Application of Childhood Obesity in Nano Penta Topological Spaces

Rana B. Yaseen[1], Mizal H. Alobaidi[2], Ali A. Shihabc[3]

[1,2]*Professor, Department of Mathematics, College of Computer Science and Mathematics, Tikrit University, Tikrit, Iraq.*

[3]*Professor, Department of Mathematics, College of Education for Pure Sciences, Tikrit University, Tikrit, Iraq.*

Abstract - *The difference and methods for calculating Nano Penta degree of decision traits in the practical application of childhood obesity have been studied in Nano Penta and Multi Granular Nano Penta topologies. It was found that the use of Multi Granular Nano Penta topology becomes better than the Nano Penta topology.*

***Key Words*: Nano Penta topology, Multi Granular Nano Penta topology , Childhood Obesity**

1. INTRODUCTION AND PRELIMINARIES

Obesity is an increase in the percentage of fat and it is accumulation under the skin and around body tissues that are differ from the normal limits. The diagnosis of obesity is based on the body mass index (BMI). According to the following equation : BMI = body weight in kilograms / square height in meters [7] and the world health organization has defined obesity indicators according to the following classifications [3].

Table-1: Table of information on obesity measures

No.	Obesity indicators	
1	Overweight	25-29,99 kg
2	Low obesity	30- 34,99 kg
3	Medium obesity	35- 39.99 kg
4	Severe obesity	40 ≤

The data used in this study were collected from the research presented by Asmaa et.al[1] in 2021 as the most important factors causing obesity in children from the age of 5 years to14 years old, that revealed the presence of 5 main factors that had a clear influence on overweight and obesity in children. In the past years, Nano topological space known by Thivagar and Richard[4] has been used in civilian life, as in[4]. In 2021 Yaseen [9] studied the properties of Penta open sets in Penta topological introduced by Khan **[6]** in 2018.

Definition 1.1 [5] $(\mathcal{M},\mathfrak{I}_{\mathfrak{R}}(\mathbb{X}))$ Nano topological space & $\mathbb{X}\subseteq\mathcal{M}$.Let $\mathcal{M}/\mathcal{D}=\{\mathcal{D}_1,\mathcal{D}_2,\dots,\mathcal{D}_K\}$be all decision classes induced by decision attribute $\mathcal{D}$ and A is divided into a set C of condition attributes, obtain Nano degree of dependence is defined as

$\gamma[S,\mathcal{D}]=\frac{1}{|\mathcal{M}|}[|\mathcal{L}_s(\mathcal{D}_1)|+|\mathcal{L}_s(\mathcal{D}_2)|]$.

The potential factors of childhood obesity were studied and investigated using the concept of the Nano Penta topology concept which introduced by Yaseen, R.et al.

Definition 1.2[8]

Let $\mathcal{M}$ be a non_ empty universe set, $\mathfrak{I}_{\mathfrak{R}1}(\mathbb{X}),\mathfrak{I}_{\mathfrak{R}2}(\mathbb{X}),\mathfrak{I}_{\mathfrak{R}3}(\mathbb{X}),\mathfrak{I}_{\mathfrak{R}4}(\mathbb{X})$ and $\mathfrak{I}_{\mathfrak{R}5}(\mathbb{X})$ are Nano topologies on $\mathcal{M}$ with respect to $\mathbb{X}$. Then a subset $\mathbb{A}$ is said to be Nano Penta open ($\mathcal{N}_{\mathcal{P}}$-open)set, if $\mathbb{A}\in(\mathfrak{I}_{\mathfrak{R}1}(\mathbb{X})\cup\mathfrak{I}_{\mathfrak{R}2}(\mathbb{X})\cup\mathfrak{I}_{\mathfrak{R}3}(\mathbb{X})\cup\mathfrak{I}_{\mathfrak{R}4}(\mathbb{X})\cup\mathfrak{I}_{\mathfrak{R}5}(\mathbb{X}))$ and complement is $\mathcal{N}_{\mathcal{P}}$_closed set and the set with five topologies called $(\mathcal{M},\mathfrak{I}_{\mathfrak{R}\mathcal{P}}(\mathbb{X}))$Nano Penta topological space($\mathcal{N}_{\mathcal{P}}$-topology),∀ $\mathcal{P}$ = 1,2,3,4,5, so these $\mathcal{N}_{\mathcal{P}}$-open sets satisfy all the axioms of Nano topology $\mathcal{M}$.

