



## ANP and ELECTRE methods for determine new student admissions

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### Abstract

Higher Education is a level of education after High School which selects new students based on achievement, report cards, and tests. Admission selection was based on report cards. Number of indicators and who register make it difficult for determine which students are accepted in education. Multi Criteria Group Decision Making (MCGDM) is a way to determine the best alternative from many alternative choices based on predetermined criteria. In this study, MCGDM used is Analytic Network Process (ANP) and Elimination and Choice Expression Reality (ELECTRE). ANP model is a development of AHP and requires linkages between criteria using a network. ELECTRE is method based concept of ranking through pairwise comparisons between alternatives on the appropriate criteria. Contribution is integration ANP and ELECTRE methods based on group, by determining decisions based on consistency ratio. The results of testing level consistency ratio, group-based ANP-ELECTRE can be applied to assessment selection at Electrical Engineering with highest accuracy of 86.36%.

## 1. Introduction

Higher education is a continuation of high school, which is organized to prepare students to become societies with academic and professional abilities in order to apply, develop and create science, technology and arts (Law 2 1989, (16) 1). There are many admissions paths for new students in tertiary institutions, namely raport path, test track and independent path. The raport path is a form of selection for new student admissions to enter higher education which is carried out through the school report card scores. The large number of prospective new student applicants who enter college using report cards, so a decision support system is needed to determine the selection of new student admissions. The Existence complex assessment criteria, alternative choices of majors and several assessors in decision makers so that Multiple Criteria Decision Making (MCDM) method is needed [1][2]. Multi Criteria Decision Making (MCDM) is a way to determine the best alternative from many alternative choices based on predetermined criteria. The criteria used in research can be in the form of measures, rules or standards in determining the best decision. There are several MCDM methods, namely Elimination and Choice of Expressing Reality (ELECTRE), Simple Additive Weighting (SAW), Product Weighted (WP), Ideal Solution Similarity Order Preference Technique (TOPSIS), and Analytical Hierarchy Process (AHP), DEMATEL [3]. The research problem is that there are several assessors (decision-making groups) in determining the weight of new student admission criteria so that consistent assessments are needed to produce optimal decisions. The method used in this research is integration of ANP and ELECTRE methods. ANP is used to determine weighting of criteria for new student admission, while ELECTRE is used to determine alternative student rankings in chosen major.

ANP is a method that is easily applied to various qualitative studies, such as decision making, forecasting, evaluation, mapping, strategizing, resource allocation and so on [4]. The advantages of ANP include more objective comparisons, more accurate predictive ability, and more stable results [4][5]. ANP is more general than AHP used in multi-criteria decision analysis [5]. ANP uses a network approach without having to define levels like the hierarchy used in AHP [6]. ELECTRE is a multi-criteria decision-making method based on the concept of outranking using paired comparisons of alternatives based on each appropriate criterion. The ELECTRE method is used in conditions where a suitable alternative can be produced [7][8][9]. Previous research on admission selection for new students used the SAW method [10][11], TPA selection using the ANP method [4], the ELECTRE method for report cards and scholarships [12], and priority selection of prospective debtors [13][14]. Some of the methods used previously have not used group decisions, have not considered the consistency of the ratio in determining the optimal decision, in determining the weighting of the criteria have not dynamically and using a hybrid weighting method. Based on previous research regarding the admission of new students with FAHP and COPRAS [15][16], it is explained that considering the value of

CR in decision making can increase the value of accuracy in decision making. The contribution of this research is the decision making model with the integration of the ANP and ELECTRE methods based on the group or the multi criteria Group Decision Making (MCGDM) by determining the optimal decision based on the smallest consistency ratio (CR) of several decision makers. The weight assessment of the comparison matrix between criteria as a group uses the Geometric Mean Aggregation method [6]. The purpose of this study was to build a decision support system to assist the committee for admission of new students in determining the selection of new students using the integration of the ANP and ELECTRE methods. Therefore, in this study, the ANP and ELECTRE methods were used for the selection of new students by considering value of the consistency ratio in determining new student admissions.

