mathematics

MDPI

Article

Formulation of a Grey Sequence and an Optimization Solution to Present Multi-Layer Family Networks

Shahryar Sorooshian [1,2,3]

[1] Department of Business Administration, University of Gothenburg, 40530 Gothenburg, Sweden; shahryar.sorooshian@gu.se
[2] Department of Management, Apadana Institute of Higher Education, Shiraz 7187985443, Iran
[3] School of Prime Logistics, Saito University College, Petaling Jaya 46200, Malaysia

Abstract: Despite the potential benefits of family relationships and family events, insufficient studies have been undertaken to address how to overcome their obstacles. So, the main objective of this paper is to present a systematic model for prioritizing family members in response to standing limitations on family relationships. For this, the chosen methodology is conceptual sequence modeling, and the proposed model is optimized to include family membership motives and demotivators. Moreover, multiple criteria for the membership nominations are included to respond to the dynamic scenarios and complexity of decision-making. The feasibility of the proposed model is proven in a numerical case. Thus, the contribution of the proposed model is predictable to be from event planning to relative relationship management.

Keywords: family members; family relationship; relative relationship; multi-layer; optimization

MSC: 91F99; 11B99

check for updates

Citation: Sorooshian, S. Formulation of a Grey Sequence and an Optimization Solution to Present Multi-Layer Family Networks. *Mathematics* **2023**, *11*, 144. https://doi.org/10.3390/math11010144

Academic Editors: Bartosz Sawik and Elena Pérez-Bernabeu

Received: 29 November 2022
Revised: 20 December 2022
Accepted: 21 December 2022
Published: 28 December 2022

Copyright: © 2022 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

On one hand, family events provide opportunities for relatives to reaffirm positive relationships and promote feelings of satisfaction [1]. Family relationships are noteworthy for well-being across the life course [1–3]. The regularity with which family members interact is an important measure of commitment in a supportive relationship, as is the general availability of family members for companionship, support, and emergency assistance [4]. It is even arguable that an individual's educational success is influenced by both their immediate and extended family relations, as well as exchanges among these two groups [5]. Birth, marriage, and funerals are examples of family events that alter the family system and impinge on the individual's business [6,7]; thus, family events and relationships can have an impact on different ventures, including business performance.

However, on the other hand, Stadler and Jepson [8] discovered that having a family event is a complex decision-making process influenced by perceived barriers to attendance linked to contexts such as time, space, funds, and comfort. The study conducted by Innes et al. [9] discovered that when reducing obstacles in tourism and leisure services, some frequent concerns and problems necessitate further public- and private-sector thinking and planning. Researchers [8] showed that, while some aspects can enable families to attend events, they can also limit their ability to do so. People are sometimes confused about how to find a proper boundary layer for relationships with family members. Stadler and Jepson [8,10] and Foster and Robinson [11] both remark that more study is necessary for the family event field.

The literature has divided family members into immediate family and extended family, though this grouping has limitations; it is unstandardized yet, and it is too wide-ranging to be helpful in many cases. The necessity for family layers is more obvious in, for instance, traditional societies with considerable family relationships and relatives' expectations; once

private ceremonies such as marriage or birthday gatherings, or even funeral events, require filtering the family members for invitation purpose and event planning. This filtering might be due to limitations of the event space, the organizing budget, or a lack of other sources. Sometimes, circumstances and protocols similar to those during epidemics are additional pushes for smaller events [12].

With reference to the literature search, very few, if any, studies have addressed this essential issue, though Thomas, Liu, and Umberson [2] in 2017 asked for studies to make allowance for the complexity of family relationships. Most family and relationship academics study, as it is also identified by Cook [13], focuses on a specific form of affiliation. Scholars usually investigate marriage connections, parent-child interactions, father-child ties, sibling relationships, and so on. In fact, such studies assess between-family diversity within a certain type of relationship and aim to define, predict, and explain these patterns. Thus, to fill the literature gap and as a solution to the above-explained problem statement, this letter tries to propose a model to categorize members of a family with a systematic approach concerning their relationship classification. Hence, if family membership constraints are included, present how the decision on the family relationship can be optimized.

2. Materials and Methods

In the nonappearance of past hypothetical works, it is indispensable to take conceptual mathematical modeling into account [14]. The recommended instruction could begin with conceptual modeling in a real-world problem context (e.g., drawing pictures or diagrams to semantically represent the problem with the context), and then decontextualize the mathematical relationship to represent it symbolically and manipulate the representing symbols [15]. As a result, a family network component must be defined, and based on this definition, the context will be developed. Figure 1 depicts a person with some family members at the same family affiliation level for this study. This figure could be explained using the hypothetical example of an individual (person A) with his/her five cousins in the displayed affiliation layer.

