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IMPACT OF EXCESSIVE TELEVISION VIEWING BY CHILDREN – AN ANALYSIS USING INTUITIONISTIC FUZZY SOFT MATRICES

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Abstract – Television being an effective medium of entertainment and communication attracts people of all ages. Television viewing has become the more important affair than any other in the daily routine. The influence of television on children causes great concern to the parents as excessive viewing by children results in physical, mental, behavioral, social and academic setbacks to younger generation. The concept of Intuitionistic fuzzy soft matrices is applied to identify the group of children (based on age) worst affected.

Keywords – Soft set, Fuzzy soft set, Intuitionistic Fuzzy soft Set, Intuitionistic fuzzy soft matrix.

Introduction

Television, an effective medium of mass communication, plays a predominant role in the daily routine of the public. It is the first one to switch -on and the last one to switch - off in many houses. Though the taste differs based on the age of the viewer, all in the family are in the habit of viewing the programs of their taste. Monthly tariff, payable to the service provider for viewing TV programs, gains prime significance in the monthly budgets, irrespective of the level of income of the family. This indoor medium has multidimensional values. In addition to entertainment, matters relating to science and technology, social and cultural aspects, sports and games, economics and business, wild life and adventure and many more are telecasted. Viewing of such programs undoubtedly enrich wisdom of the people, especially the children. They are privileged to view and learn everything around the world. Many programs motivate and develop creativity among such younger generation.

It is quite natural that every coin has two sides. Though better exposure is the prime advantage, long time viewing is common in case of children. Such long time viewing of television programs by children not only causes health hazards to the children but also affects their overall performance in their academic activities. Many researchers observed that viewing programs that shows terror, horror, super power heroism, barbaric fights and so on has short term negative impact on their behavior. The researchers insisted that the parents should effectively supervise their children viewing television in terms of time of viewing and the programs to be viewed. Many research studies in India and abroad bring to light the prevalence of excessive viewing of television by children and its ill – effects on children. So the authors intended to identify the various problems encountered by the children, based on the opinion of the parents

regarding the ill - effects of excessive viewing of television and analyze the same using intuitionistic fuzzy soft matrices.

Basic Definitions

Definition 1[2] : Let U be a nonempty finite set of objects called universe and let E be a nonempty set of parameters. An ordered pair (F,E) is said to be a **soft set** over U, if F is a mapping from E to the set of all subsets of U.

Definition 2[4] : Let U be a universe. A fuzzy set X over U is a set defined by a function μ_x representing a mapping μ_x:U→[0,1]. Here, μ_x called membership function of X, and the value $\mu_x(u)$ is called the grade of membership of u ∈ U. The value represents the degree of u belonging to the fuzzy set X. Thus, a **fuzzy set** X over U can be represented as follows,

$$X = \{(u/(\mu_x(u)):u \in U,\ \mu_x(u) \in [0,1]\}$$

Definition 3[1] : Let U be a universal set, E a set of parameters and A ⊂ E. Then a pair (F,A) is called **fuzzy soft set** over U, where F is a mapping from A to the set of all fuzzy subsets of U.

Definition 4[3] : An **intuitionistic fuzzy set** A in a non empty set U (a universe of discourse) is an object having the form $A = \{x, \mu_A(x), \nu_A(x)) : U \rightarrow [0,1]\}$, where the functions $\mu_A(x) : U \rightarrow [0,1]$, $\nu_A(x) : U \rightarrow [0,1]$, denotes the degree of membership and degree of non-membership of each element x ∈ U to the set A, respectively, and $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ for all x ∈ U.

Given an universal set U and a set of parameters E, for A ⊆ E, the pair (F, A) is called an **intuitionistic fuzzy soft set** over U if F is a mapping from A to the set of all Intuitionistic Fuzzy subsets of U.

