics Algorithm Olivia Johanna, Samuel Lukas, Kie Van IvankySaputra | 98 |
| 20. | GIS Habitat Based Models Spatial Analysis to Determine The Suitability Of Habitat For Elephants AgusSukoco | 103 |

| | |
|--|-----|
| 21. The Course Management System Workflow-Oriented to Control Admission and Academic Process Usman Rizal, YuthsiAprilinda | 108 |
| 22. Fuzzy Graphs With Equal Fuzzy Domination And Independent Domination Numbers A.Nagoorgani, P. Vijayalakshmi | 115 |
| 23. Solving Pixel Puzzle Using Rule-Based Techniques and Best First Search Dina Stefani, Arnold Aribowo, Kie Van IvankySaputra, Samuel Lukas | 118 |
| 24. Capacity Needs for Public Safety Communication Use 700 MHz as Common Frequencyin Greater Jakarta Area SetiyoBudiyanto | 125 |
| 25. Impact of Implementation Information Technology on Accounting Sarjito Surya | 132 |
| 26. Document Management System Based on Paperless WiwinSusanty, TaqwanThamrin, Erlangga, Ahmad Cucus | 135 |
| 27. Traceability Part For Meter A14C5 In PT Mecoindo Of The Measurement Of Quality Of Use Suratman, WahyuHadiKristanto, AsepSuprianto, MuhamadFatchan, DendyPramudito | 139 |
| 28. Designing and Planning Tourism Park with Environment and Quality Vision and Information Technology-Based(Case Study: Natural Tourism Park Raman Dam) Fritz A. Nuzir, AgusSukoco, Alex T | 149 |
| 29. Smart House Development Based On Microcontroller AVR-ATMEGA328 Haryansyah, Fitriansyah Ahmad, Hadriansa | 157 |
| 30. Analyze The Characteristic of Rainfall and Intensity Duration Frequency (IDF) Curve at Lampung Province Susilowati | 161 |
| 31. The Research of Four Sugarcane Variety (<i>Saccharum officinarum</i>) as The Raw Materials of Bioethanol Production in Negara Bumi Ilir Lampung M.C.Tri Atmodjo, Agus Eko T, Sigit Setiadi, Nurul Rusdi, Ngatinem JP, Rina, Melina, Agus Himawan | 174 |
| 32. Design an Inverter for Residential Wind Generator Riza Muhida, Afzeri Tamsir, Rudi Irawan, Ahmad Firdaus A. Zaidi | 177 |
| 33. The Research of Two Sugarcane Variety (<i>Saccharum officinarum</i>) as The Raw Materials of Bioethanol Production in Negara Bumi Ilir - Lampung M.C. Tri Atmodjo, Agus Eko T., Sigit Setiadi, Nurul Rusdi, Ngatinem JP, Rina, Melina, Agus H. | 182 |
| 34. Design of Plate Cutting Machine For Cane Cutter (<i>Saccharum Oficinarum</i>) Use Asetilin Gas M,C, Tri Atmodjo, Tumpal O.R, Sigit D.Puspito | 186 |

| | | |
|-----|---|-----|
| 35. | Behaviour of Sandwiched Concrete Beam under Flexural Loading Firdaus, Rosidawani | 191 |
| 36. | Diesel Particulate Matter Distribution of DI Diesel Engine Using Tire Disposal Fuel Agung Sudrajad | 196 |
| 37. | Microstructure Alterations of Ti-6Al-4V ELI during Turning by Using Tungsten Carbide Inserts under Dry Cutting Condition Ibrahim, G.A. Arinal, H, Zulhanif, Haron, C.H.C | 200 |
| 38. | Validation Study of Simplified Soil Mechanics Method Design with Kentledge Pile Loading Test of Bored Pile Lilies Widodojoko | 204 |
| 39. | Performance Assessment Tool for Transportation Infrastructure and Urban Development for Tourism Diana Lisa | 211 |
| 40. | Earthquake Resistant House Building Structure Ardiansyah | 221 |

Implementing CBR on The College Rankings Based on Webometrics with EPSBED's Data and Webometrics Knowledge

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Abstract—inclusion of the name of a university in a ranking system, especially at the top level according to a specific community is important and worth doing. The consideration, including the entry of a university in the list of top universities, is an excellent starting point for the world to recognize the existence of higher education, to boost the image of the university, will also improve promotion, especially in student acquisition and external support.

