Selection of the best process for desalination under a Treesoft set environment using the multi-criteria decision-making method

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Selection of the best process for desalination under a Treesoft set environment using the multi-criteria decision-making method

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Abstract

Multi-criteria decision-making (MCDM), which has been called a revolution in the field, is one of the most exact methods for making decisions. Multicriteria decision-making (MCDM) is the process of selecting options by considering multiple criteria to determine which is best. A multitude of applications in engineering, design, and finance are possible with the tools and methods derived from MCDM. Application-oriented problems with multiple criteria involve ambiguous and more inaccurate options, to deal with this ambiguity Smarandache introduced Treesoft sets, which are an extension of hypersoft sets. So, in this paper, we will consider a real-life application-oriented problem "Desalination process" under the treesoft sets environment and find the best method for desalination using one of the MCDM methods.

Keywords: Desalination; Multi-criteria Decision Making; Treesoft Set; Neutrosophic set

1. Introduction

One of the most valuable resources on the earth is water. More than 40% of people worldwide are already impacted by its scarcity, according to the UN a figure that prompts concern and motivates the pursuit of remedies. Desalination is one of these, and it is not novel either. It involves using physical and chemical methods to extract the minerals mostly salt from saltwater. In the upcoming years, increasing desalination plant capacity while lowering environmental impact will be crucial. Since 70% of our world is covered in water, it is easy to assume that there is an abundance of it. Nevertheless, fresh water is limited in the world (it makes up only 3% of total water), and two-thirds of that is either frozen solid or unstable. Approximately 2.7 billion people experience scarcity at least one month of the year, while 1.1 billion people worldwide lack access to clean water. Desalination can be beneficial in these situations because, ironically, a lot of places where fresh water scarcity occurs are near the sea.The method of desalination is used to get rid of the dissolved mineral salts in water. This currently one of the most popular methods for extracting fresh water for use in agriculture or human consumption when applied to seawater. Reverse osmosis, solar distillation, electrodialysis, nanofiltration, and gas hydrate are some of the commonly used methods in this desalination process.

Decision-making is a multifaceted intellectual process that involves solving problems while taking into account various factors to achieve a desired outcome. This process may be rational or irrational and can use implicit and explicit assumptions, which may be impacted by biological, cultural, physiological, and social factors. The complexity of decision-making is influenced by these factors, as well as by the level of risk and authority involved. In today's world, computer equipment can assist in automatically calculating and estimating solutions to decision-making problems by using mathematical equations, manifold statistics, mathematics, and economic theories Multicriteria decision-making (MCDM) aims to find the best option by considering several criteria during the selection process. Various tools and techniques from MCDM can be applied in different sectors, such as finance, engineering, and robotics. The scientific tools for managing incomplete data are believed to be periodic mathematics (PM), rough set theory (RST), fuzzy set theory (FST), and probability set theory (PST), which are particularly relevant to these issues, regardless of the missing data range.

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Fuzzy sets were first proposed by Zadeh to manage uncertainty, leading to their usefulness in various tasks like pattern detection, medical diagnosis, and decision-making. As a result of their popularity, numerous generalizations of fuzzy sets, such as rough sets, soft sets, intuitionistic fuzzy sets, bipolar fuzzy sets, bipolar soft sets, m-polar soft sets, hypersoft sets, and many others, have been introduced. Soft sets (Ss) are an intriguing expansion of fuzzy sets with additional vagueness and ambiguity features at the highest level of incompleteness. Soft sets deal with uncertain, fuzzy, and unspecified elements. In every decision-making scenario, the role of parameters is relevant, but when parameters are unclear, experts must evaluate them. In such cases, uncertainty is assessed by assigning a fuzzy membership grade, or a fuzzy soft set, which is an extension of soft sets.