**2. Research Method**

**2.1 Algorithm integration ANP-ELECTRE method**

The integration algorithm of ANP and ELECTRE methods is a combination of two methods to determine the weight and ranking of new student admissions based on raport card route. The ANP method is used to determine the weight of each indicator in Indonesian, English, mathematics, physics, chemistry, and biology subjects. The weight of each criterion is determined based on the consistency ratio and the existence of a relationship or network of each criterion, then to determine the recommendation and ranking of students received can be seen in the ELECTRE algorithm. Overall the integration of the ANP-ELECTRE method can be seen in Figure 1. Based on Figure 1 ANP method begins by determining the criteria for new student admission, and then determine pairwise comparison matrix from a questionnaire assessment of several experts. Calculate Eigen value, to determine value of consistency ratio (CR). Determine level of user consistency, this method must be equipped with a Consistency Index (CI) calculation. After obtaining the consistency index, the results are compared with the Random Consistency Index (RI) for each n objects. Table 2 Shows with RI value for each n objects (2 ≤ n ≤ 10). Prof. Saaty compiled the RI Table obtained from an average consistency index of 500 matrices. CR (Consistency Ratio) is the result of a comparison between the Consistency Index (CI) and the Random Index (RI). If CR ≤ 0.10 (10%) means that the user's answer is consistent so that the resulting solution is optimal [15][16]. The results of the normalization of the criteria matrix as the weight input in the ELECTRE method. The network or linkage of each subject can be seen in Figure 2 Network between criteria in new student admissions. In Figure 1 Indonesian and English subjects have no relationship with other criteria so that the value on Weight Super matrix is 0, meanwhile, mathematics, physics, chemistry and biology have an interrelated relationship. If the criteria are interrelated, it will enter the super matrix calculation process.

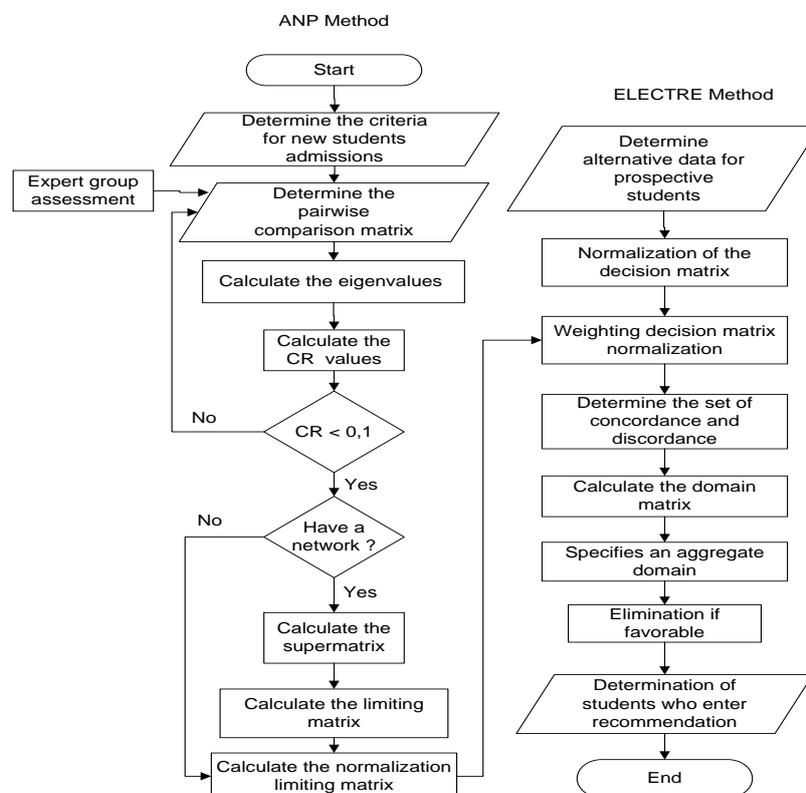


Figure 1. Algorithm ANP-ELECTRE Integration

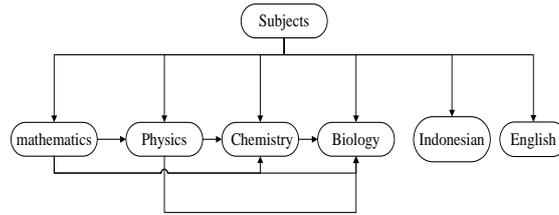


Figure 2. Network between Criteria in New Student Admissions

**2.2 ELECTRE Method**

This method is based on the study of outranking relationships using a concordance and a mismatch index to analyze those relationships among realities. The concordance and mismatch index can be seen as a measure of dissatisfaction that decision makers use in choosing one alternative over another [17][18][19].