Definition 1.3 $(\mathcal{M},\mathfrak{I}_{\mathfrak{R}\mathcal{P}}(\mathbb{X}))$ is Nano Penta topological space and $\mathbb{X}\subseteq\mathcal{M}$.Let $\mathcal{M}/\mathcal{D}=\{\mathcal{D}_1,\mathcal{D}_2,\dots,\mathcal{D}_K\}$be all decision classes induced by decision attribute $\mathcal{D}$ and A is divided into a set C of condition attributes, obtain Nano Penta degree of dependence is $\gamma[\mathcal{P},\mathcal{D}]=\frac{1}{|\mathcal{M}|}[|\mathcal{L}_{\mathcal{P}}(\mathcal{D}_1)|+|\mathcal{L}_{\mathcal{P}}(\mathcal{D}_2)|]$.

Definition 1.4 [8]

Let $\mathcal{M}$ be the universe set, any five equivalence relations on $\mathcal{M}$, where $\mathbb{X}\subseteq\mathcal{M}$ and $\mathfrak{I}_{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X})=$

$\left\{\mathcal{M},\emptyset,\underline{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}},\overline{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X}),B_{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X})\right\}$,

$\underline{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X})=\coprod_{x\in\mathcal{M}}\{[x]:\mathfrak{R}_1(x)\subseteq\mathbb{X}\vee\mathfrak{R}_2(x)\subseteq\mathbb{X}\vee\mathfrak{R}_3(x)\subseteq\mathbb{X}\vee\mathfrak{R}_4(x)\subseteq\mathbb{X}\vee\mathfrak{R}_5(x)\subseteq\mathbb{X}\}$,

$\overline{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X})=\coprod_{x\in\mathcal{M}}\{[x]:\mathfrak{R}_1(x)\cap\mathbb{X}\neq\emptyset\wedge\mathfrak{R}_2(x)\cap\mathbb{X}\neq\emptyset\wedge\mathfrak{R}_3(x)\cap\mathbb{X}\neq\emptyset\wedge\mathfrak{R}_4(x)\cap\mathbb{X}\neq\emptyset\wedge\mathfrak{R}_5(x)\cap\mathbb{X}\neq\emptyset\}$and

$B_{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X})=\overline{\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}}(\mathbb{X})-\sum_{\mathcal{P}=1}^{5}\mathfrak{R}_{\mathcal{P}}(\mathbb{X})$

Thus, $\Im_{\sum_{\mathcal{P}=1}^{5}\Re_{\mathcal{P}}}(\mathbb{X})$ forms a topology on $\mathcal{M}$ called as the Multi- Granular Nano Penta topology on $\mathcal{M}$ with respect to $\mathbb{X}$. $\left(\mathcal{M},\ \Im_{\sum_{\mathcal{P}=1}^{5}\Re_{\mathcal{P}}}(\mathbb{X})\right)$ called the Multi- Granular Nano Penta topological spaces.
In this research , Nano Penta degree is calculated to find Nano Penta and Multi- Granular Nano topological spaces accuracy through the practical application of childhood obesity.