There are various circumstances in which attributes need to be further classified into attribute-valued disjoint sets, and fuzzy soft sets are seen to be appropriate parametrization technique to deal with vagueness and uncertainty. Smarandache originated the idea of hypersoft sets (HSSs) from the notion of soft sets by substituting a multiparameter (sub-attribute) function defined on the cartesian product of n attributes for the one-parameter function. Compared to SS, the established HSS is more adaptable and better suited for contexts where decisions are made. Additionally, he introduced sophisticated HSS extensions, such as fuzzy HSS, intutionistic fuzzy HSS, and crisp HSS. HSS theory and its extensions have been gaining surprising traction in recent years. Numerous researchers examined advanced distinguishing operators in addition to traits derived from HSS and its expansions.

The hypersoft sets, a soft set extension, used a multi-argument approximation function to solve the shortcomings of the current structures for attribute-valued disjoint sets. Eventually, MultiSoft sets were added to soft sets to address ambiguous circumstances in real-world issues. Also, treesoft sets, which are extremely close to hypersoft sets, have been an extension of MultiSoft sets in recent times. Treesoft sets are concerned with parameters, sub-parameters, sub-sub-parameters, and so on, while hypersoft sets deal with parameters and sub-parameters. One of the unique characteristics of treesoft sets is their ability to have numerous sub-sub-parameters, denoted as level 0, level 1, level 2,…,level n. Uncertainties in real-world problems will be greatly diminished with the use of treesoft sets. In this paper One of the MCDM method, the ELECTRE method is used. ELECTRE (Elimination and choice Translating Reality) approach has been used to solve issues in many different fields because how well it ranks the alternatives in terms of precedence among the criteria. Benayoun et al. first introduced the ELECTRE method, which has then expanded into many other methods. Numerous domains, including risk assessment, supplier selection, and multiple-criteria decision making have effectively used ELECTRE approaches.

2. Preliminaries :

2.1 Linguistic variable: A linguistic variable is defined in terms of a base variable, whose values are real numbers within a specific range. A base variable in the usual sense, as exemplified by any physical variable(e.g., temperature, pressure, electric current, magnetic flux, etc.) as well as any other numerical variable (e.g., interest rate, blood count, age, performance, etc.)

Table 1: Linguistic variable

Linguistic Terms	umerical range
Very Small	[0.0-0.25]
Small	[0.25-0.45]
Medium	[0.45-0.65]
Large	[0.65-0.85]
Very Large	[0.85-1.0]

2.2 Fuzzy set: Let U be the universe whose generic element be denoted by u. A fuzzy set F in U is a function $F: U \to [0,1]$. We frequently use μ_F for the function F and say that the fuzzy set F is characterized by its membership function $\mu_F: U \to [0,1]$ which associates with each u in U, a real number $\mu_F(u)$ in [0,1]. The value $\mu_F(u)$ at u represents the grade of membership of u in F and is interpreted as the degree to which u belongs to F. Thus, the closer the value of $\mu_F(u)$ is to 1, the more u belongs to F.

2.3 Soft set: Let U be a universal set, $P(U)$ be the power set of U and A be the set of all parameters. A soft set (δ, A) on U is defined by:

$(\delta, A) = \{(a, \delta(a)): a \in A, \delta(a) \in P(U)\}$ where $\delta: A \to P(U)$

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2.4 Hypersoft sets: Let U be the universal set and $P(U)$ be the power set of U. Consider $a_1, a_2, a_3, \dots, a_n$, for $n \geq 1$ be n well defined attributes, whose corresponding sub-attributes of a_i are respectively the sets $A_1, A_2, A_3, \dots, A_n$ with $A_i \cap A_j = \emptyset$ for $i \neq j$ and $i, j \in \{1,2,3, \dots, n\}$ then the pair $(\delta, A_1 \times A_2 \times \dots \times A_n)$ is said to be hypersoft set over X where $\delta: E_1 \times E_2 \times \dots \times E_n \rightarrow P(U)$.

2.5 MultiSoft sets: Let U be the universal set and H be a non-empty subset of U. And $P(H)$ is the power set of H. Let $A_1, A_2, \dots, A_n$ be $n \geq 2$ sets of attributes (parameters) whose intersection $A_1 \cap A_2 \cap \dots \cap A_n = \emptyset$. Let $A = A_1 \cup A_2 \cup \dots \cup A_n$ and $P(A)$ be the powerset of A. Then $F: P(A) \rightarrow P(H)$ is a Multisoft set over H.

