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A Review on Composite Material Selection Using DEMATEL Method

***[1]P.K. Chidambaram, [2]Kurinjimalar Ramu, [2]M. Ramachandran, [2]Chandrasekar Raja**

[1]New Prince Shri Bhavani College of Engg. & Tech Chennai, Tamil Nadu, India
[2]REST LABS, Kaveripattinam, Krishnagiri, Tamil Nadu, India.
*Corresponding author Email: chidu3011@gmail.com

Abstract: Composite materials two or more objects that are different in properties, without dissolving them with each other or by blending without mixing Are formed. Concrete, for example, includes clay bricks and fibre glasses. The Decision testing and evaluation Laboratory (DEMATEL) is a complex Cause-effect of the system and an excellent method for locating chain elements Considered, it demo also the evaluation of interrelated Relationships between factors and by visual layout model Identify the important ones. According to an innovative Hybrid Dematel a Flexible and Effective decision maker. DEMATEL Attitude Review Based on the values of the algorithm. Which focuses on the mixed decision-making methods and the criteria are interrelated Compromise solutions in relationship ps? In this paper we used DEMATEL for ranking the DEMATEL method is the most ideal solution Short-distanced ce Evaluation Parameters in Density, Micro Hardness, Tensile Strength, Flexural Strength and Impact Strength Use Attention deficit from the result it is seen that Density is got the first rank whereas is the Impact strength is having lowest ranking.

1. Introduction

Decision Testing and evaluation laboratory (DEMATEL) generally, with recommended criteria analyses the influence of certain factors The DEMATEL approach is used. It will be a multi-level decision making of the industry (MCDM) is an approach to problem solving. The DEMATEL method for construction Relationship that causes accidents Used to evaluate work. This combination is used for the inaccuracy and subjectivity of human judgments. Interval packages are used rather than real numbers in set theory. Linguistic words are converted into numbers. Material selection is the application of a given application the most suitable material to meet the needs is the selection process. Electrical properties Chemical properties, physical properties, Mechanical properties and various factors such as cost selection requirements Determine. Typical engraved composite materials: Reinforced concrete and masonry. Plywood-like composite wood. Fiber-reinforced Such as reinforced plastics polymer or fiberglass. Compounds are now used in vehicles and equipment, including panels, frames, interiors and other components. Some integrated infrastructure applications include buildings, roads, bridges and piling. Subject to successful engineering design process the choice is important. Make your product as strong as possible should also be durable. To be considered there are also security implications. You see, awful Dangerous arising from material selection Failures is still in many industries is the most common occurrence.

2. Composite material selection

After obtaining the structural SMA fiber Anisotropic Laminate Beam's equation, the process for determining the was presented. Variation fiber using partial MATLAB numerical computation is given. Finally, with SMA fiber Embedded variable cross section composite leaf Adjustment of the natural frequency of the spring the mechanism is revealed. however, there are many more challenges in adapting SMA to joint in order to implement the SMA layout plan, structure and functional integration [4] design concept, the composition must be adapted The Material choice for car body is suffering from numerous standards inclusive of fee, Stiffness, weight, resistance to impact and Many. Normal woven e-glass fabric Compounds are recognized as high proof against effect and greater competitive than one-way composites in high residences. Epoxy resin unique electricity absorption in comparison to tensile electricity, tensile modulus, fracture and other adhesives. These products are commercially available for outside production; in order that they had been decided on to replace the automobile frame. In these paintings, 20% HY564 hardener (a hundred and twenty to 180 min curing time) with epoxy resin LY564.1 and simple woven E-glass material 200g / m2 became used [20]. Composite Products Association (SACMA) Test methods. This Chemical and physical experiments refer to the product, the manufacturer's quality control Procedures should be reviewed, including incoming fiber Woven fabric and resin raw materials Quality control procedures to address Ensure that there is adhesive mixing process [2]. The Composite fabric inside the design of the car anti-roll bar to determine the precise herbal fibers that can meet the desires of the clients and the environment. Environmental analysis become studied the use of a combination of hierarchical procedure and fine function sequencing. In making the final decision, the life cycle changed into evaluated to help environmental requirements [3]. Composite materials, for example, have low radar pass-signature and the structure weight of the coffee, which is low this gadget has top resistance to underwater cracks because of its diluting and mitigating properties. Extra flexible