2. PROBLEM

A sample of 10 male children aged 8 years with overweight and obesity which identified from a study the researcher Asmaa et.al in 2021, it was found there are five factors that have direct impact on children's weight gain, namely :
1.The First Factor: (bad health habit)
The variables of the first factor represented by (late bed time, sitting for long hours on any tablet, fast food, consuming artificial juices and soft drinks)
2. The Second Factor: (social factors)
The variables second factor are (Mother's marital status , living with his parents).
3. The Third Factor: (the economic Factor)
The third factor of variables represented by (a child's expenses more than 1000, The way to go to school is by car , The go to school is by walking)
4.The forth Factor : (family history)
The fourth factor is (heredity , child's arrangement in family)
5.The fifth Factor (physical activity)
this factor contains one variable that mainly contributes to its formation, which is (physical activity) and a set $\mathcal{D}$ of decision attribute. Take $\mathcal{F}_1, \mathcal{F}_2, \mathcal{F}_3, \mathcal{F}_4, \mathcal{F}_5$ and $\mathcal{D}$ will stand for (bad health habit ,social factors, the economic factor, family history, physical activity, decision).
The domains are as follows
$V_{\mathcal{F}_1}$ = {late bed time (BT), sitting for long hours on any tablet(ST), fast food(FF), consuming artificial juices and soft drinks (AJ)}.
$V_{\mathcal{F}_2}$ = { Mother's marital status married(MM),living with one of his parents(LP)}
$V_{\mathcal{F}_3}$ = {child's expenses more than1000 (CE), the way to go to school is by car (SC) , the go to school is by walking(SW)}
$V_{\mathcal{F}_4}$ = {heredity (H), arrangement of the child in family(first, middle, last (CA1, CA2 , CA3)}
$V_{\mathcal{F}_5}$ = {child engaging in physical activity(PA) ,child not engaging in physical activity(NPA)}.

Cacase 1 : Here $\mathcal{M} = \{a,\mathfrak{b},\mathfrak{c},\mathfrak{u},\rho,\mathfrak{t},\hbar,\mathfrak{s},\mathfrak{r},\mathfrak{q}\}$the set of children, $\mathcal{F}_1\mathcal{F}_1 = \{\mathrm{BT, ST, FF, AJ}\}$ and a set $\mathcal{D}$ of decision attribute. Let $\mathcal{M}\mathcal{M}/\mathcal{F}_1 = \{\{a\mathfrak{bq}\},\{\mathfrak{u}\rho\},\{\mathfrak{sr}\},\{\mathfrak{c}\},\{\rho\},\{\hbar\}\}$.

Table -2: information on obesity variable

Children	Weight	Length	Group1 ($\mathcal{F}_1$)	Group 2 ($\mathcal{F}_2$)	Group 3 ($\mathcal{F}_3$)	Group 4 ($\mathcal{F}_4$)	Group 5 ($\mathcal{F}_5$)	Decision
$C_1 = a$	55	132	{ BT, ST, FF ,AJ}	{ LP}	{CE,SW}	{H,CA 1}	{PA}	Obesity
$C_2 = \mathfrak{b}$	48	128	{ BT, ST, FF ,AJ}	{MM}	{CE,SW}	{H,CA 2}	{PA}	Obesity
$C_3 = \mathfrak{c}$	43	128	{ ST, AJ}	{MM}	{CE,SC }	{ CA3}	{PA}	Overweight
$C_4 = \mathfrak{u}$	50	125	{ BT, ST, AJ}	{MM}	{CE,SC }	{H,CA 2}	{PA}	Obesity
$C_5 = \rho$	44	130	{ FF}	{MM}	{SC}	{ CA1}	{ NPA}	Overweight
$C_6 = \mathfrak{t}$	45	128	{ BT, ST, AJ}	{MM}	{SW}	{ CA1}	{PA}	Overweight
$C_7 = \hbar$	55	128	{ ST, FF}	{MM}	{SC}	{H,CA 2}	{PA}	Obesity
$C_8 = \mathfrak{s}$	50	129	{ BT, ST, FF}	{MM}	{SW}	{ CA2}	{PA}	Overweight
$C_9 = \mathfrak{r}$	42	129	{ BT, ST, FF}	{MM}	{CE,SC }	{H,CA 2}	{NPA}	Obesity
$C_{10} = \mathfrak{q}$	45	130	{ BT, ST, FF ,AJ}	{MM}	{CE,SW}	{ CA2}	{ NPA}	Overweight

De Decision 1-1: Obese Children with respect to $\mathcal{F}_1$. Then the corresponding upper, lower approximation and the boundary re region of $\mathbb{X}$.