2.6 Treesoft sets: Let U be the universal set and H a non-empty subset of U, with $P(H)$ the powerset of H. Let A be the set of attributes, $A = \{A_1, A_2, \dots, A_n\}$, for integer $n \geq 1$, where $A_1, A_2, \dots, A_n$ are attributes of first level (since they have one-digit indexes). Each attribute $A_i, 1 \leq i \leq n$, is formed by sub-attributes:

$$A_1 = \{A_{1,1}, A_{1,2}, \dots\}$$

$$A_2 = \{A_{2,1}, A_{2,2}, \dots\}$$

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$$A_n = \{A_{n,1}, A_{n,2}, \dots\}$$

Where $A_{i,j}$ are sub-attributes (or attributes of second level) (since they have two-digit indexes). Again, each sub-attribute $A_{i,j}$ is formed by sub-sub-attributes (or attributes of third level): $A_{i,j,k}$ and so on, as much refinement as needed into each application, up to sub-sub-…-sub-attributes or attributes of $m - level$ (or having m digits into indexes): $A_{i_1, i_2, \dots, i_m}$ Therefore, a graph-tree is formed, that we denote as Tree(A) , whose root is A (considered as level zero), then nodes of $level\ 1, level\ 2, \dots, level\ m$, we call it as leaves of the graph-tree, all terminal nodes (nodes that have no descendants). Then the treesoft set is:

$$F: P(Tree(A)) \rightarrow P(H)$$

Tree(A) is the set of all nodes and leaves (from level 1to level m) of the graph-tree, and $P(Tree(A))$ is the powerset of the Tree(A). All node sets of the TreeSoft set of $level\ m$ are:

$$Tree(A) = \{A_{i_1} | i_1 = 1,2, \dots\} \cup \{A_{i_{1,i_2}} | i_1, i_2 = 1,2, \dots\} \cup \dots \cup \{A_{i_1, i_2, \dots, i_m} | i_1, i_2, \dots, i_m = 1,2 \dots\}$$

The first set is formed by the nodes of $level 1$, second set by the nodes of $level\ 2$, third set by the nodes of $level\ 3$, and so on, the last set is formed by the nodes of $level\ m$. If the graph-tree has only two levels $(m = 2)$, then the TreeSoft set is reduced to a MultiSoft set.

Example 1: Consider the set $S = \{s_1, s_2, s_3, s_4, s_5, s_6, s_7, s_8\}$ be the cancer diagnosed patients, and $P(S)$ the powerset of S with the corresponding attributes $H = \{H_1, H_2, H_3\}$

Now lets's assume that the function F gets the following values:

$$F(Fatigue, Tumor\ location, Blood\ cell\ count, Abnormal) = \{s_4, s_5, s_8,\}$$

$$F(Fatigue, Tumor\ location, Blood\ cell\ count, normal) = \{s_1, s_2\}$$

$$F(Fatigue, Tumor\ location, Blood\ cell\ count) = all\ patients\ having\ these\ alternatives\ come\ iunder\ this\ category$$

$$F(Fatigue, Tumor\ location, Blood\ cell\ count, abnormal) \cup F(Fatigue, Tumor\ location, Blood\ cell\ count, normal) = \{s_4, s_5, s_8, s_1, s_2\}$$

