Decision Support System - Simple Additive Weighting (SAW)

import pandas as pd  
import numpy as np  
  
df = pd.read\_csv('processed\_ExcelQuizMhs.csv')  
  
df.head()

|  | name | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | knowledge mastery | teaching skill | teacher skill |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | TIM PENGAMPU PA/TA FIK, -TUGAS AKHIR 2 - A11.4701 | [192, 99, 4, 0] | [182, 109, 4, 0] | [186, 106, 2, 1] | [222, 70, 3, 0] | [191, 100, 4, 0] | [192, 100, 3, 0] | [184, 106, 5, 0] | [190, 100, 5, 0] | [186, 106, 3, 0] | [188, 103, 4, 0] | 87.41 | 0 | 88.25 |
| 1 | EGIA ROSI SUBHIYAKTO, M.Kom-SOFTWARE QUALITY A... | [43, 27, 1, 0] | [44, 26, 1, 0] | [45, 26, 0, 0] | [53, 17, 0, 1] | [44, 26, 0, 1] | [44, 26, 0, 1] | [42, 28, 1, 0] | [45, 25, 1, 0] | [43, 28, 0, 0] | [46, 25, 0, 0] | 87.04 | 0 | 87.23 |
| 2 | EGIA ROSI SUBHIYAKTO, M.Kom-REKAYASA PERANGKAT... | [27, 13, 0, 0] | [26, 14, 0, 0] | [24, 16, 0, 0] | [35, 5, 0, 0] | [27, 13, 0, 0] | [23, 17, 0, 0] | [24, 16, 0, 0] | [25, 15, 0, 0] | [24, 16, 0, 0] | [24, 16, 0, 0] | 88.00 | 0 | 88.50 |
| 3 | EGIA ROSI SUBHIYAKTO, M.Kom-SOFTWARE QUALITY A... | [27, 8, 1, 0] | [26, 10, 0, 0] | [26, 10, 0, 0] | [33, 3, 0, 0] | [27, 9, 0, 0] | [29, 7, 0, 0] | [24, 12, 0, 0] | [28, 8, 0, 0] | [27, 9, 0, 0] | [25, 11, 0, 0] | 90.74 | 0 | 92.78 |
| 4 | EGIA ROSI SUBHIYAKTO, M.Kom-REKAYASA PERANGKAT... | [31, 7, 0, 0] | [32, 6, 0, 0] | [33, 5, 0, 0] | [34, 4, 0, 0] | [31, 7, 0, 0] | [29, 9, 0, 0] | [28, 10, 0, 0] | [30, 8, 0, 0] | [32, 6, 0, 0] | [29, 9, 0, 0] | 94.04 | 0 | 93.51 |

# remove column 'knowledge mastery'  
df = df.drop(['knowledge mastery'], axis=1)  
df = df.drop(['teaching skill'], axis=1)  
df = df.drop(['teacher skill'], axis=1)  
  
df.head()

|  | name | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | TIM PENGAMPU PA/TA FIK, -TUGAS AKHIR 2 - A11.4701 | [192, 99, 4, 0] | [182, 109, 4, 0] | [186, 106, 2, 1] | [222, 70, 3, 0] | [191, 100, 4, 0] | [192, 100, 3, 0] | [184, 106, 5, 0] | [190, 100, 5, 0] | [186, 106, 3, 0] | [188, 103, 4, 0] |
| 1 | EGIA ROSI SUBHIYAKTO, M.Kom-SOFTWARE QUALITY A... | [43, 27, 1, 0] | [44, 26, 1, 0] | [45, 26, 0, 0] | [53, 17, 0, 1] | [44, 26, 0, 1] | [44, 26, 0, 1] | [42, 28, 1, 0] | [45, 25, 1, 0] | [43, 28, 0, 0] | [46, 25, 0, 0] |
| 2 | EGIA ROSI SUBHIYAKTO, M.Kom-REKAYASA PERANGKAT... | [27, 13, 0, 0] | [26, 14, 0, 0] | [24, 16, 0, 0] | [35, 5, 0, 0] | [27, 13, 0, 0] | [23, 17, 0, 0] | [24, 16, 0, 0] | [25, 15, 0, 0] | [24, 16, 0, 0] | [24, 16, 0, 0] |
| 3 | EGIA ROSI SUBHIYAKTO, M.Kom-SOFTWARE QUALITY A... | [27, 8, 1, 0] | [26, 10, 0, 0] | [26, 10, 0, 0] | [33, 3, 0, 0] | [27, 9, 0, 0] | [29, 7, 0, 0] | [24, 12, 0, 0] | [28, 8, 0, 0] | [27, 9, 0, 0] | [25, 11, 0, 0] |
| 4 | EGIA ROSI SUBHIYAKTO, M.Kom-REKAYASA PERANGKAT... | [31, 7, 0, 0] | [32, 6, 0, 0] | [33, 5, 0, 0] | [34, 4, 0, 0] | [31, 7, 0, 0] | [29, 9, 0, 0] | [28, 10, 0, 0] | [30, 8, 0, 0] | [32, 6, 0, 0] | [29, 9, 0, 0] |

Simple Additive Weighting (SAW) is one method used to solve the problem of multi-attribute decision making. The basic concept SAW method is to find the sum of the weighted performance rating for each alternative on all attributes . SAW method requires a process of normalizing the decision matrix (X) to a scale that can be compared with all the ratings of existing alternatives.

If j is an attribute benefit then using the formula number one. If the attribute j cost then using the formula number two:

The weights of all criteria are obtained by using the formula number three. With rij is the normalized performance rating of alternatives on attribute Ci Ai; i = 1,2, …, n and j = 1,2, …, n. Preference value alternative (vi) using the formula number four.

1. specifies criteria
2. input values the criteria
3. calculate weight criteria
4. normalization matrix
5. ranking process
6. ranking result

## 1. specifies criteria

criteria for the research is the values of student input, for example [192, 99, 4, 0]

## 2. Input values into criteria

For this we use the Likert scale from 1 to 4. 1 being the worst, 4 being the best. The values are as follows:

no

Nilai

Criteria Name

Type

1

192

Sangat baik

Benefit

2

99

Baik

Benefit

3

4

Kurang Baik

Cost

4

0

Tidak Baik

Cost

## 3. Input Alternative Value

The alternative value is the feature tied to the 2 aspects we wanted to measure. In this case, we are measuring the lecturer knowledge mastery and teaching skill.

For Knowledge Mastery aspects, we have the following values:

no

Alternative

Sangat Baik

Baik

Kurang Baik

Tidak Baik

1

P1

192

99

4

0

2

P2

182

109

4

0

3

P3

186

106

2

1

5

P5

191

100

4

0

10

P10

188

103

4

0

For Teaching Skill aspects, we have the following values:

no

Alternative

Sangat Baik

Baik

Kurang Baik

Tidak Baik

1

P4

222

70

3

0

2

P6

192

100

3

0

3

P7

184

106

5

0

5

P8

190

100

5

0

10

P9

186

106

3

0

### W value = [? , ? , ? , ?]

## 4. Calculate Weight Criteria

for criterion with benefit :

for criterion with cost :

### Calculate Weight Preference

W value = [5,3,2,1]