the need for flexibility is a light-weight structure is completed by the system its Different Allows the use of payloads tasks [13]. The composite substances inside the layout proposals, the layout should be stepped forward as an eco-layout. Eco-design is likewise called eco-design, and is described as the procedure of "integrating systematic surroundings into product layout and improvement", and designers ought to be very careful in selecting the right natural fiber for a product. According to investigate conducted via Karma, the choice of material frequently depends at the material used previously, to make sure that the fabric used is secure. However, this method limits the selection of materials [12]. The components of wind turbines change as material selection Technology is evolving and evolving for lighter weight systems There is a curve low Weight, low price products for some purposes Especially on knives and towers Important. Knives during gadget and the weight of the rotor are increased. Weight of the tower is the focal point of the shape due to the fact it's far generally Sophisticated light weight, high strength Above the mousse due to the ingredients contained 60% of the total weight of the turbine in [10]. The electronics packages, much like the cost Silicone material or Polyamide. AESO resin Measured water absorption turned into zero.5% and AESO-KFS Distribution coefficients of compounds rely upon the keratin fiber content and the absorption through the fiber dominates. The garage modulus of the AESO compound changed into drastically by adding keratin fibers Updated. Fiber content damping of the mixture with increasing the height decreased and the peak expanded. The breakdown hardness and breakdown power of the compounds had been extended by increasing the fiber. The breakdown power of keratin fiber in composites turned into envisioned using a nail answer. The mechanical properties of latest composite substances are within an appropriate range for composite packages [19]. Composite Products Association (SACMA) Test Methods. These chemical and physical experiments refer to the product; Material Selection Adviser (COMASA) was created by upgrading GONNS. The new version has the ability to upgrade multiple neural network clusters each at once they also use a genetic algorithm for the cluster. Each cluster is like an object. In this study, the computer is made up of two neural networks when represented, optimization [7]. Subject GMT. So, in this study, the car bumper beam among other criteria in development, structure choice is explored. Eight bumper beam ideas Low impact test under standard conditions Simulated with the same object model. Choosing the right concept is confusing [9]. Density is the number of People, animals, plants, or gadgets in a given location. To calculate the density, you divide the quantity of gadgets by using the region size. The population density of a rustic is the wide variety of humans in that Divided with the aid of the area in rectangular kilometers or miles. Micro hardness is a broadly used time period for testing materials' hardness the use of small implemented loads. The most appropriate term to explain that is the micro-indentation hardness check. Macro hardness is the measurement of the hardness of tested materials with excessive hundreds. Material macro hardness measurement is a short and simple technique of obtaining mechanical assets information for a complete cloth from a small pattern. It is likewise extensively used for pleasant manage of floor remedy techniques. Ultimate tensile energy (or abbreviated tensile energy) is an essential characteristic to decide the mechanical performance of substances. The flexural strength of an object is defined as the maximum bending pressure applied to the object before it is formed. The most common way to obtain the flexural strength of an object is to use a cross-bending test using a three-point flexibility test technique. When preventing an explosion or fracture, the force of the metal to withstand the collision force is referred to as the impact strength.

3. DEMATEL Method

The DEMATEL method can Specific problem, pinup Bound problems, and structural modeling techniques that can contribute to identifying solutions that can work through a hierarchical structure, identifying the interdependence between the components of an organization for a reason, and influencing the fundamental Concept of situational relations and Due to the influence of the elements The chart uses a lot the directional graphs [4]. Built on the basic principle of DEMATEL, it executes Issues by visualization method Analyses and solves. Modeling this structure Approach adopts the form of a driven diagram, which is a causal effect for presenting values of influence between interrelated relationships and factors. By analyzing the visual relationship of conditions between systemic Factors, all components a causal group and the effect is divided into groups. It also provides researchers with Structure between system components Better understanding of the relationship and complexity for troubleshooting computer problems can find ways [12]. The DEMATEL system is integrated Emergency management together Manage. In the manner proposed, it is not necessary to diffusely obscure numbers before using the DEMATEL method. Therefore, this method is uncertain of evaluation Will truly reflect the character. Finally, to get the final results from different aspects Twice in each integrated PPA We use DEMATEL, which is ours [5]. Decision Testing and Assessment Laboratory (DEMATEL). The DEMATEL method is a powerful method gathering team knowledge to build a structured model and visualizing the causal relationship of subsystems. But crisp values the ambiguity of the real world Is adequate reflection [1]. DEMATEL explores the interdependence between equity the amount of investment factors and factors and ANP to assess their dependencies Integrates. This section is, first of all, DEMATEL Establishes network relationships through, secondly, for each factor ANP to increase weight compared to Uses. Third, systematic data collection process is provided [25]. The DEMATEL method effectively calculates the consequences between criteria, which efficiently separates the set of complicated elements right into a sender organization and a recipient institution and transforms it right technique to choosing a management gadget Between alternate configurations Explicit Priority Weights come from In addition, the ZOGP model allows companies to make full use of limited resources for planning to implement optimal management systems [23]. This influence and causal Group barriers pro or Source for affected group barriers can be considered due. Therefore, in order to effectively implement electronic waste management, barriers belonging to a causal or an influential group should be considered on a priority basis. Therefore, decision makers need to determine obstacles the legal framework is strong make sure there is controllable in order to minimize impact or influence barriers. Therefore, derived from ISM and DEMATEL methods the results are somewhat

consistent. Integrated ISM DEMATEL Results for e-waste management constraints determines not only the structure but also the structure the interactions between these barriers [28]. DEMATEL studies, specific purpose for which DEMATEL is used. categories: Factors or Only relationships between criteria the first type of clarification; Second types to identify the main factors in terms of causal relationships and interrelationships size; The third category is relations of criteria and analysis of impact levels by doing the scale determines the weight [3]. Accordingly, the preliminary drawback (cluster one) became about topics including the comparative weights of selection makers in the DEMATEL approach who did now not well bear in mind linking to the team decision making. Obviously, in a group decision-making hassle, regular decision-makers can always trust their factor of view and count on it to be prevalent via other selection-makers. This way that very last evaluation guides must be close to their judgments, and if the very last assessment effects are near their critiques, the choice maker is willing to simply accept it; otherwise, they may deny it. It is believed that a significant purpose for the aforementioned discrepancies lies in methods based on unstructured comparisons such as DEMATEL [14]. DEMATEL is widely accepted for analyzing the overall relationship of factors and classifying factors into cause-and-effect types. Therefore, this article considers each source as a criterion in decision making. Based on DEMATEL, the significance and level of significance of each piece of evidence can to deal with a mixture of conflicting evidence, it is necessary to expand the DEMATEL method with the source theory for better conclusions. In this article, instead of the comparative criteria provided by the experts in DEMATEL [7], the corresponding proposition between the bodies of sources is changed. The DEMATEL technique used the as well as creating causal relationships between criteria for evaluating the Integrated Multiple Scale Decision Making (MCDM) Outreach Personnel Program. Integrates DEMATEL and a new cluster-weighted system in which DEMATEL system is a company The reason for the complexity between the criteria this is to visualize the structure of relationships It is also used to measure the influence of criteria. Buyukozkan and Ozturkcan integrated ANP and DEMATEL an innovation in terms of technology have developed an approach, which is for companies Helps determine important Six Sigma projects and logistics specifically prioritize these projects Helps to identify in companies [2].