Step for the ELECTRE method [18]:

- **Step 1:** Calculate the normalized decision matrix

In this procedure, each attribute is converted into a comparable value. Any normalization of  $r_{ij}$  can be done. The formula can be seen in Equation 1.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \text{ for } i=1,2,3,\dots, n \text{ and } j=1,2,3,\dots,n \tag{1}$$

With  $r$  : Normalized value;  $x$  : Alternative value

So the value of the R matrix obtained can be seen in Equation 2. The results of normalization,

$$R = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ \dots & \dots & \dots & \dots \\ r_{m1} & r_{m2} & \dots & r_{mn} \end{bmatrix} \tag{2}$$

With  $R$  : Normalized value;  $m$  : Alternative;  $n$  : Criteria

- **Step 2:** Weighted matrix that has been normalized.

Value that has been normalized, each column in the matrix R is multiplied by the weights  $w_j$  determined by the decision maker. Thus, the weighted normalized matrix is  $V = R.W$  which can be seen in Equation 3.

$$V = \begin{bmatrix} v_{11} & v_{12} & \dots & v_{1n} \\ v_{21} & v_{22} & \dots & v_{2n} \\ \dots & \dots & \dots & \dots \\ v_{m1} & v_{m2} & \dots & v_{mn} \end{bmatrix} \tag{3}$$

$$= R.W \begin{bmatrix} w_1 r_{11} & w_2 r_{12} & \dots & w_n r_{1n} \\ w_1 r_{21} & w_2 r_{22} & \dots & w_n r_{2n} \\ \dots & \dots & \dots & \dots \\ w_1 r_{m1} & w_2 r_{m2} & \dots & w_n r_{mn} \end{bmatrix}$$

Where  $w$  can be seen the results in Equation 4,

$$W = \begin{bmatrix} w_1 & 0 & 0 & \dots & 0 \\ 0 & w_2 & 0 & \dots & 0 \\ \dots & \dots & \dots & \dots & 0 \\ 0 & 0 & 0 & \dots & w_n \end{bmatrix} \text{ and } \sum_{i=1}^n w = 1 \tag{4}$$

With  $V$  : Results of weighting on the normalized matrix;  $W$  : Pre-defined weight

- **Step 3:** Specifies the concordance and discordance set

For each pair of alternative  $k$  and  $l$  ( $k,l = 1, 2, 3 \dots m$  and  $k \neq l$ ) the set of criteria  $J$  is divided into two subsets, namely concordance and discordance. If a criterion on an alternative includes the concordance in Equation 5.

$$C_{kl} = \{j, y_{kj} \geq y_{lj}\}, \text{ for } j = 1, 2, 3, \dots, n \tag{5}$$

With  $c_{kl}$  : Score Concordance

Conversely, if the criteria for an alternative is discordance, that is if as in Equation 6.

$$D_{kl} = \{j, y_{kj} < y_{lj}\}, \text{ for } j = 1, 2, 3, \dots, n \tag{6}$$

With  $D_{kl}$  : Score Discordance

- **Step 4:** Calculate concordance and discordance matrices.

a. Concordance

Determine a value for an element in the concordance matrix, namely by adding the weights that have been included in the concordance formula, then do it as the formula can be seen in Equation 7 below.

$$c_{kl} = \sum j c_w w_j \tag{7}$$

So that the resulting concordance matrix looks like Equation 8.

$$C = \begin{bmatrix} - & c_{12} & c_{13} & \dots & c_{1n} \\ c_{21} & - & c_{23} & \dots & c_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ c_{m1} & c_{m2} & c_{m3} & \dots & - \end{bmatrix} \tag{8}$$

With C : matrix concordance

b. Discordance

Determine a value in the discordance matrix element, namely the maximum value difference between the criteria included in the discordance formula divided by the maximum difference between the values of all existing criteria, the formula can be seen in Equation 9.

$$d_{kl} = \frac{\{max(v_{mn} - v_{mn-ln})\}; m, n \in D_{kl}}{\{max(v_{mn} - v_{mn-ln})\}; m, n = 1, 2, 3, \dots} \tag{9}$$

So that the discordance matrix is obtained such as Equation 10,

$$D = \begin{bmatrix} - & d_{12} & d_{13} & \dots & d_{1m} \\ d_{21} & - & d_{23} & \dots & d_{2m} \\ \dots & \dots & \dots & \dots & \dots \\ d_{m1} & d_{m2} & d_{m3} & \dots & - \end{bmatrix} \tag{10}$$

With D : matrix discordance

- **Step 5:** Determine the dominant concordance and discordance matrices.