$\mathcal{M}/\mathcal{F}_1$	$\mathcal{L}_{F_1}(\mathbb{X}$ i=1,2, 3,4,5	$U_{F_1}(\mathbb{X}_i)$	$B_{\mathcal{F}_1}(\mathbb{X}_i)$	$\Im_{\mathcal{F}_1}(\mathbb{X}_i)$
$\mathbb{X}_1 = \{a\mathfrak{b}\}$	$\emptyset$	$\{a\mathfrak{bq}\}$	$\{a\mathfrak{bq}\}$	$\{\mathcal{M},\emptyset,\{a\mathfrak{bq}\}\}$
$\mathbb{X}_2 = \{\mathfrak{br}\}$	$\emptyset$	$\{a\mathfrak{bsrq}\}$	$\{a\mathfrak{bsrq}\}$	$\{\mathcal{M},\emptyset,\{a\mathfrak{bsrq}\}\}$
$\mathbb{X}_3 = \{a\mathfrak{u}\}$	$\emptyset$	$\{a\mathfrak{butq}\}$	$\{a\mathfrak{butq}\}$	$\{\mathcal{M},\emptyset,\{a\mathfrak{butq}\}\}$
$\mathbb{X}_4 = \{a\mathfrak{ur}\}$	$\emptyset$	$\{a\mathfrak{but}\hbar\mathfrak{srq}\}$	$\{a\mathfrak{but}\hbar\mathfrak{srq}\}$	$\{\mathcal{M},\emptyset,\{a\mathfrak{but}\hbar\mathfrak{srq}\}\}$
$\mathbb{X}_5 = \{\mathfrak{r}\}$	$\emptyset$	$\{\mathfrak{sr}\}$	$\{\mathfrak{sr}\}$	$\{\mathcal{M},\emptyset,\{\mathfrak{sr}\}\}$

Then
$\Im_{\mathcal{F}_1\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{a\mathfrak{but}\hbar\mathfrak{srq}\},\{\mathfrak{sr}\},\{a\mathfrak{butq}\},\{a\mathfrak{bsrq}\},\{a\mathfrak{bq}\}\}$,
so $\mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{a\mathfrak{but}\hbar\mathfrak{srq}\}\}$.
Phase 1-1-1: The attribute when (late bed time) was removed from $\mathcal{F}_1$,
$\mathcal{M}/(\mathcal{F}_1 - \mathrm{BT}) = \{\{a\mathfrak{bq}\},\{\mathfrak{cut}\},\{\hbar\mathfrak{sr}\},\{\rho\}\}$, we obtain
$\Im_{(\mathcal{F}_1-\mathrm{BT})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{a\mathfrak{bcut}\hbar\mathfrak{srq}\},\{a\mathfrak{bcutq}\},\{a\mathfrak{b}\hbar\mathfrak{srq}\},\{\hbar\mathfrak{sr}\}\}$,
so $\mathbb{B}_{(\mathcal{F}_1-\mathrm{BT})_{\mathcal{P}}} = \{\mathcal{M},\emptyset,\{a\mathfrak{bcu}\rho\mathfrak{t}\hbar\mathfrak{srq}\}\}$is basis for $\Im_{(\mathcal{F}_1-\mathrm{BT})\mathcal{P}}(\mathbb{X})$,
then $\mathbb{B}_{(\mathcal{F}_1-\mathrm{BT})_{\mathcal{P}}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_1}(\mathbb{X})$.
Phase1-1- 2: The attribute when (sitting for long hours on any tablet) was removed from $\mathcal{F}_1$,