TABLE 1. Composite material selection

	Density	**Micro Hardness**	**Tensile Strength**	**Flexural Strength**	**Impact strength**	**Sum**
Density	0	2	3	2	2	9
Micro hardness	3	0	2	1	1	7
Tensile strength	2	1	0	3	2	8
Flexural strength	1	4	2	0	2	9
Impact strength	2	2	1	1	0	6

Table 1 shows that DEMATEL Decision making trail and evaluation laboratory in Composite material selection with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength.

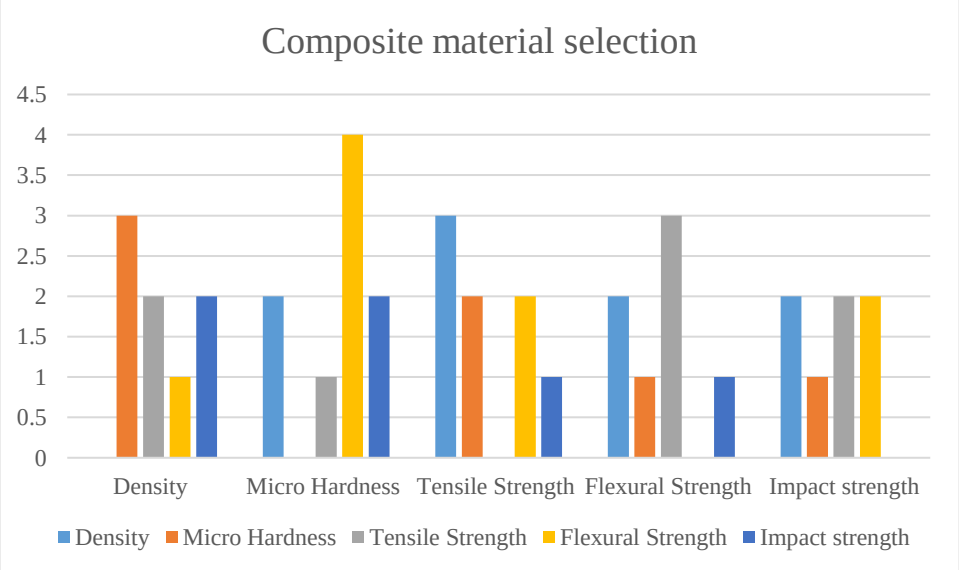

Figure 1. Composite material selection

Figure 1 shows that DEMATEL Decision making trail and evaluation laboratory in Composite material selection of Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength. It is the Composite material selection and comparison of Density. Micro hardness is widely used Word it refers to the test of hardness. Tensile strength, by the original cross section of the object When subdivided, a material without fracture Maximum load that can be borne. Flexibility is strength

TABLE 2. Normalization of Direct Relation Matrix

	Density	**Micro Hardness**	**Tensile Strength**	**Flexural Strength**	**Impact strength**
Density	0	0.222222222	0.33333333	0.222222222	0.222222222
Micro hardness	0.333333333	0	0.22222222	0.111111111	0.111111111
Tensile strength	0.222222222	0.111111111	0	0.333333333	0.222222222
Flexural strength	0.111111111	0.444444444	0.22222222	0	0.222222222
Impact strength	0.222222222	0.222222222	0.11111111	0.111111111	0

Table 2 shows that the Normalizing of direct relation matrix in Composite material selection of Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength. The diagonal value of all the data set is zero.

TABLE 3. Calculate the total relation matrix

	density	**Micro Hardness**	**Tensile Strength**	**Flexural Strength**	**Impact strength**
density	0	0.22222	0.333333333	0.222222	0.222222
Micro Hardness	0.3333333	0	0.222222222	0.111111	0.111111
Tensile Strength	0.2222222	0.11111	0	0.333333	0.222222
Flexural Strength	0.1111111	0.44444	0.222222222	0	0.222222
Impact strength	0.2222222	0.22222	0.111111111	0.111111	0

Table 3Shows the Calculate the total relation matrix in Composite material selection. Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength.

TABLE 4.T= Y (I-Y)-1, I= Identity matrix

1	0	0	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	1	0
0	0	0	0	1

Table 4Shows that= Y (I-Y)-1, I= Identity matrix in Composite material selection. Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength is the common Value.

TABLE 5. Y Value

0	0.222222	0.333333	0.222222	0.222222
0.333333	0	0.222222	0.111111	0.111111
0.222222	0.111111	0	0.333333	0.222222
0.111111	0.444444	0.222222	0	0.222222
0.222222	0.222222	0.111111	0.111111	0

Table 5Shows the Y Value in Composite material selection is Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength is the Calculate the total relation matrix Value and Y Value is the same value.