The concordance dominant matrix can be formed with the help of the threshold value, namely by comparing each element value in the concordance matrix with the threshold value.

$$C_{kl} \geq \underline{c}$$

With Threshold value ( $\underline{c}$ ) as in Equation 11.

$$\underline{c} = \frac{\sum_{k=1}^n \sum_{l=1}^n c_{kl}}{m * (m - 1)} \tag{11}$$

With  $c$  : Score Threshold Concordance and value of each element of the F matrix as the dominant concordance matrix is determined by Equation 12.

$$f_{kl} = 1, \text{ if } c_{kl} \geq \underline{c} \text{ and } f_{kl} = 0, \text{ if } c_{kl} < \underline{c} \tag{12}$$

With  $f_{kl}$  : Concordance Dominant Matrix

Discordance, to form the dominant discordance matrix value, the threshold value is also used, namely in Equation 13.

$$\underline{d} = \frac{\sum_{k=1}^n \sum_{l=1}^n d_{kl}}{m * (m - 1)} \tag{13}$$

With  $\underline{d}$  : score threshold concordance and the value of each element for the matrix G as the dominant discordance matrix is determined as follows which can be seen in Equation 14.

$$g_{kl} = 0, \text{ if } c_{kl} \geq \underline{d} \text{ and } g_{kl} = 1, \text{ if } c_{kl} < \underline{d} \tag{14}$$

With  $g_{kl}$  : Discordance dominant matrix

- **Step 6:** Determine aggregate dominance matrix.

The next step is to determine the aggregate dominance matrix as an E matrix, where each element is obtained from the multiplication between the elements of the F matrix and the G elements, which can be seen in Equation 15.

$$e_{kl} = f_{kl} \times g_{kl} \tag{15}$$

With E : Aggregate dominance matrix

- **Step 7:** Elimination of less favorable alternatives.

Matrix E provides the order of choice for each alternative, that is, if  $e_{kl} = 1$  then alternative  $A_k$  is a better choice than  $A_l$ . So that the value of the E matrix which has the number of  $e_{cl} = 1$  at least will be eliminated. Thus, the best alternative is one that dominates the other alternatives.

### 2.3 Analytic Network Process (ANP) Method

Analytic Network Process (ANP) [19][20][21] is a generalization of AHP with regard to dependencies. In AHP, as with the other methods presented in this book, we assume that the criterion is independent. If not independent, correlated criteria will result in over value weights in decisions, as will be illustrated. Factors in a decision can also be represented and quantified in a model Analytic Network Process (ANP) [22]. Measuring the sensitivity of a factor in a decision quantified in the ANP model is consequently difficult because ANP is not a simple tree structure and changes in one factor influence decisions that are interrelated and may (or may not) influence the final decision.

Step Scheme Analytic Network Process (ANP) [23][24][25]:

1. Structuring and classifying problem

The thing that must be considered for the preparation of ANP structure is to first identify the elements that will be used as criteria in the ANP method consideration. In addition, the first step that must be taken is determining the criteria and sub-criteria for ANP. Determine relationship between criteria and sub-criteria.

2. Create a comparison matrix of interrelated variables

Matrix comparisons are made in accordance with decision making in assessing the level of importance of an element. The values and definitions of qualitative opinions from Saaty comparison scale can be seen in Table 1.

Table 1. Pairwise Comparison

Level interests	Definition	Explanation
1	Just as important	The two elements are equally important
3	A little bit more important	One element is slightly more important than the other.
5	Quite important	Experience and decisions show power over one activity over another.
7	Very important	Experience and decisions indicate a strong preference for one activity over another.
9	Absolutes are more important	One absolute element is preferable to its partner, at the highest level of confidence.
2,4,6,8	Intermediate value	The values between two adjacent considerations.
The opposite $a_{ij} = 1/a_{ji}$	If for element i has a ratio of 1 to 9 when compared to element j, then j has the opposite value when compared to i.	