Webometrics is one of the world university ranking system that can be enjoyed by universities in Indonesia. Of the publication in July 2009 a total of 39 universities and the publication in January 2010 as many as 57 universities ranked 6000 Indonesia succeeded in the world. This ranking technique to calculate the accessibility of university websites and publications on google scholar as the ranking parameter. However, Webometrics do not Rank its based on a study program of higher education. Indonesia has more than 3000 universities which have an operating permit and each university has a study program. Objectivity in the performance of a university can be controlled through the data formulated academic activities through program Evaluation Based Self-Evaluation Study (EPSBED). EPSBED Data published to the public through the website [http: \ \ evaluasi.or.id](http://\evaluasi.or.id). whereas until now Indonesia has not had a rating system.

Case-Based Approach Computing Reasoning (CBR), combined with machine learning algorithms its Nearest Neighbor (NN) as the ranking methodology that uses data EPSBED, then the ranking of a university system may be based on their individual study program.

Keywords— Case-Based Reasoning, Nearest Neighbor, EPSBED, classification algorithms, AI

I. INTRODUCTION

The recognition that the so-called international institutions, highly desirable range of Higher Education. Not only in Indonesia, but also in different countries. Among other forms of recognition by the Nobel Prize, an international, up to university ranking is based on certain indicators. Higher ranking is based on certain indicators that have been done a few organizations or institutions. The ranking is quite recognized in the world there are several other Academic.

Ranking of World University (ARWU), the Times Higher Education Supplement (THES) dan Webometrics.

According to Romi, [1] inclusion of the name of a university in the rankings, especially at the top level according to a specific community is important and worth doing. The consideration, including the entry of a university in the list of top universities, is an excellent starting point for the world to recognize the existence of higher education, to boost the image of the university, will also improve promotion, especially in the acquisition and external support students in the study. It was also one of the tangible manifestation of the successful efforts of the National Education program.

Currently there is the rating that can be enjoyed-College Education in Indonesia. Of the publication in July 2009 a total of 39 universities in Indonesia managed to occupy the 6000 ranking of the world. College of Engineering ranking is calculated from the accessibility of university websites and publications on google scholar as the ranking parameter. Such ranking is done by Webometrics.

Indonesia has the 3099 Higher Education, but if the Webometrics ranking is based on the data above, shows that only 1.25% Higher Education Indonesia to enter the ranking system. According to Romi [1], low rank Indonesia Higher Education, Higher Education while Indonesia has parameters that can be used as indicators of the ranking.

From the above facts can be identified the problem as follows:

- a. *There are currently no College Ranking System Based on Data EPSBED*
- b. *There are currently no models and criteria to rank universities in Indonesia*

Case-Based Reasoning (CBR) is a problem solving technique based on the knowledge and experience Aamodt and Plaza [2], describes the type of CBR as a circular process that consists of 4 (four) stages.

- Retrieve, get the cases compared with a collection of similar cases in the past.
- Reuse, reuse of existing cases and try to solve a problem now.
- Revise, amend and adopt the proposed solution if necessary.
- Retain, continue to use the last solution as part of the new cases.

Case-Based Reasoning methodology will be used for evaluating indicator-style ranking by Webometrics EPSBED parameter data, so it will get a higher education system has pemeringkaan indicators based on data and facts are valid.

The purpose of the research Implementation Case-Based Reasoning to rank the data-based National Universities Webometrics EPSBED and aims to:

- Build and test the Intelligent Systems that use the data and the data EPSBED Webometrics ranking to rank universities in Indonesia.
- Evaluating Case-Based Reasoning Methodology for Ranking the models using data EPSBED as a criteria to rank universities. The benefits of this research are as follows:
 - Practical benefits of this research is that by implementing the Case-Based Reasoning in a data-based Higher Education ranking EPSBED may be an alternative in the ranking universities without re-weighting to each value of the parameter
 - Theoretical benefits of this research are expected to contribute to the development of a method of ranking institutions
 - As a reference for further research, particularly with respect to the ranking of an institution.