TABLE 6. I-Y Value

1	-0.22222	-0.33333	-0.22222	-0.22222
-0.33333	1	-0.22222	-0.11111	-0.11111
-0.22222	-0.11111	1	-0.33333	-0.22222
-0.11111	-0.44444	-0.22222	1	-0.22222
-0.22222	-0.22222	-0.11111	-0.11111	1

Table 6Shows the I-Y Value Composite material selection is Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength table 4 T= Y(I-Y)-1, I= Identity matrix and table 5 Y Value Subtraction Value.

TABLE 7. (I-Y)-1Value

2.362834898	1.630696	1.613178	1.396783	1.375143
1.393176093	2.195901	1.322075	1.115984	1.095374
1.420998397	1.45758	2.243817	1.36793	1.280341
1.453972979	1.749199	1.50292	2.166533	1.332894
1.154110373	1.206664	1.068583	0.951111	1.839363

Table 7 shows the (I-Y)-1Value Composite material selection Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength with respect to Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength Table 6 shown the Inverse Value.

TABLE 8. Total Relation matrix (T)

1.362834898	1.630696	1.613178	1.396783	1.375143
1.393176093	1.195901	1.322075	1.115984	1.095374
1.420998397	1.45758	1.243817	1.36793	1.280341
1.453972979	1.749199	1.50292	1.166533	1.332894
1.154110373	1.206664	1.068583	0.951111	0.839363

Table 8 shows that the total relation matrix the direct relation matrix is multiplied with the inverse of the value that the direct relation matrix is subtracted from the identity matrix.

TABLE 9. Composite material selection Ri, Ci

	Ri	**Ci**
Density	7.378635	6.785093
Micro hardness	6.12251	7.240039
Tensile strength	6.770666	6.750572
Flexural strength	7.205519	5.99834
Impact strength	5.219831	5.923117

Table 9 shows the Composite material selection Ri, Ci Value in Density is showing the Highest Value for Ri and Impact strength is showing the lowest value. Micro hardness is showing the Highest Value for Ci and Flexural strength is showing the lowest value.

TABLE 10. Calculation of Ri+Ci and Ri-Ci To Get The Cause And Effect

	Ri+Ci	**Ri-Ci**	**Rank**	**Identity**
Density	14.16373	0.593542	1	cause
Micro hardness	13.36255	-1.11753	3	effect
Tensile strength	13.52124	0.020094	2	cause
Flexural strength	13.20386	1.207179	4	cause
Impact strength	11.14295	-0.70329	5	effect

Table 10shows the Calculation of Ri+Ci and Ri-Ci to Get the Cause and Effect. Density, Micro hardness, Tensile strength, Flexural strength, Impact strength. Density, Tensile strength, Flexural strength is Showing the highest Value of cause. Micro hardness, Impact strength is showing the lowest Value of effect.

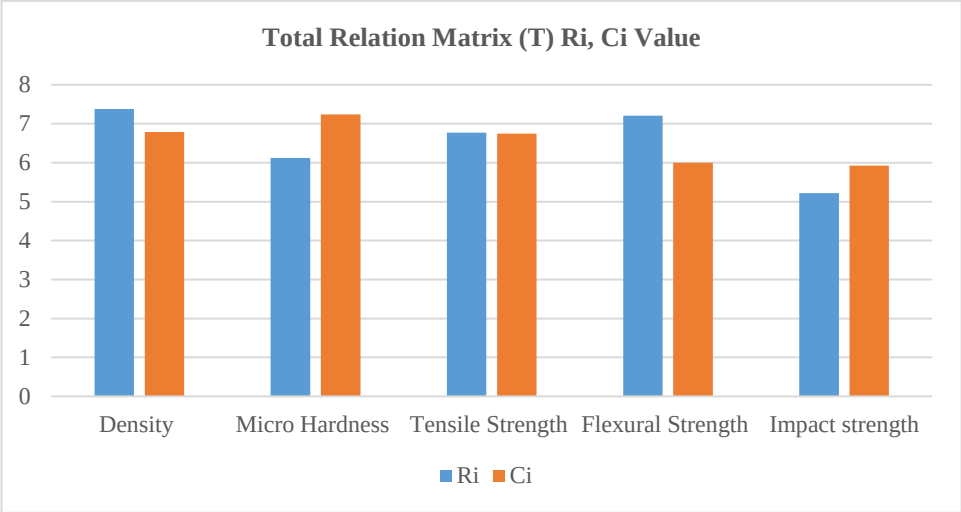

Figure 2. Total Relation Matrix (T) Ri, Ci Value.

Figure 2shows the Total Relation Matrix (T) Ri, Ci Value Composite material selection of Density, Micro hardness, Tensile strength, Flexural strength, Impact strength. Density is showing the highest value for Total Relation Matrix (T) Ri, Ci Value and Impact strength is showing the lowest value.

TABLE 11. T Matrix Value

1.362835	**1.630696**	**1.613178**	**1.396783**	**1.375143**
1.393176	1.195901	**1.322075**	1.115984	1.095374
1.420998	1.45758	1.243817	1.36793	1.280341
1.453973	**1.749199**	1.50292	1.166533	**1.332894**
1.15411	1.206664	1.068583	0.951111	0.839363

Table 11shows the T matrix value of in Density, Micro Hardness, Tensile Strength, Flexural Strength, Impact strength. calculate the average of the matrix and its threshold value **alpha Value 1.307886421**. If the T atrix value is greater than threshold value, then bold it.