$\mathcal{M}/(\mathcal{F}_1 - \mathrm{ST}) = \{\{abq\},\{c\},\{ut\},\{\rho\hbar\},\{sr\}\}$, we obtain $\Im_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abq\},\{absrq\},\{abutq\},\{abutsrq\},\{sr\}\}$, so the set $\mathbb{B}_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}} = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is basis for $\Im_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}}(\mathbb{X}) = \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Phase 1-1-3: The attribute when (fast food) was removed from $\mathcal{F}_1$,
$\mathcal{M}/(\mathcal{F}_1 - \mathrm{FF}) = \{\{abutq\},\{\hbar\},\{sr\},\{c\}\}$, we obtain $\Im_{(\mathcal{F}_1-\mathrm{FF})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abutq\},\{sr\},\{abutsrq\}\}$, so the set $\mathbb{B}_{\mathcal{F}_1-\mathrm{FF}} = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is basis for $\Im_{(\mathcal{F}_1-\mathrm{FF})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_1-\mathrm{FF})\mathcal{P}}(\mathbb{X}) = \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Phase 1-1-4: The attribute when (consuming artificial juices and soft drinks) was removed from $\mathcal{F}_1$,
$\mathcal{M}/(\mathcal{F}_1 - \mathrm{AJ}) = \{\{abq\},\{c\},\{\hbar\},\{ut\},\{sr\},\{\rho\}\}$, we obtain $\Im_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abutq\},\{abutsrq\},\{absrq\},\{abq\}\}$, so the set $\mathbb{B}_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}} = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is the basic for $\Im_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}}(\mathbb{X}) = \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Note: the condition attributes ST, FF, AJ are the variables from $\mathcal{F}_1$, therefore, the variables CORE ={BT}.

Decision 1-2: Children who are overweight with respect to $\mathcal{F}_1$, i=1,2,3,4,5

Then

$\mathcal{M}/\mathcal{F}_1$	$\mathcal{L}_{\mathcal{F}_1}(\mathbb{X}_i$	$U_{\mathcal{F}_1}(\mathbb{X}_i)$	$B_{\mathcal{F}_1}(\mathbb{X}_i)$	$\Im_{\mathcal{F}_1}(\mathbb{X}_i)$
$\mathbb{X}_1 = \{sq\}$	$\emptyset$	$\{absrq\}$	$\{absrq\}$	$\{\mathcal{M},\emptyset,\{absrq\}\}$
$\mathbb{X}_2 = \{tq\}$	$\emptyset$	$\{abutq\}$	$\{abutq\}$	$\{\mathcal{M},\emptyset,\{abutq\}\}$
$\mathbb{X}_3 = \{tsq\}$	$\emptyset$	$\{abutsrq\}$	$\{abutsrq\}$	$\{\mathcal{M},\emptyset,\{abutsrq$
$\mathbb{X}_4 = \{t\}$	$\emptyset$	$\{ut\}$	$\{ut\}$	$\{\mathcal{M},\emptyset,\{ut\}\}$
$\mathbb{X}_5 = \{q\}$	$\emptyset$	$\{abq\}$	$\{abq\}$	$\{\mathcal{M},\emptyset,\{abq\}\}$

$\Im_{\mathcal{F}_1\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abutsrq\},\{absrq\},\{abutq\},\{abq\},\{ut\}\}$. So $\mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is the basis for $\Im_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Phase 1-2-1: The attribute when (late bed time) was removed from $\mathcal{F}_1$
$\mathcal{M}/(\mathcal{F}_1 - \mathrm{BT}) = \{\{abq\},\{cut\},\{\hbar sr\},\{q\}\}$
$\Im_{(\mathcal{F}_1-\mathrm{BT})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abq\},\{abcutq\},\{abcut\hbar srq\},\{ab\hbar srq\}\}$, so $\mathbb{B}_{(\mathcal{F}_1-\mathrm{BT})\mathcal{P}} = \{\mathcal{M},\emptyset,\{abcut\hbar srq\}\}$ is basis for $\Im_{(\mathcal{F}_1-\mathrm{BT})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_1-\mathrm{BT})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Phase 1-2-2: The attribute when (sitting for long hours on any tablet) was removed from $\mathcal{F}_1$,
$\mathcal{M}/(\mathcal{F}_1 - \mathrm{ST}) = \{\{abq\},\{c\},\{ut\},\{\rho\hbar\},\{sr\}\}$, we obtain $\Im_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abq\},\{absrq\},\{abutq\},\{abutsrq\},\{ut\}\}$, so $\mathbb{B}_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}} = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is basis for $\Im_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}}(\mathbb{X})$, so $\mathbb{B}_{(\mathcal{F}_1-\mathrm{ST})\mathcal{P}}(\mathbb{X}) = \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Phase 1-2-3: The attribute when (fast food)is removed from $\mathcal{F}_1$, $\mathcal{M}/(\mathcal{F}_1 - \mathrm{FF}) = \{\{abutq\},\{\hbar\},\{sr\},\{c\}\}$, then $\Im_{(\mathcal{F}_1-\mathrm{FF})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abutsrq\},\{abutq\}\}$, so $\mathbb{B}_{\mathcal{F}_1-\mathrm{FF}} = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is basis for $\Im_{(\mathcal{F}_1-\mathrm{FF})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_1-\mathrm{FF})\mathcal{P}}(\mathbb{X}) = \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Phase 1-2-4: The attribute when (consuming artificial juices and soft drinks) was removed from $\mathcal{F}_1$,
$\mathcal{M}/(\mathcal{F}_1 - \mathrm{AJ}) = \{\{abq\},\{c\},\{\hbar\},\{ut\},\{sr\},\{\rho\}\}$, $\Im_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{abutq\},\{abutsrq\},\{abq\},\{ut\},\{absrq\}\}$, so $\mathbb{B}_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}} = \{\mathcal{M},\emptyset,\{abutsrq\}\}$ is basis for $\Im_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}}(\mathbb{X})$, so $\mathbb{B}_{(\mathcal{F}_1-\mathrm{AJ})\mathcal{P}}(\mathbb{X}) = \mathbb{B}_{\mathcal{F}_1\mathcal{P}}(\mathbb{X})$.