Definition 5[5] : Let $U = \{c_1, c_2, c_3 \ldots c_m\}$ be the universal set and $E = \{e_1, e_2, e_3 \ldots e_n\}$ be the set of parameters. Let A ⊆ E and (F, A) be a intuitionistic fuzzy soft set in the fuzzy soft class (U, E). Then intuitionistic fuzzy soft set (F,A) can be represented in matrix form as $S_{mxn} = [a_{ij}]_{mxn}$ or $S = [a_{ij}]$ i =1, 2, 3,…,m, j=1, 2, 3,….,n where

$$a_{ij} = \begin{cases} (\mu_j(c_i), \nu_j(c_i)) & \text{if } e_j \in A \\ (0,1) & \text{if } e_j \notin A \end{cases}$$

Here $\mu_j(c_i)$ represents the membership of c_i in the intuitionistic fuzzy set $F(e_j)$ and $\nu_j(c_i)$ represents the non-membership of c_i in the intuitionistic fuzzy set $F(e_j)$. The matrix $S_{m\times n}$ is called **intuitionistic fuzzy soft matrix**. This matrix S can also be written as $S = (\mu_A, \nu_A)$ or $S = [(\mu_{ij}, \nu_{ij})]$.

Definition 6[5] : Let $A = [a_{ij}]_{mxn}$ be an intuitionistic fuzzy soft matrix, where $a_{ij} = (\mu_j(c_i), \nu_j(c_i))$. Then we define the **value matrix** of intuitionistic fuzzy soft matrix A is $V(A) = [a_{ij}] = [\mu_{ij} - \nu_{ij}]$ i = 1,2,…,m, j = 1,2,…,n.

Definition 7[5] : If $A = [a_{ij}]_{mxn}$, $B = [b_{ij}]_{mxn}$ be two intuitionistic fuzzy soft matrices, then we define **score matrix** of A and B as $S_{(A,B)} = [d_{ij}]_{mxn}$ where $[d_{ij}] = V(A) - V(B)$.

Definition 8[5] : Let $A = [a_{ij}]_{mxn}$, $B = [b_{ij}]_{mxn}$ be two intuitionistic fuzzy soft matrices. Let the corresponding value matrices be V(A), V(B) and their score matrix is $S_{(A,B)} = [d_{ij}]_{mxn}$ then we define **total score** for each c_i in U is $S_i = \sum_{j=1}^{n} d_{ij}$.

Algorithm for decision making method by using Intuitionistic Fuzzy soft matrices

Step 1 : Input the intuitionistic fuzzy soft set (F,C) and obtain the intuitionistic fuzzy soft matrix A corresponding to (F,C) respectively .

Step 2 : Write the intuitionistic fuzzy soft complement matrix A^c .

Step 3 : Compute V(A), $V(A^c)$ and $S_{((A),(A^c))}$.

Step 4 : Compute the total score S_i for each u_i in U.

Step 5 : Find u_i for which max (S_i).

Incase max S_i occurs for more than one value, then repeat the process by reassessing the parameters.

Application of Intuitionistic fuzzy soft matrices

To ascertain the ill-effects of television viewing by the children, an interview schedule was administered to the parents and response was elicited regarding the behavioral changes of their children. Based on the pilot study the authors grouped the problems into 5 categories as follows:

1. Physical – Obesity , Eye problems and Food intake
2. Mental – Lack of Concentration , Depression and Feeling fear
3. Behavioral – Aggressive Behavior, Experiencing harmful practices and Avoiding outdoor games
4. Social – Not mingling with friends and relatives, Avoiding functions and festivals, Preferring to be lonely at home
5. Academic – Poor performance in tests and exams , Late to school and Frequent failure in completing home works .

The respondents were grouped into 5 categories based on the age of their children which forms the alternative set or universal set $U = \{ u_1, u_2, u_3, u_4, u_5\}$ and the categories of problems were used to form the criteria set $C = \{ c_1, c_2, c_3, c_4, c_5\}$.