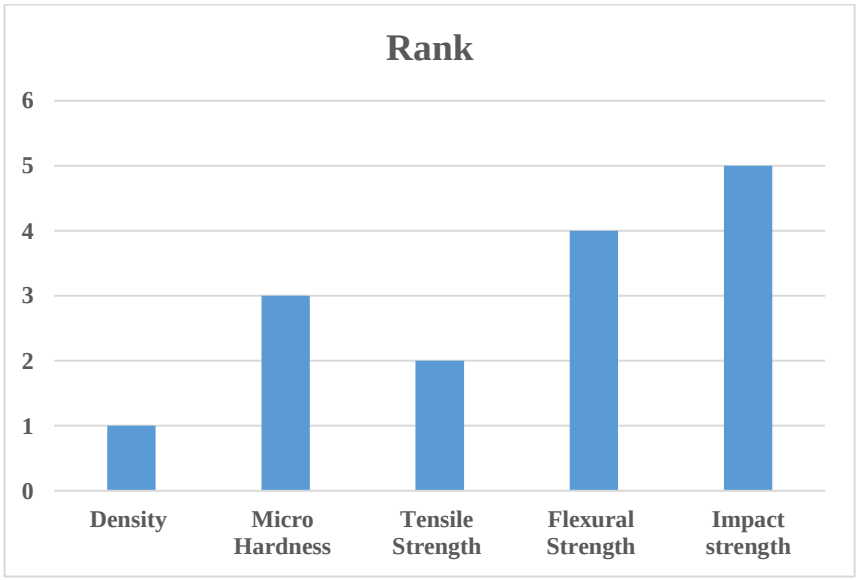

Figure 3. Shown the Rank

Figure 3shows the Rank using the DEMATEL for Composite material selection. Density is got the first rank whereas is the Impact strength is having the Lowest rank.

4. Conclusion

Mixed material the after obtaining the structural SMA fiber Anisotropic Laminate Beam's equation, the process for determining the was presented. Variation with SMA fiber Embedded variable cross-section composite leaf Adjustment of the natural frequency of the spring the mechanism is revealed. however, there are many more challenges in adapting SMA to joint in order to implement the SMA layout plan, structure and functional integration [4] design concept, the composition must be adapted The DEMATEL method structural modelling techniques that can contribute to identifying solutions that can work through a hierarchical structure, identifying the interdependence between the components of an organization for a reason, and influencing the fundamental the directional graphs [4]. Built on the basic principle of DEMATEL, it executes of a driven diagram, which is a causal effect for presenting values of influence between interrelated relationships and factors. In this paper we used DEMATEL for ranking the DEMATEL method is the most ideal solution for Short-distance Evaluation Parameters in Density, Micro Hardness, Tensile Strength, Flexural Strength, and Impact Strength Use Attention deficit from the result it is seen that Density is got the first rank whereas is the Impact strength is having the Lowest rank.

Reference

[1]. Ke, Jun, Zhen-yu Wu, Xiao-ying Chen, and Zhi-ping Ying. "A review on material selection, design method and performance investigation of composite leaf springs." Composite Structures 226 (2019): 111277.

[2]. Golzar, M., and M. Poorzeinolabedin. "Prototype fabrication of a composite automobile body based on integrated structure." The International Journal of Advanced Manufacturing Technology 49, no. 9 (2010): 1037-1045.

[3]. Tomblin, John S., John D. Tauriello, and Sean P. Doyle. "A composite material qualification method that results in cost, time and risk reduction." JOURNAL OF ADVANCED MATERIALS-COVINA- 34, no. 4 (2002): 41-51.

[4]. Rathor, Ketan, Sushant Lenka, Kartik A. Pandya, B. S. Gokulakrishna, Susheel Sriram Ananthan, and Zoheib Tufail Khan. "A Detailed View on industrial Safety and Health Analytics using Machine Learning Hybrid Ensemble Techniques." In 2022 International Conference on Edge Computing and Applications (ICECAA), pp. 1166-1169. IEEE, 2022.

[5]. Bhalla, Kanika, Deepika Koundal, Bhisham Sharma, Yu-Chen Hu, and Atef Zaguia. "A fuzzy convolutional neural network for enhancing multi-focus image fusion." Journal of Visual Communication and Image Representation 84 (2022): 103485.

[6]. Mastura, M. T., S. M. Sapuan, M. R. Mansor, and A. A. Nuraini. "Environmentally conscious hybrid bio-composite material selection for automotive anti-roll bar." The International Journal of Advanced Manufacturing Technology 89, no. 5 (2017): 2203-2219.

[7]. Farooqui, Nafees Akhter, and Ritika Amit Kumar Mishra. "Analysis of Antioxidant and Rutin Content in Buckwheat Flour Bread by Machine Learning Approach." Design Engineering (2021): 17188-17201.

[8]. Sukumaran, C., B. Karpagavalli, R. Hariharan, and V. Parthiban. "Preclusive Strategies of Obesity to Lead a Healthy Life-A Review‖." Pharmaceutical Sciences and Research 1, no. 1 (2022): 42-45.Vallbo, S. "Material selection considerations for polymer composite structures in naval ship applications." Journal of Sandwich Structures & Materials 7, no. 5 (2005): 413-429.

[9]. Mukherjee, Tulika, Tapas Sarkar, Piyali Paul, Ajit K. Chakraborty, Parasuraman Jaisankar, and Siba Brata Mukhopadhyay. "Putralone, a novel 10α-hydroxy-25-nor D: A friedo-oleanane triterpenoid from Putranjiva roxburghii." Natural Product Communications 7, no. 4 (2012): 1934578X1200700424.