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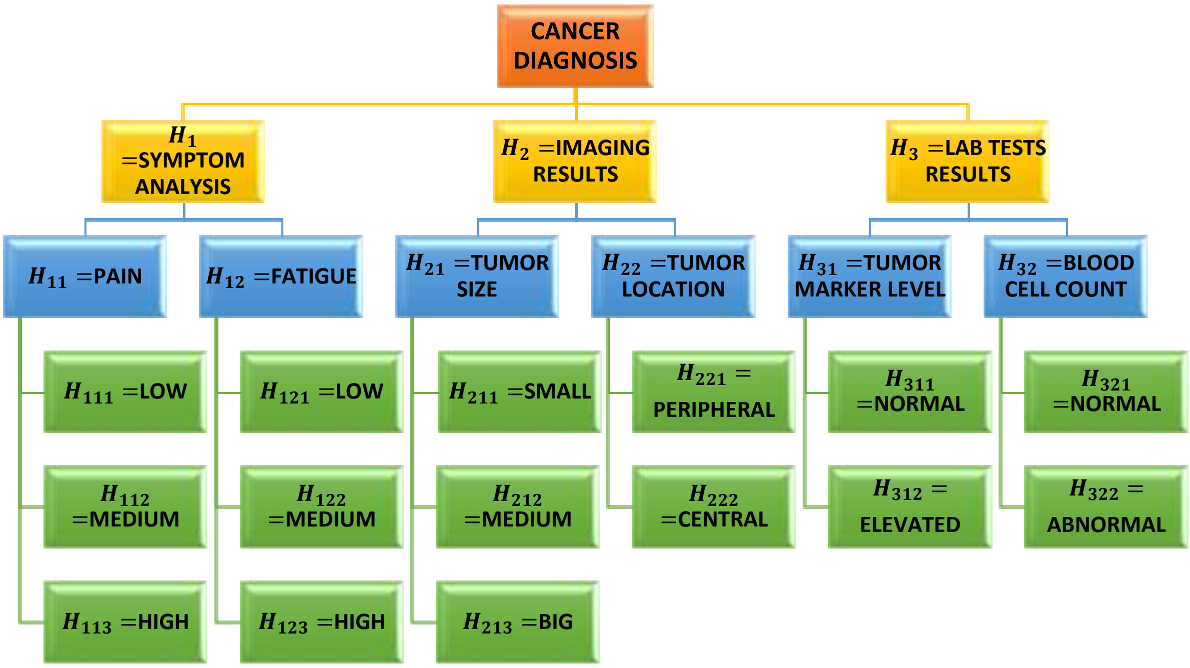

3. MCDM Method

ELECTRE (Elimination and Choice Translating reality) MCDM method: The ELECTRE approach is notable outranking models that are broadly applicable for comparing performances across a range of factors for various MCDM issues. The Engineering and Management departments have already started using ELECTRE as a decision-making tool. Benayoun et al.'s ELECTRE techniques, which was first developed, and then rooted out to ELECTRE I, II, III, IV, and IS methods are a popular family of outranking techniques for MCDM issues, which have seen lot of positive and beneficial developments.

Step 1: Develop the Decision matrix $X = [x_{ij}]_{n\times m}$

Step 2: Normalized matrix and weighted normalized matrix can be determined using the below formulae:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} {x_{ij}}^2}} \quad (1)$$

$$V_{ij} = w_{ij} \sum_{i=1}^{m} r_{ij} \quad (2)$$

Step 3: Find the concordance and discordance interval sets

The concordance interval set is used to describe the dominance query

$c_{ab} = \{j | x_{aj} \geq x_{bj}\}$, where $j = 1,2,3 \ldots n$ (3)

The discordance interval sets is given by

$d_{ab} = \{j | x_{aj} < x_{bj}\}$, where $j = 1,2,3 \ldots n$ (4)

Step 4: Calculation of concordance interval matrix

$$c_{ab} = \sum_{j\in c_{ab}} w_j \; for \; j = 1,2,3 \ldots n \quad (5)$$

Step 5: Determine the discordance interval matrix

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$$d(a,b) = \frac{j \in D_{ab}{}^{max}\left|v_{aj} - v_{bj}\right|}{j \in J; m,n \in I^{max}\left|v_{mj} - v_{nj}\right|} \quad (6)$$