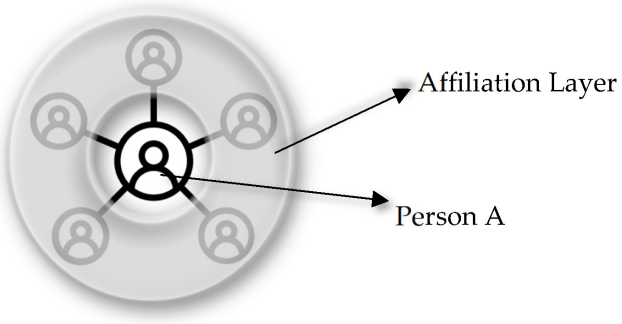

Figure 1. Family membership layer.

Discrete mathematics, with reference to the affiliation layer of family memberships, is the best starting point for conceptual mathematical modeling, given that each layer has included a set of individuals. Discrete mathematics is the investigation of mathematical structures that are discrete as opposed to continuous. In stark comparison, discrete mathematics separates topics from continuous mathematics, such as those of calculus or real numbers; thus, logical propositions, graphs, and integers are all examples of things that can be explored in the field of discrete mathematics [16]. In the model of this study, discrete objects are such as family members. Here, the best presentation of discrete objects in mathematics is sets and sequences. It is reasonable to assume that sets and sequences have been used since the earliest stages of mathematics [16,17]. Sequences are not only useful in and of themselves but also in the advancement of other concepts and in the formalization of real-life scenarios in mathematics [17], such as this article's aim to model family relationships. Hence, with these definitions, this study attempts to propose a mathematical

model to determine the sequence of family affiliation layers to establish a new path in response to its defined aim.

In many social sciences, all of the facts are not precisely known, and uncertainty is possible in nature. Then, without including uncertainties, the adaption of a basic algorithm is useless [18]. As a result, the proposed model will be enhanced by taking uncertainties into account. Furthermore, the author expands the proposed model's applicability from its basic research contributions to an applied model with a contribution to real-world scenarios in light of claims that the capabilities of operations research are superior to those of discrete mathematics for improved decision-making and problem-solving [19].

While the modeling illustrates the sequence of family affiliation layers, in operations research optimization, the collection exists to represent the solution space, and the function is to identify an optimal solution in the solution space based on the decision-makers' objective function [20]. In addition, in operations research, the concept of multi-criteria decision-making (MCDM) promotes the modeling benefits by taking into consideration a complex family situation. As a result, Figure 2 depicts the methodological approach for this article.

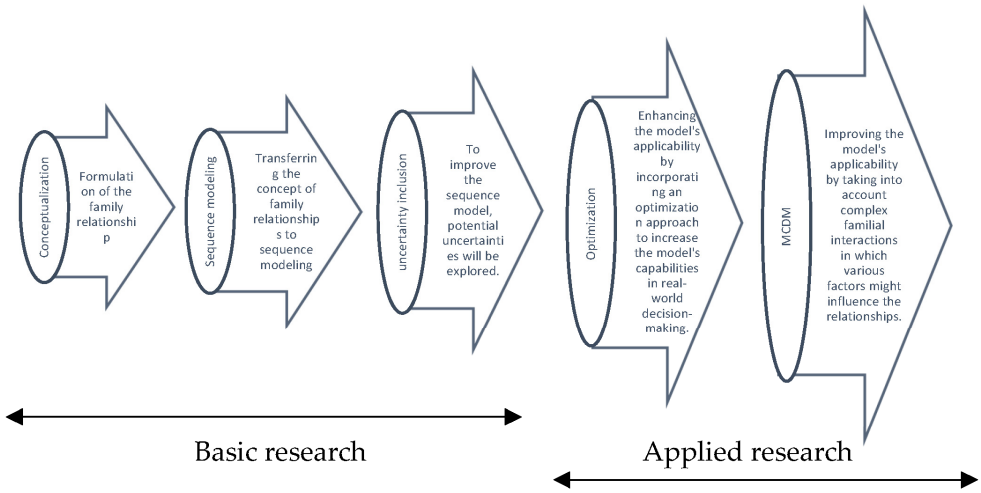

Figure 2. Modeling methodological approach.

3. Result and Discussion

A multi-layer family is presented as a model in Figure 3. In the presented model, layer 1 for any person is first assumed to be his/her children, spouse(s), parents, and siblings.