[10]. Rathor, Ketan, Keyur Patil, Mandiga Sahasra Sai Tarun, Shashwat Nikam, Devanshi Patel, and Sasanapuri Ranjit. "A Novel and Efficient Method to Detect the Face Coverings to Ensurethe Safety using Comparison Analysis." In 2022 International Conference on Edge Computing and Applications (ICECAA), pp. 1664-1667. IEEE, 2022.

[11]. Azman, M. A., M. R. M. Asyraf, A. Khalina, Michal Petrů, C. M. Ruzaidi, S. M. Sapuan, W. B. Wan Nik, M. R. Ishak, R. A. Ilyas, and M. J. Suriani. "Natural fiber reinforced composite material for product design: A short review." Polymers 13, no. 12 (2021): 1917.

[12]. Ranjit, P. S., and Mukesh Saxena NK. "Studies on Combustion and Emission Characteristics of an IDI CI Engine by Using 40% SVO Diesel Blend Under Different Preheating Conditions." Global Journal of Research Analysis (GJRA) 1, no. 21 (2014): 43-46.

[13]. Theotokoglou, Efstathios E., and Georgios A. Balokas. "Computational analysis and material selection in cross-section of a composite wind turbine blade." Journal of Reinforced Plastics and Composites 34, no. 2 (2015): 101-115.

[14]. Garg, Hitendra, Bhisham Sharma, Shashi Shekhar, and Rohit Agarwal. "Spoofing detection system for e-health digital twin using EfficientNet Convolution Neural Network." Multimedia Tools and Applications 81, no. 19 (2022): 26873-26888.

[15]. TP, Krishna Kumar, and M. Ramachandran. "Using a ELECTRE MCDM method for Software Testing Techniques."

[16]. Sukumaran, C., and P. J. Sebastian. "Effect of Inclusive Games and Physical Exercises on Selected Physical Variables among the Intellectually Challenged Children." Annals of the Romanian Society for Cell Biology 26, no. 01 (2022): 1442-1450.

[17]. Nautiyal, Aditi, and Amit Kumar Mishra. "Machine learning approach for intelligent prediction of petroleum upstream stuck pipe challenge in oil and gas industry." Environment, Development and Sustainability (2022): 1-27.
[18]. Hong, Chang K., and Richard P. Wool. "Development of a bio-based composite material from soybean oil and keratin fibers." Journal of applied polymer science 95, no. 6 (2005): 1524-1538.
[19]. Torre, L., J. M. Kenny, and A. M. Maffezzoli. "Degradation behaviour of a composite material for thermal protection systems Part I–Experimental characterization." Journal of materials science 33, no. 12 (1998): 3137-3143.
[20]. Rathor, Ketan, Anshul Mandawat, Kartik A. Pandya, Bhanu Teja, Falak Khan, and Zoheib Tufail Khan. "Management of Shipment Content using Novel Practices of Supply Chain Management and Big Data Analytics." In 2022 International Conference on Augmented Intelligence and Sustainable Systems (ICAISS), pp. 884-887. IEEE, 2022.
[21]. Sukumaran, C., D. Selvam, M. Sankar, V. Parthiban, and C. Sugumar. "Application of Artificial Intelligence and Machine Learning to Predict Basketball Match Outcomes: A Systematic Review." Computer Integrated Manufacturing Systems 28, no. 11 (2022): 998-1009.
[22]. Bajaj, Karan, Bhisham Sharma, and Raman Singh. "Implementation analysis of IoT-based offloading frameworks on cloud/edge computing for sensor generated big data." Complex & Intelligent Systems 8, no. 5 (2022): 3641-3658.
[23]. TP, Krishna Kumar, and M. Ramachandran. "A Review of Marine Current Energy and Types of Energy using MOORA Method."
[24]. Kumar, Ashish, Somenath Roy Chowdhury, Tulika Chakrabarti, Hemanta K. Majumdar, Tarun Jha, and Sibabrata Mukhopadhyay. "A new ellagic acid glycoside and DNA topoisomerase IB inhibitory activity of saponins from Putranjiva roxburghii." Natural Product Communications 9, no. 5 (2014): 1934578X1400900523.
[25]. Yang, S. Y., I. N. Tansel, and C. V. Kropas-Hughes. "Selection of optimal material and operating conditions in composite manufacturing. Part I: computational tool." International Journal of Machine Tools and Manufacture 43, no. 2 (2003): 169-173.
[26]. Davoodi, M. M., S. M. Sapuan, D. Ahmad, A. Aidy, A. Khalina, and Mehdi Jonoobi. "Concept selection of car bumper beam with developed hybrid bio-composite material." Materials & Design 32, no. 10 (2011): 4857-4865.
[27]. Mansour, Romany F., Eatedal Alabdulkreem, Heba F. Eid, K. Sathishkumar, Mohd Abdul Rahim Khan, and Anil Kumar. "Fuzzy logic based on-line fault detection and classification method of substation equipment based on convolutional probabilistic neural network with discrete wavelet transform and fuzzy interference." Optik 270 (2022): 169956.
[28]. Farooqui, Nafees Akhter, Amit Kumar Mishra, and Ritika Mehra. "Automatic crop disease recognition by improved abnormality segmentation along with heuristic-based concatenated deep learning model." Intelligent Decision Technologies Preprint (2022): 1-23.
[29]. Krishna Kumar, T. P., M. Ramachandran, and Sathiyaraj Chinnasamy. "Investigation of Public Transportation System Using MOORA Method." REST Journal on Emerging trends in Modelling and Manufacturing 6, no. 4 (2020): 124-129.
[30]. Shieh, Jiunn-I., Hsin-Hung Wu, and Kuan-Kai Huang. "A DEMATEL method in identifying key success factors of hospital service quality." Knowledge-Based Systems 23, no. 3 (2010): 277-282.
[31]. Kamali, Ali-Mohammad, Milad Kazemiha, Behnam Keshtkarhesamabadi, Mohsan Daneshvari, Asadollah Zarifkar, Prasun Chakrabarti, Babak Kateb, and Mohammad Nami. "Simultaneous transcranial and transcutaneous spinal direct current stimulation to enhance athletic performance outcome in experienced boxers." Scientific Reports 11, no. 1 (2021): 19722.
[32]. Ranjit, Pasupuleti Subrahmanya. "Studies on hydrogen supplementation of SVO operated IDI CI engine for performance improvement and reduction emissions." PhD diss., UPES, 2014.
[33]. Koundal, Deepika, and Bhisham Sharma. "Advanced neutrosophic set-based ultrasound image analysis." In Neutrosophic set in medical image analysis, pp. 51-73. Academic Press, 2019.
[34]. Lin, Ru-Jen. "Using fuzzy DEMATEL to evaluate the green supply chain management practices." Journal of cleaner production 40 (2013): 32-39.
[35]. Kumawat, Gaurav, Santosh Kumar Vishwakarma, Prasun Chakrabarti, Pankaj Chittora, Tulika Chakrabarti, and Jerry Chun-Wei Lin. "Prognosis of Cervical Cancer Disease by Applying Machine Learning Techniques." Journal of Circuits, Systems and Computers 32, no. 01 (2023): 2350019.
[36]. C. Sukumaran, M. Ramachandran, Chinnasami Sivaji, Manjula Selvam, “Ranking of Product in E-store using WASPAS method”, REST Journal on Banking, Accounting and Business, 1(1), (2022):1-9
[37]. Krishna Kumar, T. P., M. Ramachandran, and Vimala Saravanan. "Candidate Selection for a Project Using Weight Sum Method." Data Analytics and Artificial Intelligence 1, no. 1 (2021): 53-59.
[38]. Li, Ya, Yong Hu, Xiaoge Zhang, Yong Deng, and Sankaran Mahadevan. "An evidential DEMATEL method to identify critical success factors in emergency management." Applied Soft Computing 22 (2014): 504-510.
[39]. Koundal, Deepika, and Bhisham Sharma. "Challenges and future directions in neutrosophic set-based medical image analysis." In Neutrosophic Set in Medical Image Analysis, pp. 313-343. Academic Press, 2019.