Step 6: Calculation of concordance index matrix

$$\bar{c} = \sum_{a=1}^{m}\sum_{b=1}^{m}\frac{c(a,b)}{m(m-1)} \quad (7)$$

Based on the threshold value $\bar{c}$ concordance dominance matrix E can be determined as follows

$$E = \begin{cases} e(a,b) = 1 \; if \; c(a,b) \geq \bar{c} \\ e(a,b) = 0 \; if \; c(a,b) < \bar{c} \end{cases} \quad (8)$$

Step 7: Determine the discordance index matrix

The preference of dissatisfaction can be measured by discordance index:

$$\bar{d} = \sum_{a=1}^{m}\sum_{b=1}^{m}\frac{d(a,b)}{m(m-1)} \quad (9)$$

Based on the discordance index mentioned above, the discordance matrix F is given by :

$$F = \begin{cases} f(a,b) = 1 \; if \; d(a,b) \leq \bar{d} \\ f(a,b) = 0 \; if \; d(a,b) > \bar{d} \end{cases} \quad (10)$$

Step 8: Calculate the net superior and net inferior value

Let c_a and d_a be the net superior and net inferior value

The c_a is given by:

$$c_a = \sum_{b=1}^{n} c(a,b) - \sum_{b=1}^{n} c(b,a) \quad (11)$$

On the contrary d_a is used to determine the number of inferiority ranking of the alternatives:

$$d_a = \sum_{b=1}^{n} d(a,b) - \sum_{b=1}^{n} d(b,a) \quad (12)$$

Step 9: Calculate the ranking of the alternatives and find the best alternative.

4. Formulation of the problem: Let A and B respectively be the Environmental head and Technical Manager; they are the decision makers, and they will decide the best desalination process from the below methods for converting sea water into drinking water, with the following weight criterions given by {0.2,0.13,0.16,0.11,0.21,0.19}

$D = \{d_1, d_2, d_3, d_4, d_5\}$ be the desalination process, were,

$$d_1 = Reverze\ Osmosis, d_2 = Solar\ Distillation, d_3 = Electro\ dialysis,$$

$$d_4 = Nano\ filtration, d_5 = Gas\ hydrate\ formation$$

and the corresponding attributes be

$$e_1 = Costs, e_2 = Chemical\ reactions, e_3 = Process\ of\ desalination,$$

$$e_4 = Resources, e_5 = Health\ aspects, e_6 = Public\ Support$$

with the corresponding sub-attributes

$$e_1 = E_1 = \begin{Bmatrix} e_{11} = economic\ costs, \\ e_{12} = environmental\ costs \end{Bmatrix}; \; e_2 = E_2 = \begin{Bmatrix} e_{21} = adverse\ effects, \\ e_{22} = non-adverse\ effects \end{Bmatrix}$$

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$$e_3 = E_3 = \begin{Bmatrix} e_{31} = membrane\ process, \\ e_{32} = thermal\ process \end{Bmatrix};\ e_4 = E_4 = \begin{Bmatrix} e_{41} = manpower, \\ e_{42} = equipment \end{Bmatrix}$$

$$e_5 = E_5 = \{e_{51} = iodine\ deficieny\};\ e_6 = E_6 = \begin{Bmatrix} e_{61} = high\ fresh\ water\ scarcity \\ e_{62} = low\ fresh\ water\ scarcity \end{Bmatrix}$$

And the corresponding sub-sub-attributes are given below:

$$e_{11} = \begin{Bmatrix} e_{111} = energy\ cost, \\ e_{112} = land\ cost \end{Bmatrix};\ e_{12} = \begin{Bmatrix} e_{121} = destruction\ of\ food\ chain, \\ e_{122} = residual\ salt \end{Bmatrix};$$

$$e_{21} = \{e_{211} = more\ of\ chemicals\};\ e_{22} = \{e_{221} = purity\ of\ water\};$$

$$e_{31} = \{e_{311} = thin\ sheet\ of\ filter\};\ e_{32} = \{e_{321} = heat\ energy\};$$

$$e_{41} = \begin{Bmatrix} e_{411} = researchers, \\ e_{412} = technicians \end{Bmatrix};\ e_{42} = \begin{Bmatrix} e_{421} = electrical, \\ e_{422} = electronical \end{Bmatrix};$$

$$e_{51} = \{e_{511} = removal\ of\ iodine\ deficiency\};$$

$$e_{61} = \{e_{611} = high\ public\ support\};\ e_{62} = \{e_{621} = less\ fresh\ water\ scarcity\}$$