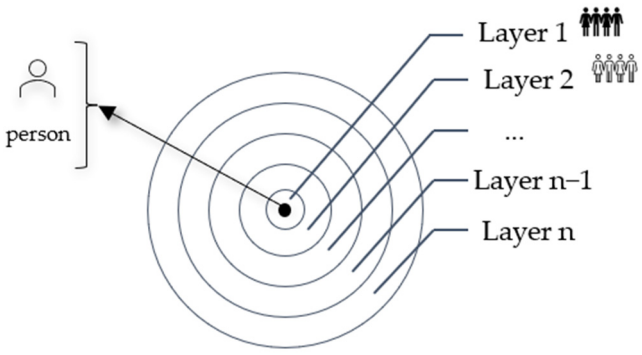

Figure 3. Multi-layer family model.

However, each member of layer 1 has its own layer 1 (children, spouses, parents, and siblings). Therefore, layer 2 for person A, as a case, will be people in layer 1 of each and every member of layer 1. Similarly, layer n of person A will be people in layer 1 of each and every member of layer $n - 1$.

Mathematically, the 'multi-layer family' sequence for person A is presented in Equation (1).

$$\begin{gathered} \{Layer_{n_A}\} = \{Layer_{1_B}\} \\ \text{Subject to:} \\ \{Layer_1\} = \{\text{children, spouse, parents, and siblings}\} \\ B\epsilon\left\{Layer_{(n-1)_A}\right\} \\ n\epsilon N \end{gathered} \tag{1}$$

In self-motivated and dynamic relationships between people, the multi-layer family model has an exception: the level of friendship or unfriendship (used as an antonym for friendship) could alter the layers. As an example, if person A is a close friend of his/her cousin, the cousin, instead of layer 3, can be considered in layer 2 or even layer 1 based on the level of friendship. Vice versa, unfriendship from possible exist of conflict or other causes, such as communication barriers, can influence the layer levels. For instance, if there are relationship issues or conflicts between person A and his/her cousin, on account of the level of unfriendship, the cousin can be considered at level 4 or even higher.

As shown in Figure 4, this model is valid not only for relatives of a person (person-to-person relationships) but also for relatives of a nuclear family (family-to-person relationships), seeing a nuclear family as a married man and woman with their children [21]. For this, in the case of nuclear family A, layer 1 will be defined as all first-layer fellows of all members of nuclear family A. Sequentially, layer n for family A will be layer 1 for each and every member of layer n − 1 of the nuclear family A.

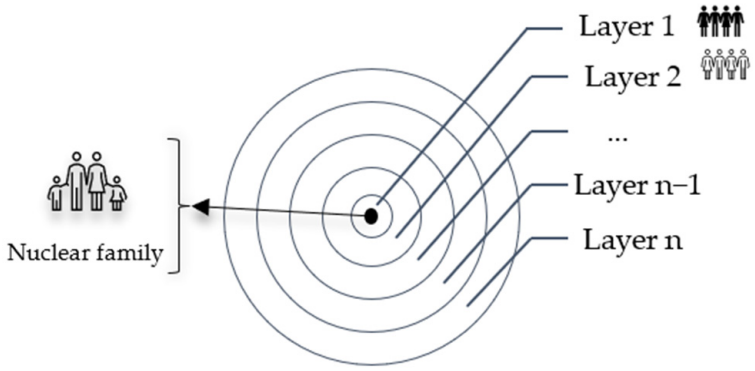

Figure 4. Multi-layer family model for a nuclear family.

In addition, the proposed multi-layer family model works for a more forward-thinking situation for layering nuclear families in family-to-family relationships. In a way, if any member of a nuclear family, labeled nuclear family B, is in layer n of nuclear family A, then the whole nuclear family B is called layer n.

Still, the friendship (or unfriendship) expectation is applicable for the formulation of the family-to-person and/or family-to-family relationship layers. However, after considering the expectations for layering relationships, when a relative (person) or a nuclear family is placed in a layer, it cannot be shifted to any well-ahead layers. For one, in family-to-family relationship circumstances, when nuclear family B is placed in layer n due to the relationship of one of its members with family A, it cannot be placed in any layer m (where $n\&m\epsilon N$ and m > n) considering the relationships of other members of family B with family A. The following instance, to simplify the person-to-person concern, is that if person A married his/her cousin, the cousin is in layer 1 due to the marriage relationship (spouse), and layer 3 for the cousin relationship is not effective anymore.

As a layer membership moderator, not only friendship but also other variables may be involved. The moderator can alter the layer if they are impactful enough, but even when examining a single layer, the family connectivity and closeness do not always have the same

quality. Given the distance from the center in Figure 5, membership in a layer is distributed all across the layer range, resulting in a grey layer (GL). Situations in which membership in layer n is fully confirmed are labeled "white", whereas those in which membership in layer n − 1 or n + 1 is fully confirmed are labeled "black". Addressing the membership function in real-world and complex relationships is complicated and uncertain. In fact, circumstances that fall between these two extremes can be referred to as "grey", as shown in Figure 3. Deng 1982 introduced the grey system theory, which is a mathematical theory based on the concept of grey sets [22]. It is capable of resolving uncertainty concerns with discrete data and a lack of certainty.