[40]. Wu, Wei-Wen, and Yu-Ting Lee. "Developing global managers' competencies using the fuzzy DEMATEL method." Expert systems with applications 32, no. 2 (2007): 499-507.
[41]. Kumar Pandey, Rakesh, Anil Kumar, Ajay Mandal, and Behzad Vaferi. "Employing deep learning neural networks for characterizing dual-porosity reservoirs based on pressure transient tests." Journal of Energy Resources Technology 144, no. 11 (2022): 113002.
[42]. Ranjit, P. S., and Venkateswarlu Chintala. "Direct utilization of preheated deep fried oil in an indirect injection compression ignition engine with waste heat recovery framework." Energy 242 (2022): 122910.
[43]. Fulmare, Nilima Salankar, Prasun Chakrabarti, and Divakar Yadav. "Understanding and estimation of emotional expression using acoustic analysis of natural speech." International Journal on Natural Language Computing (IJNLC) 2, no. 4 (2013): 37-46.
[44]. Krishna Kumar, T. P., M. Ramachandran, and Sathiyaraj Chinnasamy. "Exploring Various Applications of Block Chain Technology." Recent trends in Management and Commerce 1, no. 1 (2020): 92-96.
[45]. Lee, Wen-Shiung, Alex YiHou Huang, Yong-Yang Chang, and Chiao-Ming Cheng. "Analysis of decision making factors for equity investment by DEMATEL and Analytic Network Process." Expert Systems with Applications 38, no. 7 (2011): 8375-8383.
[46]. Mishra, Amit Kumar, and Shweta Paliwal. "Mitigating cyber threats through integration of feature selection and stacking ensemble learning: the LGBM and random forest intrusion detection perspective." Cluster Computing (2022): 1-12.
[47]. C Sukumaran, M Ramachandran, Vimala Saravanan, Sathiyaraj Chinnasamy, "An Empirical study of Brand Marketing Using TOPSIS MCDM Method", REST Journal on Banking, Accounting and Business, 1(1), (2022):10-18
[48]. Kumar, Ashish, Nilanjana Banerjee, Venugopal Singamaneni, Sudheer K Dokuparthi, Tulika Chakrabarti, and Sibabrata Mukhopadhyay. "Phytochemical investigations and evaluation of antimutagenic activity of the alcoholic extract of Glycosmis pentaphylla and Tabernaemontana coronaria by Ames test." Natural Product Research 32, no. 5 (2018): 582-587.
[49]. Dogra, Roopali, Shalli Rani, Bhisham Sharma, Sandeep Verma, Divya Anand, and Pushpita Chatterjee. "A novel dynamic clustering approach for energy hole mitigation in Internet of Things-based wireless sensor network." International Journal of Communication Systems 34, no. 9 (2021): e4806.
[50]. Soni, Rajkumar, Prasun Chakrabarti, Zbigniew Leonowicz, Michał Jasiński, Krzysztof Wieczorek, and Vadim Bolshev. "Estimation of life cycle of distribution transformer in context to furan content formation, pollution index, and dielectric strength." IEEE Access 9 (2021): 37456-37465.
[51]. Tsai, Wen-Hsien, and Wen-Chin Chou. "Selecting management systems for sustainable development in SMEs: A novel hybrid model based on DEMATEL, ANP, and ZOGP." Expert systems with applications 36, no. 2 (2009): 1444-1458.
[52]. Krishna Kumar, T. P., M. Ramachandran, and Vimala Saravanan. "A Risk Assessment of Emergency management using (WASPAS) MCDM Method." Recent trends in Management and Commerce 2, no. 3 (2022): 36-43.
[53]. Kapoor, Nishant Raj, Ashok Kumar, Anuj Kumar, Anil Kumar, and Krishna Kumar. "Transmission Probability of SARS-CoV-2 in Office Environment Using Artificial Neural Network." Ieee Access 10 (2022): 121204-121229.
[54]. Kumar, Ashwani, and Gaurav Dixit. "An analysis of barriers affecting the implementation of e-waste management practices in India: A novel ISM-DEMATEL approach." Sustainable Production and Consumption 14 (2018): 36-52.
[55]. Ranjit, P. S., and M. Saxena. "State-of-the-art of storage and handling issues related to high pressure gaseous hydrogen to make use in internal combustion engines." International Journal of Scientific & Engineering Research (IJSER) 3, no. 9 (2012): 1-17.
[56]. Kumar, Ashish, Ketan Rathor, Snehit Vaddi, Devanshi Patel, Preethi Vanjarapu, and Manichandra Maddi. "ECG Based Early Heart Attack Prediction Using Neural Networks." In 2022 3rd International Conference on Electronics and Sustainable Communication Systems (ICESC), pp. 1080-1083. IEEE, 2022.
[57]. Farooqui, Nafees Akhter, Amit Kumar Mishra, and Ritika Mehra. "Concatenated deep features with modified LSTM for enhanced crop disease classification." International Journal of Intelligent Robotics and Applications (2022): 1-25.
[58]. Si, Sheng-Li, Xiao-Yue You, Hu-Chen Liu, and Ping Zhang. "DEMATEL technique: A systematic review of the state-of-the-art literature on methodologies and applications." Mathematical Problems in Engineering 2018 (2018).
[59]. Khan, Zuhaib Ashfaq, Hafiz Husnain Raza Sherazi, Mubashir Ali, Muhammad Ali Imran, Ikram Ur Rehman, and Prasun Chakrabarti. "Designing a wind energy harvester for connected vehicles in green cities." Energies 14, no. 17 (2021): 5408.
[60]. Yazdi, Mohammad, Faisal Khan, Rouzbeh Abbassi, and Risza Rusli. "Improved DEMATEL methodology for effective safety management decision-making." Safety science 127 (2020): 104705.
[61]. Sukumaran, C., and P. J. Sebastian. "Effect of Inclusive Games and Physical Exercises on Selected Physical Variables among the Intellectually Challenged Children." Annals of the Romanian Society for Cell Biology 26, no. 01 (2022): 1442-1450.