II. MODEL, ANALYSIS, DESIGN, AND IMPLEMENTATION

The study was conducted to provide a solution to the lack of university ranking systems, as well as the lack of models and criteria that can be used as an indicator of the ranking.

Case-Based Reasoning (CBR) is a method in solving problems that occur, based on the case (case) has ever seen. This method since it was first coined, has been widely implemented in the computational problems are complicated and complex. Webometrics is one example of an international ranking published in January and July on the internet. Publication month of July 2009 there were 39 Webometrics ranking Universities in Indonesia who entered the world university ranking 6000. Parameters used in evaluating universities Webometrics uses 4 (four).

This study was to implement the CBR method that uses Case-Based form of the model containing the knowledge that there are 39 universities in the Webometrics ranking of the parameters have been added to the data EPSBED. Then the system will test the similarity of each university with Case-Based Model.

All data of Higher Education in the country who have made Webometrics ranking on General Knowledge. While the High

Collegde to be calculated to measure the proximity to the rank of General Knowledge Nearest Neighbor algorithm (NN). NN is an algorithm to calculate the distance matrix between two pieces of data based on attribute data is owned by Siu, [3] So that the research approach in developing the rating system can be seen in Figure 1.

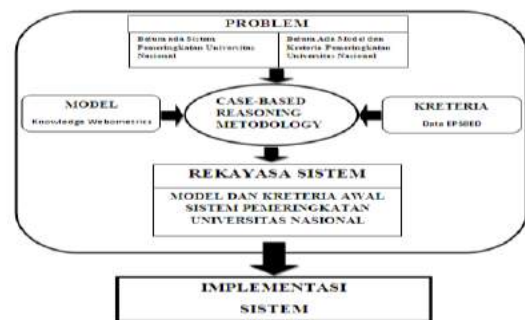


Figure 1. The research approach

This study uses data that is used as a model Webometrics ranking, extracted and stored in the Case-Based. So that the CBR stages rating system can be seen in Figure 2.



Figure 2. Stages of CBR with Case-Base Model

The final results of this study is a graph of the difference between the Webometrics ranking with the ranking system output with the CBR method.

Analysis data Analysis and measurement of research output analysis method, using a comparative technique to analyze the pretest and posttest graphs the difference between before and after the system is applied to the system applied. Before the system is implemented, data ranking universities that go on Webometrics ranking at the input to the system as general knowledge, which referred as a data model. Data model is a list of national universities into the ranks Webometrics month of July 2009 which appears in Figure 3, the X axis is the name of High school and Y axis are ranked on Webometrics.

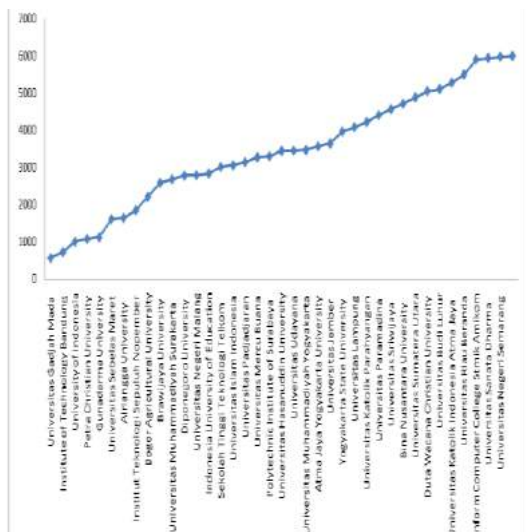


Figure 3. Graph Model Implementation

To retrieve the data to evaluate the system uses the nearest-neighbor algorithm. According to Greg Grudic [4], nearest-neighbor algorithm is an algorithm used to calculate the distance matrix between the input data based on any attribute similarity data. This algorithm has the advantage, among others, implement and simple to use and comprehensive and easy to use for prediction. Formulated as:

$$Sim = D(X, Y)$$

Where:

$$D(X, Y) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2} \quad (1)$$

X = data evaluation

Y = the sample data

x_i = the ith parameter of evaluation data

y_i = ith parameter of evaluation data

n = number of parameters

After the data obtained, to calculate weights based on the similarity of the formula:

$$IF \sum_{i=1}^n x_i \leq \sum_{i=1}^n y_i, Sim + 1 \quad (2)$$

$$W_i = Sim * X_{sol} \quad (3)$$

X_{sol} = the solution of the data evaluation

w_i = weight of ith solution

Both the Universities Indonesia who entered the Webometrics ranking or university which is used as the test

sample, is a university that has a data EPSBED His studies for each program. That to describe a working model in this study retrieval process can be described as follows:

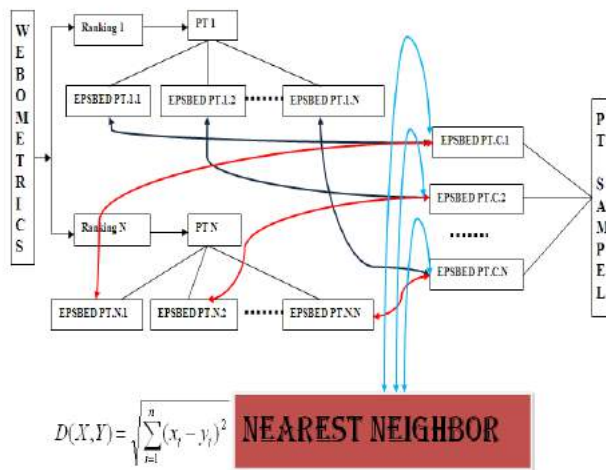


Figure 5. Retrieval process

Pseudo-code implementation of the above algorithm is as follows:

- Pseudo-code : Similarity Test
 Narrativ : Computing similarity using k-nearest neighbor algorithm
 Input : Table CaseBased and Table CurrentCase
 Output : Table Retive
 Metode : ujiSimilaritas ()
1. CREATE Object cCase as an instance of using the ArrayList class CurrentCase type;
 2. CREATE Object cBase as an instance of using the ArrayList class CaseBased type;
 3. CREATE Object cCaseManager as an instance of class CurrentCaseManager;
 4. CREATE Object cBaseManager as an instance of class CaseBaseManager;
 5. Comparative Variable INITIAL = 0, x = 0, y = 0;
 6. cCase = cCaseManager.getCurrentCase ();
 7. cBase = cBaseManager.getCaseBase ();
 8. WHILE Y <= cCase.size ()
 CurrentCase CCN = cCase.get (Y);
 9. WHILE X <= cBase.size ()
 CaseBased CBN = cBase.get (X);
 IF (cBN.skorAkreditascCN.skorAkreditas)+(cCN.jlPenelitianancBN.jlPenelitian)+(-cCN.rtIPScBN.rtIPS)+(-cCN.rtSKScBN.rtSKS) + (-cCN.rsMHS cBN.rsMHS)+(cBN.rtMHSBaru-cCN.rtMHSBaru)+(cCN.S1cBN.S1)+(cCN.S2cBN.S2)+(cCN.S3cBN.S3)+(-cCN.prof cCN.prof)<= 0 then = 1
 ELSE Comparative Comparative = 0;
 10. Similarity=SQRT((cBN.skorAkreditascCN.skorAkreditas)^2+(cBN.jlPenelitiancCN.jlPenelitian)^2+(cBN.rtIPScCN.rtIPS)^2+(cBN.rtSKScCN.rtSKS)^2+(cBN.rsMHS cCN.rsMHS)^2+(cBN.rtMHS

$$SBarucCN.rtMHSBaru)^2+(cBN.S1-cCN.S1)^2+(cBN.S2cCN.S2)^2+(cBN.S3cCN.S3)^2+(cBN.profcCN.prof)^2$$

11. INSERT INTO table result (cBN.id, cCN.KdUniv, similarity, contrast)
12. INCREMENT X
13. END WHILE X
14. INCREMENT Y
15. END WHILE Y
16. END Method;

III. RESULTS AND DISCUSSION

A. Reserch Model

The data sample used in testing the CBR-based ranking method uses data that enter the National Higher Education in the Webometrics ranking and published in January 2010. While the selected study program is the Management Studies Program has data extracted from the site EPSBED Directorate General of Higher Education (DIKTI) is <http://dikti.evaluasi.go.id>, with EPSBED parameters as shown in step 11 in the pseudo-code similariats test.