Group of Respondents (Universal set U)

(Based on age of children)

u_1 – 6 to 8 years
u_2 – 9 to 10 years
u_3 – 11 to 12 years
u_4 – 13 to 14 years
u_5 – 15 to 16 years

Criteria Set C

c_1 - Physical
c_2 - Mental
c_3 - Behavioural
c_4 - Social
c_5 - Academic

In order to collect data an interview schedule was developed, pre-tested and administered to the respondents. A sample of 200 respondents (40 in each group) was selected adopting convenient sampling technique. Care was taken to include the parents of children of age group ranging between 6 years and 16 years and pursuing education in government, government aided and private schools in Coimbatore. Five point scaling technique (Strongly Agree, Agree, Neither agree nor disagree, Disagree and Strongly disagree) was used and they were asked to respond based on the prevalence and intensity of each of the 5 categories of problems of their children.

The membership function and non – membership function was ascertained based on the response. The number of respondents who marked either "Strongly agree" or "Agree" was counted and its proportion to the total respondents of a particular group was used for framing membership function. In the same manner, the response under " Disagree" or "Strongly disagree" was used for framing non-membership function.

Therefore the corresponding intuitionistic fuzzy soft set is

$(F,C) = \{F(c_1) = \{(u_1,0.5,0.4)\ (u_2,0.7,0.2)\ (u_3,0.8,0.1)\ (u_4,0.7,0.3)\ (u_5,0.6,0.3)\}$
$F(c_2) = \{(u_1,0.5,0.4)\ (u_2,0.6,0.4)\ (u_3,0.9,0.1)\ (u_4,0.8,0.2)\ (u_5,0.7,0.3)\}$
$F(c_3) = \{(u_1,0.6,0.4)\ (u_2,0.7,0.3)\ (u_3,0.9,0.1)\ (u_4,0.8,0.2)\ (u_5,0.8,0.2)\}$
$F(c_4) = \{(u_1,0.7,0.3)\ (u_2,0.8,0.2)\ (u_3,0.6,0.4)\ (u_4,0.5,0.4)\ (u_5,0.6,0.4)\}$
$F(c_5) = \{(u_1,0.8,0.2)\ (u_2,0.9,0.1)\ (u_3,0.7,0.3)\ (u_4,0.6,0.4)\ (u_5,0.6,0.3)\}\}$

Therefore the intuitionistic fuzzy soft matrix is

$$A = \begin{array}{c} \\ u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \end{array} \begin{array}{c} \begin{array}{ccccc} c_1 & c_2 & c_3 & c_4 & c_5 \end{array} \\ \begin{bmatrix} (0.5,0.4) & (0.5,0.4) & (0.8,0.2) & (0.7,0.3) & (0.6,0.4) \\ (0.7,0.2) & (0.6,0.4) & (0.9,0.1) & (0.8,0.2) & (0.7,0.3) \\ (0.6,0.3) & (0.7,0.3) & (0.6,0.3) & (0.6,0.4) & (0.8,0.2) \\ (0.7,0.3) & (0.8,0.2) & (0.6,0.4) & (0.5,0.4) & (0.8,0.2) \\ (0.8,0.1) & (0.9,0.1) & (0.7,0.3) & (0.6,0.4) & (0.9,0.1) \end{bmatrix} \end{array}$$

Then the intuitionistic fuzzy soft complement matrix is

$$A^c = \begin{array}{c} \\ u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \end{array} \begin{array}{c} \begin{array}{ccccc} c_1 & c_2 & c_3 & c_4 & c_5 \end{array} \\ \begin{bmatrix} (0.4,0.5) & (0.4,0.5) & (0.2,0.8) & (0.3,0.7) & (0.4,0.6) \\ (0.2,0.7) & (0.4,0.6) & (0.1,0.9) & (0.2,0.8) & (0.3,0.7) \\ (0.3,0.6) & (0.3,0.7) & (0.3,0.6) & (0.4,0.6) & (0.2,0.8) \\ (0.3,0.7) & (0.2,0.8) & (0.4,0.6) & (0.4,0.5) & (0.2,0.8) \\ (0.1,0.8) & (0.1,0.9) & (0.3,0.7) & (0.4,0.6) & (0.1,0.9) \end{bmatrix} \end{array}$$