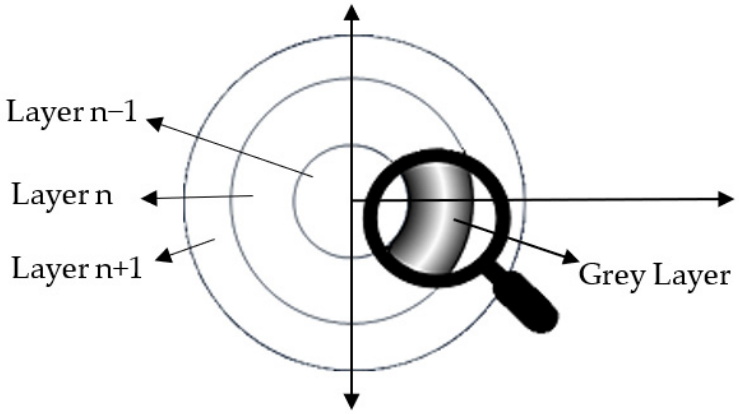

Figure 5. Grey layer.

In grey theory, the membership function is defined as Equation (2) and needs to be included in the family membership (FM) sequence.

$$Layer_{(n)_A} \epsilon \left(Layer_{(n-1)_A}, \ Layer_{(n+1)_A} \right) \tag{2}$$

Equation (3) will result from incorporating the grey-layer concept into the multi-layer family. With a 3D perspective, Figure 6 presents the multi-layer family model in a clone, combining concepts explained in Figures 3–5.

$$\begin{gathered} \{GL_{n_A}\} = \{GL_{1_B}\} \\ \text{Subject to:} \\ \{Layer_1\} = \{\text{children, spouse, parents, and siblings}\} \\ GL_{(n)_A} \epsilon \left(\left\{ Layer_{(n-1)_A} \right\}, \left\{ Layer_{(n+1)_A} \right\} \right) \ \text{if} \ \{Layer_{n_A}\} = \{Layer_{1_B}\} \\ B \epsilon \left\{ GL_{(n-1)_A} \right\} \ \& \ n \epsilon N \end{gathered} \tag{3}$$

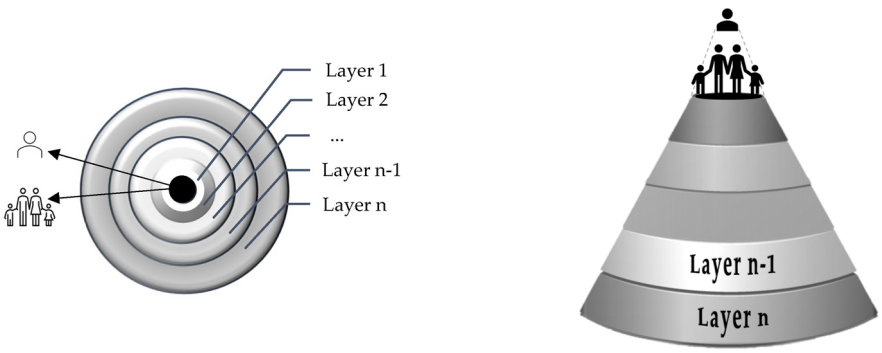

Figure 6. A 3D presentation of the model.

Besides, in Equation (4), the proposed model includes the following optimization decisions: This, with the help of the FM function, can be useful in optimizing the inclusion of layers in family relationships. The FM function displays the inclusion of members from each layer (beginning with layer 1), and the optimized number of layers (n) is of concern. Parameter n could be explained in the case of a family or an individual wanting to enroll as many family members as possible into an affiliation when some consolidations should be included; therefore, this n refers to the maximum possibility of including members of layer 1 plus all further levels until layer n. Of course, including members in the FM boundary line has both motivations (such as relationship/network benefits, organizing family events, etc.) and demotivations (such as costs, time constraints, etc.).

$$\begin{gathered} Maximize\ FM = \sum_n \{GL_{n_A}\} \\ \text{Subject to:} \\ \text{Motivation and Demotivation functions} \\ n > 0 \end{gathered} \tag{4}$$

In light of the grey layers concept, friendship alone is insufficient to determine layer members in the dynamic social environment. As a result, a set of supplementary criteria for the layer's member nomination is required for each individual. Users of the proposed model, in real life, must also operationalize relations in order to quantify this multiple-criteria decision to analyze the criteria influence on family relationship management. A report by Schluter [23] has already recognized some criteria that, when differentiated, convey a better understanding of the relationships themselves. It explained five criteria for assessing relationships (though the approach was more in a people-organization context). These additional five criteria are adapted to upgrade multi-layer family decisions.