National Higher Education Data entry Webometrics ranking contained in Table 1, sorted again only at the universities have a Program Management Studies.

Table 1. Sample Data Webometrics

| UNIVERSITY | SIZE | VISIBILIT Y | RIC H FILE S | SCHOLA R | RAN K |
|--------------------------------------|-------|-------------|--------------|----------|-------|
| University of Gadjah Mada | 602 | 421 | 1,028 | 827 | 562 |
| Institute of Technology Bandung | 564 | 657 | 1,138 | 654 | 661 |
| University of Indonesia | 903 | 1,007 | 741 | 981 | 815 |
| Petra Christian University | 1,137 | 1,794 | 964 | 59 | 854 |
| Gunadarma University | 883 | 1,590 | 1,106 | 613 | 1025 |
| University of Negeri Malang* | 3,545 | 1,873 | 1,544 | 107 | 1256 |
| Institute Teknologi Sepuluh Nopember | 1,289 | 885 | 2,716 | 2,094 | 1315 |
| Universitas Sebelas Maret | 1,386 | 1,224 | 3,070 | 2,479 | 1585 |
| Airlangga University | 1,287 | 2,863 | 3,767 | 231 | 1628 |
| Brawijaya University | 2,671 | 1,825 | 3,542 | 1,975 | 2026 |
| Diponegoro University | 2,353 | 3,209 | 4,343 | 426 | 2059 |
| Bogor Agricultural University | 3,053 | 1,912 | 4,989 | 1,569 | 2162 |
| Universitas Padjadjaran | 2,902 | 2,423 | 3,239 | 1,880 | 2236 |
| Indonesia University of | 1,436 | 1,763 | 4,117 | 4,423 | 2298 |

| Education* | | | | | |
|---|-------|-------|-------|-----|------|
| Universitas Sriwijaya | 2,352 | 4,644 | 4,631 | 193 | 2337 |
| Universitas Islam Indonesia | 3,026 | 3,764 | 4,965 | 470 | 2422 |
| Universitas Muhammadiyah Surakarta | 3,839 | 5,423 | 2,829 | 185 | 2471 |
| Informatics and Computer College Stmik Amikom | 4,537 | 3,492 | 5,928 | 472 | 2616 |

Higher Education in the name of the * mark in Table 1 is a sign of Higher Education has more than one webdomain. In the National College of Management Studies Program and has entered Webometrics rankings are listed in Table 2.

B. Rank Name of University Ranked

Whereas after the implementation of Case-Based Reasoning methods in The ranking system to measure the proximity (similarity) Higher Education (sample data) to the data output system model is obtained as in figure 6.

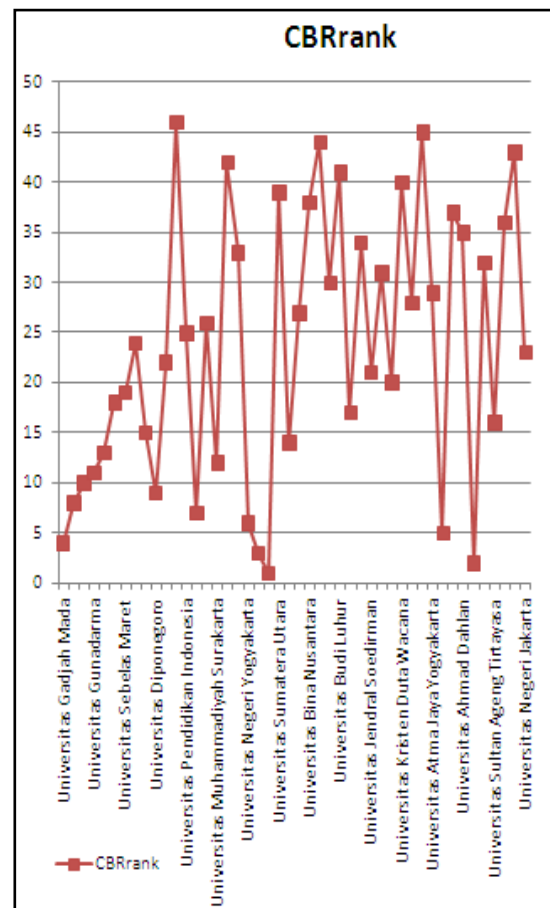


Figure 6. Graph Case-Based Reasoning rating

CONCLUSION

Comparison of the data above using Microsoft Excel, by combining the output above, the data are as follows:

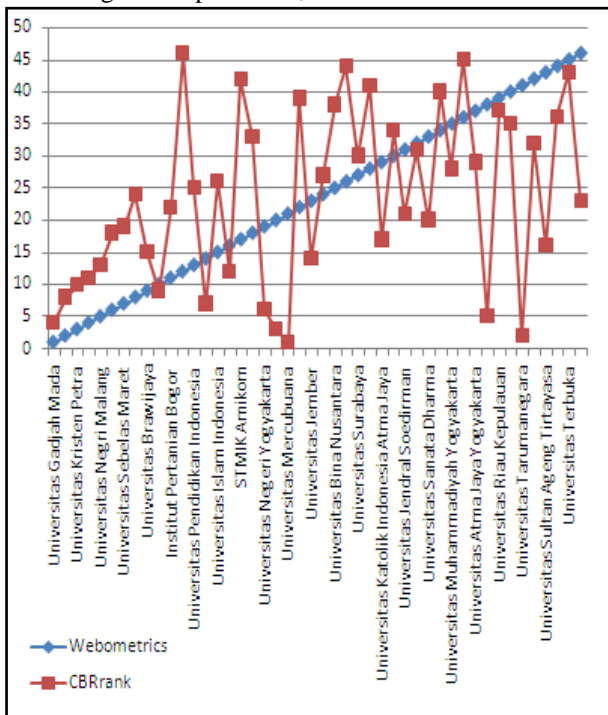


Figure 7. Comparison of results and graphs Webometrics CBR rating

From the data in Figure 7, it is clear that significant differences in output CBR method, although the method is to use machine learning methods to model, but the application will have its own characteristics. Comparative ranking of the above anomalies can be measured at the universities have the highest rank of each rating system. College is located at 572 Webometrics rankings are the University of Gadjah Mada. While the ranking CBR, Management Studies Program University of Mercubuana that was ranked highest as shown in table 3.

Of the value of W_i (weight rating) Program of Management Studies University Mercubuana have a higher weight rating of Management Studies, Gadjah Mada University. Learning algorithm is applied to the revised classification models to calculate the weight (score) to the data by testing encludian evaluation of each university.

Table 3. Comparison Table Parameters between the University of Gajah Mada University and the University Mercubuana

| Perguruan Tinggi | SA | PS2 | PS1 | PS3 | RMHS | MhsP | S1 | S2 | S3 | Prof | MhsU |
|-------------------------|--------------------|-----|--|-----|------|------|---------|----|----|------|-------|
| Universitas Mercubuana | 1 | 5 | 14 | 0 | 38 | 2510 | 6 | 40 | 4 | 1 | 17687 |
| Universitas Gadjah Mada | 1 | 71 | 70 | 42 | 1 | 18 | 1 | 15 | 1 | 0 | 3276 |
| Perguruan Tinggi | $\sum_{i=1}^n X_i$ | | $IF \sum_{i=1}^n x_i \leq \sum_{i=1}^n y_i, Sim+1$ | | | | W_i | | | | |
| Gadjah Mada | 20306 | | Sim+1 | | | | 293.233 | | | | |
| Mercubuana | 3496 | | Sim | | | | 572.000 | | | | |

Based on the results of the study, which starts from the needs analysis phase, design to testing with mengimplemtasikan Ranking System Methodology Case-Based Reasoning it can be concluded:

- Intelligent systems that use data and data EPSBED Webometrics ranking may rank the universities in Indonesia
- Cased-Based Reasoning methodology can be used as a model and data EPSBED ranking as the criteria to rank universities
- To improve the accuracy pemeringktan CBR, further research should be done.

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