Let the function be $\varphi: E_1 \cup E_2 \cup E_3 \cup E_4 \cup E_5 \cup E_6 \rightarrow P(S)$

Now let us assume the relation

$$\varphi(E_1 \cup E_2 \cup E_3 \cup E_4 \cup E_5 \cup E_6) = \varphi\begin{pmatrix} environmental(e_{12}), purity\ of\ water(e_{221}), membrane\ process\ (e_{31}), electrical(e_{421}), \\ iodine\ deficieny\ (e_{51}), high\ public\ support\ (e_{611}). \end{pmatrix}$$

These are some of the actual requirements for selecting the best method from desalination process, the decision makers give their opinions in matrix form separately as:

$$A = \begin{Bmatrix} \varphi(d_1) = \{e_{12}(0.7), e_{221}(0.8), e_{31}(0.7), e_{421}(0.6), e_{51}(0.5), e_{611}(0.6)\} \\ \varphi(d_2) = \{e_{12}(0.7), e_{221}(0.3), e_{31}(0.4), e_{421}(0.5), e_{51}(0.1), e_{611}(0.2)\} \\ \varphi(d_3) = \{e_{12}(0.1), e_{221}(0.4), e_{31}(0.6), e_{421}(0.2), e_{51}(0.3), e_{611}(0.6)\} \\ \varphi(d_4) = \{e_{12}(0.5), e_{221}(0.3), e_{31}(0.4), e_{421}(0.2), e_{51}(0.7), e_{611}(0.4)\} \\ \varphi(d_5) = \{e_{12}(0.8), e_{221}(0.1), e_{31}(0.3), e_{421}(0.2), e_{51}(0.6), e_{611}(0.2)\} \end{Bmatrix}$$

$$B = \begin{Bmatrix} \omega(d_1) = \{e_{12}(0.9), e_{221}(0.7), e_{31}(0.5), e_{421}(0.6), e_{51}(0.3), e_{611}(0.5)\} \\ \omega(d_2) = \{e_{12}(0.2), e_{221}(0.5), e_{31}(0.3), e_{421}(0.2), e_{51}(0.7), e_{611}(0.4)\} \\ \omega(d_3) = \{e_{12}(0.6), e_{221}, (0.3) e_{31}(0.4), e_{421}(0.1), e_{51}(0.3), e_{611}(0.4)\} \\ \omega(d_4) = \{e_{12}(0.5), e_{221}(0.4), e_{31}(0.2), e_{421}(0.6), e_{51}(0.5), e_{611}(0.8)\} \\ \omega(d_5) = \{e_{12}(0.1), e_{221}(0.8), e_{31}(0.4), e_{421}(0.3), e_{51}(0.4), e_{611}(0.5)\} \end{Bmatrix}$$

Step 1: Construct the decision matrix

$$A = \begin{bmatrix} 0.7 & 0.8 & 0.7 & 0.6 & 0.5 & 0.6 \\ 0.7 & 0.3 & 0.4 & 0.5 & 0.1 & 0.2 \\ 0.1 & 0.4 & 0.6 & 0.2 & 0.3 & 0.6 \\ 0.5 & 0.3 & 0.4 & 0.2 & 0.7 & 0.4 \\ 0.8 & 0.1 & 0.3 & 0.2 & 0.6 & 0.2 \end{bmatrix}$$

$$B = \begin{bmatrix} 0.9 & 0.7 & 0.5 & 0.6 & 0.3 & 0.5 \\ 0.2 & 0.5 & 0.3 & 0.2 & 0.7 & 0.4 \\ 0.6 & 0.3 & 0.4 & 0.1 & 0.3 & 0.4 \\ 0.5 & 0.4 & 0.2 & 0.6 & 0.5 & 0.8 \\ 0.1 & 0.8 & 0.4 & 0.3 & 0.4 & 0.5 \end{bmatrix}$$