3. Determining the Eigen vector Value

The next step after doing a matrix comparison is to determine the eigenvector value of the matrix. The way to calculate the eigenvector value is to add the results of the matrix value for each criterion divided by the number of weights in each column. The eigenvector value is obtained from Equation 16 below.

$$X = \left( \sum W_{ij} \times \sum W_j \right) / n \tag{16}$$

With x: Eigenvector;  $W_{ij}$  : Column cell values in a row (for  $i, j = 1 \dots n$ );  $\sum W_j$  : Total number of columns;  $n$  = number of matrices being compared

4. Check the consistency ratio

After determining the eigenvector value, the next step is to determine r consistency ratio. This consistency ratio is also used to determine the weight of the ANP method. Here's the formula for calculating the weighting ratio:

a. The first step is to find the max value using the formula Equation 17.

$$\lambda maks = \sum (nilai\ eigen\ n \times number\ of\ column\ n) \tag{17}$$

b. After getting the  $\lambda$  max value, the next step is to find the CI (Consistency Index) value with the formula Equation 18.

$$CI = \frac{(\lambda maks - n)}{(n - 1)} \tag{18}$$

With CI : Consistency Index;  $\lambda$ max : Largest Eigen values;  $n$  : Number of matrices being compared  
 The CI value will not be meaningful if there is a standard to state whether the CI shows a consistent matrix. Saaty argues that a matrix resulting from random comparisons is an absolutely inconsistent matrix. From the random matrix, the Consistency Index value is also obtained, which is also called the Random Index (RI). The following is the RI table in Table 2.

*Table 2. RI Table*

Random Index Table								
Order matrix	3	4	5	6	7	8	9	10
RI	0.58	0.9	1.12	1.12	1.34	1.41	1.45	1.49

c. The final step after comparing the CI and RI values will get the consistency value of the matrix, namely the CR (Consistency Ratio) value with the formula of Equation 19.

$$CR = \frac{CI}{RI} \tag{19}$$

With CR : Consistency Ratio; CI : Consistency Index; RI : Random Index

d. Compute the Mean Aggregation Matrix of several decision makers.

5. Super matrix formation

Super matrix consists of 3 matrix arrangements, the first is Unweight super matrix, weight super matrix, and limiting super matrix. Unweight super matrix is a local priority weight value that does not take into account the cluster comparison. The weight super matrix is the multiplication of the paired comparison value with the unweight value. The limiting super matrix is the iteration product of the value of the weight super matrix that ranks itself. The following is the formula for the Unweight Super matrix in Equation 20.

$$UW_{ij} = x_i * x_j \tag{20}$$

With UW : Unweight Super matrix,  $x$  : Eigen vector  
 Super matrix Weight formula can be seen in Equation 21.

$$W_i = UW_i \times Y_i \quad (21)$$

With  $W$ : Weight Super matri;  $Y$ : Pairwise comparison matrix value  
The Limiting Super matrix formula can be seen in Equation 22.

$$L_i = W_i^{(W_i)} \quad (22)$$

With  $L$ : Limiting Super matrix

#### 6. Develop alternative

The compilation of weights in ANP is divided into several types, namely raw weight and normal weight. Raw weight is the calculation per column of the eigenvector value of the limiting super matrix normalization. Meanwhile, normal weight is the weight obtained from the raw criteria weight divided by the total raw material. The formula can be seen in Equation 23 below.

$$B_r = (r_{11} \times r_{12} \times \dots \times r_{1n})^{\left(\frac{1}{n}\right)} \quad (23)$$

With  $B_r$ : Raw weight,  $r_{11}$ : Column 1 row 1,  $n$ : Number of criteria  
The normal weight formula can be seen in Equation 24.

$$B_n = \frac{Br}{\sum Br} \quad (24)$$

With  $B_n$ : Normal weight;  $\sum Br$ : Total raw weight values

### 3. Results and Discussion

#### 3.1 Dataset

Data collection for this research was conducted at Trunojoyo Madura University, which is data for prospective students who took part in the 2019. Student data used were 425 students of Faculty Engineering. In Figure 3 Architecture of Decision Support System. This System consists of three steps: Input: what the user does is input the criteria and data for prospective students new, Process: what the system does is process the user input data then do weighting and ranking process by the NP and ELECTRE method, and output: Results of the ranking of prospective new students.