- Directness: This refers to the degree to which a connection is mediated by motives, demotivates, or other members. When people are in the same location and interact face-to-face, they have the most direct interaction. Relationships are mediated by individuals, such as when members from different levels have unfriendship conflict (or friendship).
- Continuity: This relates to a relationship's duration span. Relationships need some degree of regularity. Continuity is not simply the rhythm of activities and the passage of time but also an emotional connection between people. People create tales about their relationships, and meaningful relationships must be conveyed discursively.
- Multiplexity: This describes the scope of the relationship. If the contacts that form the basis of the relationship occur solely in a certain social context, the connection has limited multiplexity. If the two people or families have the opportunity to connect in different circumstances (such as family businesses), their relationship will be affected.
- Parity: This refers to the power balance. In socialization contexts, power interactions are often asymmetric. Societies are hierarchical, and people have uneven resources. So, individuals tolerate inherent power imbalances provided they sense fairness in the relationships. In this view, procedural fairness or expectations are important for the relationship.
- Commonality: This refers to the role of past, current, or future expectations of the family members. The degree of commonality increases as the interests of the family members become more aligned. However, this can be decreased if exceptions or goals in past family relationships were not satisfied and/or current exceptions do not match.

Thus, the users of the multi-layer family model could explore the scores of the criteria of relationships and deal with multiple-criteria decision-making in family relationship planning. This decision-making is framed in Figure 7. This figure provides a broad hierarchical structure for MCDM methods by outlining a decision goal, decision criteria, and selection alternatives [12,24–26]. The MCDM goal is to break down complex decision-making into achievable steps and then combine the results, mostly when alternatives are considered,

in order to pick the best one that accomplishes the goal in concern while also taking into account a number of criteria [27]. This is a subfield of operational research [26,28].

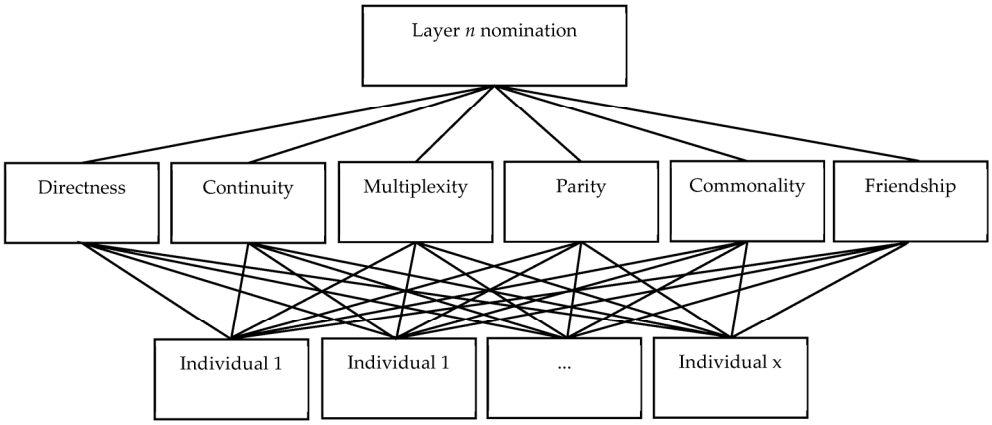

Figure 7. Multiple-criteria family relationship.

The fields of decision science and operational research would be greatly hampered without MCDM, as it is an approach to decision-making that makes it possible to take into account competing or conflicting criteria [27]; moreover, MCDM may be seen as a reliable methodical procedure for evaluating and selecting among available options [27]. To decide under uncertainty and/or with fuzzy information, MCDMs are equipped with Fuzzy/Gray logit; they are also hybridized to include decision complexities [29].

Feasibility Test

A numerical test is one method to simulate and comment on the feasibility of a model [30]. So, here, a case study is used to test the proposed model to see if it is feasible. A birthday party, to a case family, is a small gathering of family members that happens once a year. This two-child family is getting ready for the second birthday of one of their children. Even though they had a big event the first year, they cannot keep as many people coming because they do not have enough money. Now, they think that the cost of food, entertainment, and other things for each person will be about $10. Because they only have $2000 to spend, the event is planned to be based on family-to-person relationships and to try to obtain as many people as possible to attend.

