Assignment 06

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2019-03-13, 23:59 IST.

1) ELECTRE methods are relevant when facing decision situations when the decision-maker wants to include in the model at least three criteria

- true
- false

No, the answer is incorrect.
Score: 0
Accepted Answers: true

2) We need some situations to be verified to apply ELECTRE. Find the odd one from the below list:

- Actions are evaluated (for at least one criterion) on an ordinal scale
- A strong homogeneity related with the nature of evaluations exists among criteria (e.g., duration, noise, distance, security, cultural sites, monuments, …)
- Compensation of the loss on a given criterion by a gain on another one may not be acceptable for the decision maker
- May require the introduction of discrimination thresholds (indifference and preference) which leads to a preference structure with a comprehensive intransitive indifference binary relation

No, the answer is incorrect.
Score: 0
Accepted Answers: Actions are evaluated (for at least one criterion) on an ordinal scale

3) Preferences in ELECTRE methods are modelled by using binary outranking relations, S, whose meaning is “at least as good as”. Which conditions must be fulfilled for validating the assertion aSb where we have two actions a and b:

- concordance

No, the answer is incorrect.
Score: 0
Accepted Answers: Actions are evaluated (for at least one criterion) on an ordinal scale
4) In case of ELCTRE I we can assert that an action “a outranks b” (that is, “a is at least as good as b”) denoted by \( a \succeq b \), only when two conditions hold:

statement 1: concordance index \( c(a \succeq b) = \sum w_j \geq s \) for \( \{ j : g_j(a) \geq g_j(b) \} \)

where \( \{ j : g_j(a) \geq g_j(b) \} \) is the set of indices for all the criteria belonging to the concordant coalition with the outranking relation \( a \succeq b \) and \( s \) is a given concordance level

statement 2: discordance level \( d(a \succeq b) = \max \{ g_j(b) - g_j(a) \} \geq v \) for \( \{ j : g_j(a) < g_j(b) \} \)

where \( v \) is a given level of the power of the discordant coalition

- only statement 1 is TRUE
- only statement 2 is TRUE
- both are true
- both are false

No, the answer is incorrect.

Score: 0

Accepted Answers:

only statement 1 is TRUE

5) Table 1 provides a simple example of a performance matrix, for five projects and five criteria.

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>SD</th>
<th>SC</th>
<th>RM</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT 1</td>
<td>-14</td>
<td>90</td>
<td>0</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>PROJECT 2</td>
<td>129</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PROJECT 3</td>
<td>-10</td>
<td>50</td>
<td>0</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>PROJECT 4</td>
<td>44</td>
<td>90</td>
<td>0</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>PROJECT 5</td>
<td>-14</td>
<td>100</td>
<td>0</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 2 gives Thresholds and Weights

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>SD</th>
<th>SC</th>
<th>RM</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indifference threshold ((q))</td>
<td>16</td>
<td>0</td>
<td>12</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Preference threshold ((p))</td>
<td>50</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>Weights</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The concordance calculations for the five criteria in projects P2 and P5 are:

- \( c_1(P2,P5) = 1, c_2(P2,P5) = 1, c_3(P2,P5) = 1, c_4(P2,P5) = 0.333, c_5(P2,P5) = 0 \)
- \( c_1(P2,P5) = 1, c_2(P2,P5) = 0.333, c_3(P2,P5) = 1, c_4(P2,P5) = 0.333, c_5(P2,P5) = 1 \)
- \( c_1(P2,P5) = 0.333, c_2(P2,P5) = 1, c_3(P2,P5) = 1, c_4(P2,P5) = 1, c_5(P2,P5) = 0 \)
- \( c_1(P2,P5) = 0.333, c_2(P2,P5) = 0, c_3(P2,P5) = 1, c_4(P2,P5) = 1, c_5(P2,P5) = 1 \)

No, the answer is incorrect.

Score: 0

Accepted Answers:

c_1(P2,P5) = 1, c_2(P2,P5) = 1, c_3(P2,P5) = 1, c_4(P2,P5) = 0.333, c_5(P2,P5) = 0

6) Table 1 provides a simple example of a performance matrix, for five projects and five criteria.

<table>
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<td>0</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 2 gives Thresholds and Weights
The concordance index \( C(P2,P5) \) for projects P2 and P5 is:

- 0.667
- 0.557
- 0.778
- 0.457

No, the answer is incorrect.

Score: 0

Accepted Answers:
0.667

7) Table 1 provides a simple example of a performance matrix, for five projects and five criteria.

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<td>40</td>
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</tbody>
</table>

Table 2 gives the Veto Thresholds

<table>
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<th>RM</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veto threshold (v)</td>
<td>100</td>
<td>60</td>
<td>2</td>
<td>48</td>
<td>90</td>
</tr>
</tbody>
</table>

Consider criterion F, with a veto threshold of 100. If we compare projects P1 and P2; it is clear that

- the discordance index \( d_F(P1,P2) = 1.00 \)
- the discordance index \( d_F(P1,P2) = 0.33 \)
- the discordance index \( d_F(P1,P2) = 0.67 \)
- the discordance index \( d_F(P1,P2) = 0 \)

No, the answer is incorrect.