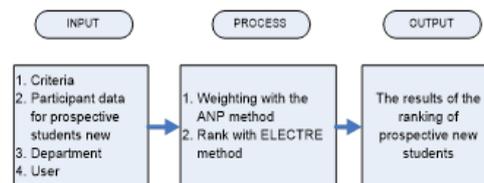


Figure 3. Architecture of Decision Support System (DSS)

#### 3.2 Testing and Analizing

The testing phase is used to determine accuracy by comparing results of the decision support system ANP-ELECTRE and higher education. Testing is carried out in stages starting from Informatics Engineering, Industrial Engineering, Information Systems and Electrical Engineering. The results of study are an implementation of integration ANP ELECTRE method, CR calculations and testing are performed to determine level of accuracy. The first step for the user to input the criteria used is the value of the data from Indonesian (IND), English (ING) and Mathematics (MAT), Physics (FIS), Chemistry (KIM), Biology (BIO) [18]. Selection of grades per subject that will be used starting from Semester I until Semester V. After determining criteria, user can enter importance value of each criterion and the value of prospective students in each criterion. The value of the criteria is derived from the pairwise comparison assessment. The system will then calculate the weight value of each criterion using the Analytical Network Process (ANP) method. The results of the ANP weight normalization as the weight input in the ELECTRE method. Following are the steps for ANP and ELECTRE method for weighting according to existing data:

##### 1. Determining the Component Weighting

The weighting of ANP method is the determination of the value of importance which will later be used to calculate the pairwise comparison matrix. Create a Pairwise Comparison Matrix with comparisons like the component weighting. The comparison results can be seen in Table 3.

Table 3. Pairwise Comparison Matrix

Criteria	IND	ING	MAT	FIS	KIM	BIO
IND	1,00	3,00	3,00	5,00	5,00	7,00
ING	0,33	1,00	3,00	3,00	3,00	5,00
MAT	0,33	0,33	1,00	3,00	5,00	5,00
FIS	0,20	0,33	0,33	1,00	3,00	3,00
KIM	0,20	0,33	0,20	0,33	1,00	3,00
BIO	0,14	0,20	0,20	0,33	0,33	1,00
Total	2,21	5,20	7,73	12,67	17,3	24,0

- Determining eigenvector value using Equation 16 of ANP. Before determining the weight, first the pairwise comparison values are normalized. This eigenvalue will be used to determine the weight of the criteria. The results are as Table 4.

Table 4. Calculates Eigenvalue and Weights

Criteria	IND	ING	MAT	FIS	KIM	BIO	Eigen vector
IND	0,45	0,58	0,39	0,39	0,29	0,29	2,668
ING	0,15	0,19	0,39	0,24	0,17	0,21	1,559
MAT	0,15	0,06	0,13	0,24	0,29	0,21	1,180
FIS	0,09	0,06	0,04	0,08	0,17	0,13	0,613
KIM	0,09	0,06	0,03	0,03	0,06	0,13	0,396
BIO	0,06	0,04	0,03	0,03	0,02	0,04	0,227
Total	1,00	1,00	1,00	1,00	1,00	1,00	6,64

- Checking Consistency Ratio

The consistency ratio has 3 calculation phases, namely determining the maximum eigenvalues using equation (16), calculating CI (Consistency Index) value using equation (17), and calculating CR (Consistency Ratio) value using Equation (18). In this study CR value is 0.006, Eigenvalues Max is 3,038714681, CI value is 0.01935734 and CR value is 0.006452447.

- Determine the super matrix unweight

Super matrix unweight can be calculated if each criterion is related. If there is no linkage between criteria / network, then the unweight value is 0. Unweight is the product of eigenvectors of each related criterion. For example, Indonesian and English unweight, the calculation is  $1.9 \times 0.79 = 1.53$ . The complete table can be seen in Table 5.

Table 5. Unweight Super Matrix

Criteria	IND	ING	MAT	FIS	KIM	BIO
IND	7,1188	4,1597	3,1474	1,6361	1,0554	0,6069
ING	4,1597	2,4306	1,8391	0,9560	0,6167	0,3546
MAT	3,1474	1,8391	1,3915	0,7234	0,4666	0,2683
FIS	1,6361	0,9560	0,7234	0,3760	0,2426	0,1395
KIM	1,0554	0,6167	0,4666	0,2426	0,1565	0,0900
BIO	0,6069	0,3546	0,2683	0,1395	0,0900	0,0517

- Determine the super matrix weight

Weight super matrix the product of the pairwise comparison value multiplied by the value on the unweight matrix,

- Determine super matrix limit

Super matrix limits the rank of the super matrix weight value by itself. An example of the limit matrix IND to ING is the weight value  $3.785^{3,7854} = 154.3216$ .