The mother's parents, the father's father, and one uncle (the father's brother) make up the first layer of this nuclear family of four (parents and children). The father's father passed away. In addition, because of some issues, the uncle has been moderately shifted from layer 1 (grey layer concepts), so the family needs to decide on his nomination under layer 1 or layer 2.

The first decision in the uncle's nomination is to become a member of a layer (1 or 2). The MCDM approach can now systematically develop family layers using the framework shown in Figure 7. Yet, there is a wide variety of MCDM methods, and these MCDMs are characterized by a wide variety of features [29]. Many reasons could affect the selection of an MCDM method for utilization [27]. Nevertheless, some researchers are in agreement that decision-makers favor their preferred MCDM approach or employ it because of its simplicity [30,31].

However, the Weighted Sum Method (WSM), for the sake of simplicity and popularity [31–33], is preferred for this case study. WSM has five steps [33]:

1. Depending on the priority, a percentage weight can be assigned to each criterion. In this case study, the researcher assumed they were equals.
2. Assign a value (V) to each of the six criteria. In this step, alternatives are presented by the decision matrix Vij, where Vij expresses how well alternative member x could meet each criterion.

3. Multiply each criterion's weight by the numeric value assigned to each alternative, then add the results.
4. Add the corresponding values for each alternative to obtain the factor rating.
5. By comparing the factor rating, the most preferred to least preferred alternative can be listed.

Table 1 presents the alternative members for layer 1 of the nuclear family and the value given to each by the family. Table 1, moreover, shows alternative nuclear family members for layer 2 and the family's value for each. In order to run the numerical case, the nomination values in this tabular format that construct the matrix V are hypothetical examples. The values are determined on a range of 0–100, with each value representing how well the alternatives fit each criterion from the perspective of the case family/decision-maker.

Table 1. Nomination values.

Criteria:	Directness	Continuity	Multiplexity	Parity	Commonality	Friendship
Layer 1 Alternatives						
Father's father (FF)	100	100	100	100	100	100
Mother's Father	95	100	100	100	100	100
Mother's Mother (MM)	100	100	100	100	100	99
Uncle	98	98	100	99	100	95
Layer 2 Alternatives						
FF's brother I	98	98	100	99	100	95
FF's brother II	97	98	100	99	99	96
MM's Sister	98	98	100	100	100	95
Uncle	98	98	100	99	100	95

The result of WSM calculations from Steps 3–5 is shown in Table 2, indicating that the uncle with some weighted sum value difference is significantly positioned as the last prioritized member for being in layer 1 but in a better position for layer 2 membership. Hence the family decides to nominate him for layer 2 membership.

Table 2. Weighted sums.

Criteria	Directness	Continuity	Multiplexity	Parity	Commonality	Friendship		
Layer 1 Alternatives							Weighted Sum	Rank
Father's father (FF)	2500	2500	2500	2500	2500	2500	15,000	1
Mother's Father	2375	2500	2500	2500	2500	2500	14,875	3
Mother's Mother (MM)	2500	2500	2500	2500	2500	2475	14,975	2
Uncle	2450	2450	2500	2475	2500	2375	14,750	4
Layer 2 Alternatives							Weighted Sum	Rank
FF's brother I	2450	2450	2500	2475	2500	2375	14,750	2
FF's brother II	2425	2450	2500	2475	2475	2400	14,725	3
MM's Sister	2450	2450	2500	2500	2500	2375	14,775	1
Uncle	2450	2450	2500	2475	2500	2375	14,750	2

From the output of WSM and based on the proposed model via Equation (1) and Figure 6, Table 3 shows the rest of the family layers (the table is not full).

Based on Equation (4), this case can also be shown mathematically, as in Equation (5).

$$\begin{gathered} Maximize\ FM = \sum_n \{GL_n\} \\ \text{Subject to:} \\ 100 \times (\sum \{Layer_n\} \leq 2000 \\ n > 0 \end{gathered} \tag{5}$$

As a result, since the decision is for a discrete mathematics problem, the best optimal situation is when n = 3. So, the family invites people from levels 1 (with 3 members), level 2 (with 4 members), and level 3 (with 8 members). Including the four-person case family, there will be 19 people at the party, and it will only cost \$1900 (19 × \$100).

Table 3. Case family members.

Family Layer	Layer Members								Number of Members $\sum\{Layer_n\}$
1	Mother's Mother (MM)	Mother's Father (MF)	Father's father (FF)						3
2	Uncle	MM's Sister (MMS)	FF's brother I (FFBI)	FF's brother II (FFBII)					4
3	Uncle's wife (UW)	Uncle's child	MMS's child (MMC)	FFBI's Child I (FFBCI)	FFBI's Child II (FFBCII)	FFBI's Child III (FFBCIII)	FFBII's wife	FFBII's Child	8
4	MMS's grand child	MMC's wife	UW's father	UW's father	UW's sister I	UW's sister II	.....		14
5	.....								28
6	.....								70
	.....								.....