Step 2: By using an accuracy function (average of the matrices) both A and B has been reduced to a single matrix as follows:

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$$Q = \begin{bmatrix} 0.8 & 0.75 & 0.6 & 0.6 & 0.4 & 0.55 \\ 0.45 & 0.2 & 0.35 & 0.35 & 0.4 & 0.3 \\ 0.35 & 0.35 & 0.5 & 0.15 & 0.3 & 0.4 \\ 0.5 & 0.35 & 0.3 & 0.35 & 0.6 & 0.6 \\ 0.45 & 0.45 & 0.35 & 0.25 & 0.5 & 0.35 \end{bmatrix}$$

Step 3: The normalized and weighted normalized matrix are found using equation (1) and (2) mentioned above:

$$Q = \begin{bmatrix} 0.134 & 0.095 & 0.099 & 0.077 & 0.083 & 0.103 \\ 0.076 & 0.025 & 0.058 & 0.052 & 0.083 & 0.056 \\ 0.059 & 0.044 & 0.082 & 0.019 & 0.062 & 0.075 \\ 0.084 & 0.044 & 0.049 & 0.045 & 0.125 & 0.112 \\ 0.076 & 0.057 & 0.058 & 0.032 & 0.104 & 0.065 \end{bmatrix}$$

Step 4: Based on the above conditions in equation (3) and (4) and applying the equations (5) and (6) the concordance and discordance interval matrices are calculated and obtained as follows:

Concordance interval Matrix

$$Q_1 = \begin{bmatrix} 0 & 1 & 1 & 0.6 & 0.79 \\ 0.21 & 0 & 0.52 & 0.27 & 0.47 \\ 0 & 0.48 & 0 & 0.29 & 0.35 \\ 0.4 & 0.73 & 0.84 & 0 & 0.71 \\ 0.21 & 0.89 & 0.65 & 0.29 & 0 \end{bmatrix}$$

Discordance interval matrix

$$Q_2 = \begin{bmatrix} 0 & 0 & 0 & 0.819 & 0.354 \\ 1 & 0 & 0.766 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 \\ 1 & 0.147 & 0.528 & 0 & 0.272 \\ 1 & 0.61 & 0.594 & 1 & 0 \end{bmatrix}$$

Step 5: Again, by applying equation (7), (8), (9) and (10) we obtain the concordance index matrix and discordance index matrix

Concordance index matrix

$$Q_1 = \begin{bmatrix} 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 0 \end{bmatrix}$$

Discordance index matrix

$$Q_2 = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

Step 6: Finally, the net superior and net inferior values are found using the equations (11) and (12), then the ranking is found:

ESALINATION PROCESS	ET SUPERIOR ALUE	ANK	ET INFERIOR ALUE	ANK
d_1 $(Reverse\ Osmosis)$	2.57	1	−2.827	1
d_2 $(Solar\ Distillation)$	−1.63	4	2.009	4
$d_3(Electro\ dialysis)$	−1.89	5	2.112	5
$d_4(Nano\ filtration)$	1.23	2	−1.872	2
d_5 $(Gas\ Hydrate\ formation$	−0.28	3	0.578	3

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From the net superior value of Concordance matrix and net inferior value of Discordance matrix and by ranking of the alternatives we can conclude that **Reverse Osmosis** method is ranked in the first position when compared to all other desalination methods.

4. Conclusion

In an effort to discuss the Treesoft set environment, a real-world problem involving selecting the optimal desalination procedure using one of the MCDM approaches is taken up in this study. When choosing the process, the related attributes are also given priority. The ELECTRE approach has already been used to enhance performance in problems with multiple criteria outranking. Additionally, we may solve more ambiguous and multi-attribute problems by utilising Treesoft sets. Treesoft sets can be used in all other fuzzy environments Intutionistic, Pythagorean, Neutrosophic, and so forth in future research.

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