c_1 c_2 c_3 c_4 c_5

$$V(A) = \begin{matrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \end{matrix} \begin{bmatrix} 0.1 & 0.2 & 0.6 & 0.4 & 0.2 \\ 0.5 & 0.2 & 0.8 & 0.6 & 0.4 \\ 0.3 & 0.4 & 0.3 & 0.2 & 0.6 \\ 0.4 & 0.6 & 0.2 & 0.1 & 0.6 \\ 0.7 & 0.8 & 0.4 & 0.2 & 0.8 \end{bmatrix}$$

$$V(A^c) = \begin{matrix} & c_1 & c_2 & c_3 & c_4 & c_5 \\ u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \end{matrix} \begin{bmatrix} -0.1 & -0.2 & -0.6 & -0.4 & -0.2 \\ -0.5 & -0.2 & -0.8 & -0.6 & -0.4 \\ -0.3 & -0.4 & -0.3 & -0.2 & -0.6 \\ -0.4 & -0.6 & -0.2 & -0.1 & -0.6 \\ -0.7 & -0.8 & 0.4 & -0.2 & -0.8 \end{bmatrix}$$

$$S_{((A),(A^c))} = \begin{matrix} & c_1 & c_2 & c_3 & c_4 & c_5 \\ u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \end{matrix} \begin{bmatrix} 0.1 & 0.2 & 0.6 & 0.4 & 0.2 \\ 0.5 & 0.2 & 0.8 & 0.6 & 0.4 \\ 0.3 & 0.4 & 0.3 & 0.2 & 0.6 \\ 0.4 & 0.6 & 0.2 & 0.1 & 0.6 \\ 0.7 & 0.8 & 0.4 & 0.2 & 0.8 \end{bmatrix} \quad \text{Total Score} = \begin{matrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \end{matrix} \begin{bmatrix} 2.8 \\ 4.0 \\ 3.6 \\ 3.8 \\ 5.8 \end{bmatrix}$$

It is seen that the last group u_5 has the maximum score and it is concluded that the children in the age group of 15 to 16 years are worst affected.

Conclusion

Excessive television viewing by children causes many problems to them. As total deprivation of children viewing television is also not advisable, parents need to supervise their children in terms of timing and channels. Such efforts will facilitate the children to watch and enjoy programs of their interest without possible ill effects. Application of intuitionistic fuzzy soft matrices to develop mathematical models, which helps to identify the most vulnerable group, is much helpful to parents and it is possible for them to take extra care while dealing with the children of that particular age group.

References

[1] Chetia, B. and Das, P.K., An Application of Interval-Valued Fuzzy Soft Set in Medical Diagnosis, Int.J.Math.Sciences 5(38)(2010).

[2] English Kuppusamy Ramamoorthy Nagarajan and Ganesamoorthy Meenambigai, An Application of Soft Sets to Lattices, Kragujevac journal of Mathematics 35(1)(2011), 75-87.

[3] Maji, P.K., Biswas, R. and Roy, A.R., Intuitionistic Fuzzy Soft Sets, The Journal of Fuzzy Mathematics 9(3)(2001), 677-692.

[4] Naim Cagman, Filiz Citak and Serdar Enginoglu, Fuzzy Parameterized Fuzzy Soft Set theory and its applications, Turkish Journal of Fuzzy Systems 1(1)(2010), 21-35.

[5] Rajarajeswari, P. and Dhanalakshmi, P., Intuitionistic Fuzzy Soft Matrix Theory And Its Application In Decision Making, International Journal of Engineering Research & Technology 2(4)(2013), 1100-1111.