Score: 0

Accepted Answers:

8) Consider the following example with 4 criteria and only 2 actions (scales: \([0,10]\)). The performance matrix is given in Table 1

<table>
<thead>
<tr>
<th></th>
<th>g1</th>
<th>g2</th>
<th>g3</th>
<th>g4</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1</td>
<td>-14</td>
<td>90</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>a2</td>
<td>129</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Suppose that the weighted-sum model was chosen, i.e, \( V(a) = w_1g_1(a) + \ldots + w_4g_4(a) \). In the considered example, the weights \( w_j \) are equal for all criteria (\( w_j = 0.250 \), for all \( j = 1, \ldots, 4 \)). Then:

- \( a_1Pa_2 \) (\( a_1 \) is strictly preferred to \( a_2 \))
- \( a_2Pa_1 \) (\( a_2 \) is strictly preferred to \( a_1 \))
9) Fill in the blanks:  
**ELECTRE I and IS:** ___________  
**ELECTRE II, III and IV:** ___________  
**ELECTRE TRI:** ___________  

- A group of options is selected and assigned to a kernel of preferred alternatives; A ranking of all options considered in pairs; All options to predefined categories are assigned  
- All options to predefined categories are assigned; A group of options is selected and assigned to a kernel of preferred alternatives; A ranking of all options considered in pairs  
- A ranking of all options considered in pairs; All options to predefined categories are assigned; A group of options is selected and assigned to a kernel of preferred alternatives  
- All options to predefined categories are assigned; A ranking of all options considered in pairs; A group of options is selected and assigned to a kernel of preferred alternatives  

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
A group of options is selected and assigned to a kernel of preferred alternatives; A ranking of all options considered in pairs; All options to predefined categories are assigned  

10) The method of ______ is the idea in which one compares one decision or alternative against the others and ranks them based on some set principle  

- Outranking  
- Concordance  
- Liking  
- Elimination  

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
Outranking  

11) ELECTRE ranking system is **transitive**, i.e., when \( A_i \rightarrow A_j \) and \( A_j \rightarrow A_k \) implies **1 point** that \( A_j \rightarrow A_k \)  

- true  
- false  

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
true  

12) Select the false statement about the concordance matrix: **1 point**  

- is symmetric along the principal diagonal  
- the row sum is 1  
- off the diagonal elements should add up to 1 if there is no inconsistency in the ranking  

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
is symmetric along the principal diagonal
the relative values of elements in concordance matrix, $C$, are calculated from the concordance index

No, the answer is incorrect.
Score: 0
Accepted Answers:
* is symmetric along the principal diagonal

13) There are two main parts to an ELECTRE application: first, ______ ; second, ______. 1 point

- the construction of one or several outranking relations; an exploitation procedure
- an exploitation procedure; the construction of one or several outranking relations
- choice elimination using a weighted sum technique; expression of the importance coefficients
- choice elimination using a weighted sum technique; apply MCDA to elaborate on the recommendations obtained in the first phase

No, the answer is incorrect.
Score: 0
Accepted Answers:
* the construction of one or several outranking relations; an exploitation procedure

14) The first pre-order is obtained using ascending distillation, selecting the worst rated alternatives initially, and finishing with the best. The second pre-order is obtained using descending distillation, by selecting the best rated alternatives initially, and finishing with the worst.

- true
- false

No, the answer is incorrect.
Score: 0
Accepted Answers:
* true

15) Table below gives a credibility matrix for certain requirements ($R_i$) in a library management system

<table>
<thead>
<tr>
<th></th>
<th>$R_1$</th>
<th>$R_2$</th>
<th>$R_3$</th>
<th>$R_4$</th>
<th>$R_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_1$</td>
<td>1.00</td>
<td>0.00</td>
<td>0.88</td>
<td>1.00</td>
<td>0.71</td>
</tr>
<tr>
<td>$R_2$</td>
<td>0.53</td>
<td>1.00</td>
<td>0.58</td>
<td>0.72</td>
<td>0.18</td>
</tr>
<tr>
<td>$R_3$</td>
<td>0.95</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.82</td>
</tr>
<tr>
<td>$R_4$</td>
<td>1.00</td>
<td>0.97</td>
<td>0.76</td>
<td>1.00</td>
<td>0.68</td>
</tr>
<tr>
<td>$R_5$</td>
<td>1.00</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

$s(\lambda_0) = \alpha + \beta \lambda$ is the discrimination threshold at the maximum level of outranking $\lambda_0$. The values of $\alpha$ and $\beta$ are usually 0.3 and $-0.15$. What is the value of $s(\lambda_0)$?

- 0.15
- 0.16
- 0.17
- 0.18

No, the answer is incorrect.
Score: 0
Accepted Answers:
* 0.15