Moreover, if this family focuses on family-family relationships and decisions, a similar numerical case can also be thought of. Table 4 provides family-family view input, assuming that some of the members live in their own nuclear family. In this situation, the case family has four members, plus layer 1 has three members and layer 2 has eleven members, for a total of 18 participants. Based on the model presented in this study, n = 2. So, when it comes to family-family relationships, the case family can only invite people up to layer 2, layer 1 with 3 members, and layer 2 with 11 members. The party will have 18 people, including the four-person case family, and it will cost \$1800 (18 \$100), which is the best figure for their budget.

Table 4. Case with family-family view.

Family Layer	Layer Members						Number of Members $\sum\{Layer_n\}$
1	Mother's parents	Father's father (FF)					3
2	Uncle's family	MMS	FFBI's family	FFBI's family			3 + 1 + 4 + 3
3	MMC's family	FFBCI's family	FFBCII's family	FFBCIII's family	UW'family	.....	8 + 3 + 3 + ...

4. Conclusions

This study proposed a mathematical answer to the questions related to the boundaries of family relationships. The usefulness of the proposed mathematical multi-layer family model is in the filtering of families and family members by classification. Based on the number of members in each layer and the total members from layer 1 to layer n, n could be decided/optimized by including available resources (motivations) and existing limitations (demotivates). As well, the class and mood of relationships will be clear-cut with reference to the proposed model. As a result, the model is dynamic; as Thomas, Liu, and Umberson [2] define, that with the potential of demotion or promotion in friendship (and perhaps other decision criteria for the layer's member nomination), family relationships modify over the life course.

This paper introduces a new method to classify family members, one that emphasizes the level of affiliation of each and every member. It provides a systematic method of classifying the layers and nominating a layer to each and every member. This article's main contribution is not only to practice by providing a decision-making tool but also to knowledge by improving existing perceptions of the unsolved complexity of family relationships. The outcome of the paper is expected to benefit not only families and event planners but also social science scholars and policymakers. To conclude, this model can be applied to different purposes, from invitations to family events and ceremonies to family law (such as decisions on the distribution of inherited) and even to future research in the social sciences. The proposed model works well for family-oriented relationships; however, future studies are invited to advance it by allowing socialization outside the family layers. Even for family-oriented relationships, other researchers need to include more decision criteria to strengthen this model's layer nomination decision-making framework.

Funding: This research received no external funding.

Data Availability Statement: Not applicable.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Booth, A.S.; Cameron, F.M. Family event participation: Building flourishing communities. *Int. J. Event Festiv. Manag.* **2020**, *11*, 223–238. [CrossRef]
2. Thomas, P.A.; Liu, H.; Umberson, D. Family relationships and well-being. *Innov. Aging* **2017**, *1*, igx025. [CrossRef] [PubMed]
3. Umberson, D.; Pudrovska, T.; Reczek, C. Parenthood, childlessness, and well-being: A life course perspective. *J. Marriage Fam.* **2010**, *72*, 612–629. [CrossRef] [PubMed]
4. Schulz, R.; Eden, J. *Families Caring for an Aging America*; National Academies Press: Washington, DC, USA, 2016.
5. Jæger, M.M. The extended family and children's educational success. *Am. Sociol. Rev.* **2012**, *77*, 903–922. [CrossRef]
6. Cramton, C.D. Is rugged individualism the whole story? Public and private accounts of a firm's founding. *Fam. Bus. Rev.* **1993**, *6*, 233–261. [CrossRef]
7. Seet, P.-S.; Tan, A.T.L.; Tan, W.-L. Family events and new venture survival: Effects of positive and negative affect on entrepreneurs. In *Academy of Management Proceedings*; Academy of Management: Briarcliff Manor, NY, USA, 2021; p. 12747.
8. Stadler, R.; Jepson, A. Understanding Feelings, Barriers, and Conflicts in Festivals and Events; the Impact upon Family QOL. In *The Routledge Handbook of Festivals*; Routledge: London, UK, 2018.
9. Innes, A.; Page, S.J.; Cutler, C. Barriers to leisure participation for people with dementia and their carers: An exploratory analysis of carer and people with dementia's experiences. *Dementia* **2016**, *15*, 1643–1665. [CrossRef]
10. Stadler, R.; Jepson, A. Understanding the value of events for families, and the impact upon their quality of life. In *The Value of Events*; Routledge: London, UK, 2017; pp. 159–177.
11. Foster, K.; Robinson, P. A critical analysis of the motivational factors that influence event attendance in family groups. *Event Manag.* **2010**, *14*, 107–125. [CrossRef]
12. Sorooshian, S. Implementation of an Expanded Decision-Making Technique to Comment on Sweden Readiness for Digital Tourism. *Systems* **2021**, *9*, 50. [CrossRef]
13. Cook, W.L. The comparative study of interpersonal relationships. *Fam. Sci.* **2010**, *1*, 37–47. [CrossRef]
14. Krstulović, R.; Dabić, P. A conceptual model of the cement hydration process. *Cem. Concr. Res.* **2000**, *30*, 693–698. [CrossRef]
15. Xin, Y.P. Conceptual model-based problem solving. In *Posing and Solving Mathematical Problems*; Springer: Berlin/Heidelberg, Germany, 2016; pp. 231–254.
16. Ross, K.A.; Wright, C.R. *Discrete Mathematics*; Prentice-Hall, Inc.: Hoboken, NJ, USA, 1985.