Note: The condition attributes ST, FF, AJ are the variables from $\mathcal{F}_1$, therefore, the variables CORE ={BT}. Which is minimal

Case 2 : Here $\mathcal{M} = \{a,b,c,u,\rho,t,\hbar,s,r,q\}$ the set of children, $\mathcal{F}_2 = \{\mathrm{MM},\mathrm{LP}\}$ and a set $\mathcal{D}$ of decision attribute. Let $\mathcal{M}/\mathcal{F}_2 = \{\{a\},\{bcu\rho t\hbar srq\}\}$.

Decision 2-1: Obese Children with respect to $\mathcal{F}_2$
Then $\Im_{\mathcal{F}_2\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{a\},\{bcu\rho t\hbar srq\}\} = \mathbb{B}_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$ is basis for $\Im_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$.

Phase 2-1-1: The attribute when (the marital status of the mother married)was removed from $\mathcal{F}_2$, $\mathcal{M}/(\mathcal{F}_2 - \mathrm{MM}) = \{a\}$, we obtain $\Im_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{a\}\}$, so $\mathbb{B}_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\{a\},\emptyset\}$, basis for $\Im_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$.

Phase 2-1-2: The attribute when(living with one of his parents)was removed from $\mathcal{F}_2$,
$\mathcal{M}/(\mathcal{F}_2 - \mathrm{LP}) = \{bcu\rho t\hbar srq\}\}$, we obtain $\Im_{(\mathcal{F}_2-\mathrm{LP})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{bcu\rho t\hbar srq\}\} = \mathbb{B}_{(\mathcal{F}_2-\mathrm{LP})\mathcal{P}} = \{\mathcal{M},\emptyset,\{bcu\rho t\hbar srq\}\}$ is basis for $\Im_{(\mathcal{F}_2-\mathrm{LP})\mathcal{P}}(\mathbb{X})$, so that $\mathbb{B}_{(\mathcal{F}_2-\mathrm{LP})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$.

Note : the variables are independent on each other.
Decision 2-2: Children who are overweight with respect to $\mathcal{F}_2$. We get $\Im_{\mathcal{F}_2\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset,\{bcu\rho t\hbar srq\}\} = \mathbb{B}_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$ is the basis for $\Im_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$.

Phase 2-2-1: The attribute when (marital status of the mother married)is removed from $\mathcal{F}_2$,
$\mathcal{M}/(\mathcal{F}_2 - \mathrm{MM}) = \{a\}$, we obtain $\Im_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset\}$, so $\mathbb{B}_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X}) = \{\mathcal{M},\emptyset\}$ is basis for $\Im_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_2-\mathrm{MM})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_2\mathcal{P}}(\mathbb{X})$.
Note: The condition attributes LP are the variables from F_2, therefore, the variables are independent of each other. CORE ={MM}. Which is minimal.