7. Normalization of limits and determination of weights. Determining the weight for ANP, the first step is to normalize the limit from the super matrix limit table. After that, just calculate the raw weight, normal weight, and ideal weight for research that only uses ANP or directly for ranking. The results of the weighting of each indicator are IND = 0.40; ING = 0.22; MAT = 0.18; FIS = 0.10; KIM = 0.06; BIO = 0.04.
8. The weighted results of the Analytical Network Process (ANP) method will be calculated for the ranking using the ELECTRE method.
9. Determine the set of Concordance and Discordance in the Index
10. Calculating the Dominant Concordance and Discordance Matrix

The trials were carried out in Department of Informatics, Industrial Engineering, Information Systems, and Electrical Engineering. The questionnaire to determine weight to several assessors was carried out five times, to find the smallest CR value, in order to obtain an optimal decision. The results of five questionnaires were carried out in order to find the value of  $CR \leq 0.1$ . In Test 1 the value of  $CR = 0.067$ , test 2 the value of  $CR = 0.201$ , Test 3 the value of  $CR = 0.261$ , test 4 the value of  $CR = 0.075$ , test 5 the value of  $CR = 0.077$ . CR values are used to determine accuracy in the Department of Informatics, Industrial Engineering, Information Systems, and Electrical Engineering. Based on the comparison of CR scores in different majors, the electrical engineering department produces a higher average accuracy. Based on the test 1 to 5 test, it can be seen in Figure 4 that the higher the CR value, the higher the accuracy value. This method can be used to recommend new student admissions decisions, with the electrical engineering department having the highest accuracy.

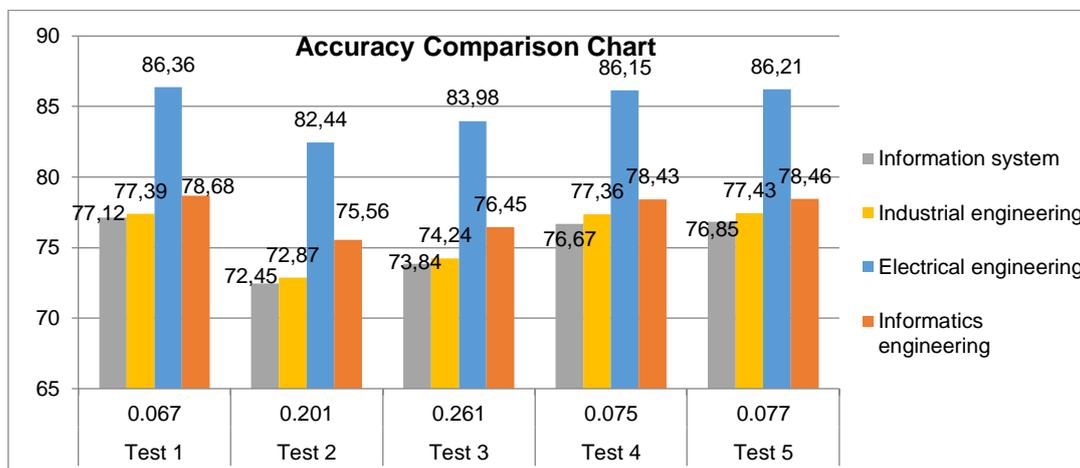


Figure 4. Accuracy System

#### 4. Conclusion

Based on the results of the research that has been done, it can be concluded that the ANP-ELECTRE method. From several trials conducted using test 1 to test 5, it can be concluded that the selection of new students with the smallest CR produces the highest accuracy, meaning that the smaller the CR value of a department, the greater the accuracy obtained. The CR value applies equally if there are same amount of data, and the network between the criteria is the same. The results of testing the consistency level of the group-based ANP-ELECTRE ratio can be applied to the assessment selection in Electrical Engineering with the highest accuracy of 86.36%. This research can be developed using data mining methods such as C 45, Naive Bayes classification, ID3.

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