[62]. Zhang, Weiquan, and Yong Deng. "Combining conflicting evidence using the DEMATEL method." Soft computing 23, no. 17 (2019): 8207-8216.

[63]. Kumar, Ashish, Somenath Roy Chowdhury, Kumar Kalyan Jatte, Tulika Chakrabarti, Hemanta K. Majumder, Tarun Jha, and Sibabrata Mukhopadhyay. "Anthocephaline, a new indole alkaloid and cadambine, a potent inhibitor of DNA topoisomerase IB of Leishmania donovani (LdTOP1LS), isolated from Anthocephalus cadamba." Natural Product Communications 10, no. 2 (2015): 1934578X1501000221.

[64]. Manjunath, C. R., Ketan Rathor, Nandini Kulkarni, Prashant Pandurang Patil, Manoj S. Patil, and Jasdeep Singh. "Cloud Based DDOS Attack Detection Using Machine Learning Architectures: Understanding the Potential for Scientific Applications." International Journal of Intelligent Systems and Applications in Engineering 10, no. 2s (2022): 268-271.

[65]. Chand, Trilok, and Bhisham Sharma. "HRCCTP: a hybrid reliable and congestion control transport protocol for wireless sensor networks." In 2015 IEEE sensors, pp. 1-4. IEEE, 2015.

[66]. Karupusamy, Sathishkumar, Mohammed Ahmed Mustafa, Bos Mathew Jos, Priyanka Dahiya, Ramakant Bhardwaj, Pratik Kanani, and Anil Kumar. "Torque control-based induction motor speed control using Anticipating Power Impulse Technique." The International Journal of Advanced Manufacturing Technology (2023): 1-9.

[67]. Kumar, Prashant, Ananda Shankar Hati, Sanjeevikumar Padmanaban, Zbigniew Leonowicz, and Prasun Chakrabarti. "Amalgamation of transfer learning and deep convolutional neural network for multiple fault detection in SCIM." In 2020 IEEE International Conference on Environment and Electrical Engineering and 2020 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), pp. 1-6. IEEE, 2020.

[68]. Lee, Hsuan-Shih, Gwo-Hshiung Tzeng, Weichung Yeih, Yu-Jie Wang, and Shing-Chih Yang. "Revised DEMATEL: resolving the infeasibility of DEMATEL." Applied Mathematical Modelling 37, no. 10-11 (2013): 6746-6757.