17. Weigand, H.-G. Sequences—Basic elements for discrete mathematics. *ZDM* **2004**, *36*, 91–97. [CrossRef]
18. Prade, H.M. Operations research with fuzzy data. In *Fuzzy Sets*; Springer: Berlin/Heidelberg, Germany, 1980; pp. 155–170.
19. Korshunov, A.D. *Discrete Analysis and Operations Research*; Springer Science & Business Media: Berlin/Heidelberg, Germany, 2013; Volume 355.
20. Meignan, D.; Knust, S.; Frayret, J.-M.; Pesant, G.; Gaud, N. A review and taxonomy of interactive optimization methods in operations research. *ACM Trans. Interact. Intell. Syst.* **2015**, *5*, 1–43. [CrossRef]
21. Williams, S.A.S. Nuclear Family. In *Encyclopedia of Child Behavior and Development. Boston*; Goldstein, S., Naglieri, J.A., Eds.; Springer: Boston, MA, USA, 2011. [CrossRef]
22. Zhou, W.; Ding, S. A novel discrete grey seasonal model and its applications. *Commun. Nonlinear Sci. Numer. Simul.* **2021**, *93*, 105493. [CrossRef]
23. Schluter, M. How to See and Use Relations; Stanrzeczy [Stateofaffairs]. 2017, pp. 443–447. Available online: https://web.archive.org/web/20210122132216id_/ (accessed on 27 December 2022).
24. Basaraner, M. A zone-based iterative building displacement method through the collective use of Voronoi Tessellation, spatial analysis and multicriteria decision making. *Bol. Ciências Geodésicas* **2011**, *17*, 161–187. [CrossRef]
25. Nam, B.; Golestani, B.; Noori, M.; Tatari, O.; An, J. *Investigation of Reflective Cracking Mitigation Techniques*; Florida. Dept. of Transportation: Tallahassee, FL, USA, 2014.
26. Sorooshian, S. Upgrading current multi-attribute decision-making with a 3-dimensional decision matrix for future-based decisions. *MethodsX* **2021**, *8*, 101403. [CrossRef]
27. Haddad, M.; Sanders, D. Selection of discrete multiple criteria decision making methods in the presence of risk and uncertainty. *Oper. Res. Perspect.* **2018**, *5*, 357–370. [CrossRef]
28. Gorski, E.G.; Loures, E.d.F.R.; Santos, E.A.P.; Kondo, R.E.; Martins, G.R.D.N. Towards a smart workflow in CMMS/EAM systems: An approach based on ML and MCDM. *J. Ind. Inf. Integr.* **2022**, *26*, 100278. [CrossRef]
29. Aikhuele, D.O.; Sorooshian, S.; Ansah, R.H.; Turan, F.M. Application of intuitionistic fuzzy TOPSIS model for troubleshooting an offshore patrol boat engine. *Pol. Marit. Res.* **2017**, *24*, 68–76. [CrossRef]
30. Spalart, P.R. Strategies for turbulence modelling and simulations. *Int. J. Heat Fluid Flow* **2000**, *21*, 252–263. [CrossRef]
31. Sorooshian, S. Group decision making with unbalanced-expertise. *J. Phys. Conf. Ser.* **2018**, *1028*, 012003. [CrossRef]
32. Sorooshian, S.; Azizan, N.A.; Ale Ebrahim, N. Weighted Aggregated Sum Product Assessment. *Math. Model. Eng. Probl.* **2022**, *9*, 873–878. [CrossRef]
33. Sorooshian, S.; Parsia, Y. Modified weighted sum method for decisions with altered sources of information. *Math. Stat.* **2019**, *7*, 57–60. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.