Case 3 : Here $\mathcal{M} = \{a,b,c,u,\rho,t,\hbar,s,r,q\}$ the set of children, $\mathcal{F}_3 = \{\mathrm{CE},\mathrm{SC},\mathrm{SW}\}$ and a set $\mathcal{D}$ of decision attribute. Let $\mathcal{M}/\mathcal{F}_3 = \{\{abq\},\{cus\},\{tr\},\{\rho\hbar\}\}$.
Decision 3-1: Obese Children with respect to $\mathcal{F}_3$,

Then $\mathfrak{I}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{abcutsrq\},\{tr\},\{abtrq\}, \{abcusq\},\{abq\}\}$, so $\mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$=$\{\mathcal{M},\emptyset, \{abcutsrq\}\}$is basis for $\mathfrak{I}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Phase 3-1-1: The attribute when (child's expenses more than1000) was removed from $\mathcal{F}_3$,$\mathcal{M}/(F_3 - CE) = \{\{abtrq\}, \{cu\rho\hbar r\}\}$,wegetℑ$_{(F_3-CE)\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{abtrq\}, \{cu\rho\hbar r\}, \{abcu\rho t\hbar srq\}\}$=$\mathbb{B}_{(F_3-CE)\mathcal{P}}(\mathbb{X})$ is basis for $\mathfrak{I}_{(F_3-CE)\mathcal{P}}(\mathbb{X})$,then $\mathbb{B}_{(F_3-CE)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Phase 3-1-2: The attribute when (the way to go to school is by using a car) is removed from$\mathcal{F}_3$,$\mathcal{M}/(\mathcal{F}_3 - SC) = \{\{abq\},\{cur\},\{ts\}\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{abcurq\}, \{cur\},\{abq\}\}$,so $\mathbb{B}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset, \{abcurq\}\}$is the basis for$\mathfrak{I}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Phase 3-1-3 : The attribute when (the way to go to school is by walking)is removed from $\mathcal{F}_3$, $\mathcal{M}/(\mathcal{F}_3 - SW)$ =$\{abq\}$,$\{cur\}$,$\{\rho\hbar\}\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{cur\} , \{abcurq\}, \{abq\}\}$, so $\mathbb{B}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset, \{abcurq\}\}$is basis for$\mathfrak{I}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Note : the variables are independent on each other.

Decision 3-2: Children who are overweight with respect to $\mathcal{F}_3$

$\mathcal{M}/\mathcal{F}_3$	$\mathcal{L}_{\mathcal{F}_3}\mathbb{X}_i$	$U_{\mathcal{F}_3}(\mathbb{X}_i)$	$B_{\mathcal{F}_3}(\mathbb{X}_i)$	$\mathfrak{I}_{\mathcal{F}_3}(\mathbb{X}_i)$
$\mathbb{X}_1 = \{sq\}$	$\emptyset$	$\{abcurq\}$	$\{abcurq\}$	$\{\mathcal{M}, \emptyset, \{abcurq\}\}$
$\mathbb{X}_2 = \{tq\}$	$\emptyset$	$\{abtrq\}$	$\{abtrq\}$	$\{\mathcal{M}, \emptyset, \{abtrq\}$
$\mathbb{X}_3 = \{tsq\}$	$\emptyset$	$\{abcutsrq\}$	$\{abcutsrq\}$	$\{\mathcal{M}, \emptyset, \{abcutsrq$
$\mathbb{X}_4 = \{t\}$	$\emptyset$	$\{tr\}$	$\{tr\}$	$\{\mathcal{M}, \emptyset,\{tr\}\}$
$\mathbb{X}_5 = \{q\}$	$\emptyset$	$\{abq\}$	$\{abq\}$	$\{\mathcal{M}, \emptyset, \{abq\}\}$

Then $\mathfrak{I}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset, \{abcutsrq\}, \{tr\}, \{abq\}, \{abtrq\}, \{abcurq\}\}$, so $\mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset , \{abcutsrq\}\}$is basis for $\mathfrak{I}_{\mathcal{F}_3\mathcal{P}}$.

Phase 3-2-1: The attribute when (child's expenses more than1000) was removed from $\mathcal{F}_3$,$\mathcal{M}/(\mathcal{F}_3 - CE) = \{\{abtrq\},\{cu\rho\hbar q\}\}$, we obtain$\mathfrak{I}_{(\mathcal{F}_3-CE)\mathcal{P}}(\mathbb{X})$ = $\{\mathcal{M}, \emptyset, \{abtsq\}\}$= $\mathbb{B}_{(\mathcal{F}_3-CE)\mathcal{P}}(\mathbb{X})$is basis for $\mathfrak{I}_{(\mathcal{F}_3-CE)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_3-CE)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Phase 3-2-2: The attribute when (the way to go to school is by using a car)is removed from $\mathcal{F}_3$, $\mathcal{M}/(\mathcal{F}_3 - SC) = \{\{abq\},\{cuq\},\{ts\}\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{ts\}, \{abq\}, \{abtsq\}\}$, so $\mathbb{B}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \{ts\}, \{abtsq\}\}$is basis for$\mathfrak{I}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_3-SC)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Phase 3-2-3 : The attribute when (the way to go to school is by walking)is removed from F_3, $\mathcal{M}/(\mathcal{F}_3 - SW)$ =$\{\{abq\},\{cur\},\{\rho\hbar\}\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{abq\}\} = \mathbb{B}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X})$ is basis for$\mathfrak{I}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X})$,then $\mathbb{B}_{(\mathcal{F}_3-SW)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_3\mathcal{P}}(\mathbb{X})$.

Note : the variables are independent on each other.

Case 4 : Here $\mathcal{M} = \{a, b,c, u ,\rho,t , \hbar, s, r, q\}$ the set of children, $\mathcal{F}_4 = \{H, CA1, CA2 , CA3\}$ and a set $\mathcal{D}$ of decision attribute. Let $\mathcal{M}/\mathcal{F}_4$ =$\{\{a\} , \{sq\},\{bu\hbar s\}, \{\rho t\},\{c\}\}$.

De **Decision 4-1**: Obese Children with respect to $\mathcal{F}_4$, Thenℑ$_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$ = $\{\mathcal{M}, \emptyset , \{a\}, \{abu\hbar srq\}, \{bu\hbar srq\}, \{arq\}, \{abu\hbar s\}, \{bu\hbar s\}\}$, so $\mathbb{B}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$=$\{\mathcal{M},\{a\}, \{abu\hbar srq\}\}$is basis for $\mathfrak{I}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$.

Phase 4-1-1: The attribute when (heredity)is removed from $\mathcal{F}_4$, $\mathcal{M}/(\mathcal{F}_4 - H) = \{\{a\rho t\}, \{bu\hbar srq\}, \{c\}\}$, $\mathfrak{I}_{(\mathcal{F}_4-H)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset, \{abu\rho t\hbar srq\}, \{bu\hbar srq\}\}$, so $\mathbb{B}_{(\mathcal{F}_4-H)\mathcal{P}}$=$\{\mathcal{M}, \emptyset, \{abu\rho t\hbar srq\}\}$for $\mathfrak{I}_{(\mathcal{F}_4-H)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_4-H)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$.

Phase 4-1-2: The attribute when (the child's arrangement in the family)was removed from F_4,$\mathcal{M}/(\mathcal{F}_4 - CA) = \{abu\hbar q\}$,weobtainℑ$_{(\mathcal{F}_4-CA)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset, \{abu\hbar q\}\}$= $\mathbb{B}_{(\mathcal{F}_4-CA)\mathcal{P}}$ is basis forℑ$_{(\mathcal{F}_4-CA)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_4-CA)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$.

Note : the variables are independent on each other.

Decision 4-2: Children who are overweight with respect to $\mathcal{F}_4$.

Then $\mathfrak{I}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset,\{bu\rho t\hbar srq\}, \{rq\}, \{\rho t\}, \{bu\hbar srq\}, \{\rho trq\}\}$, so $\mathbb{B}_{\mathcal{F}_4}$ =$\{\mathcal{M}, \emptyset , \{bu\rho t\hbar srq\}\}$ is the basis for $\mathfrak{I}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$.

Phase 4-2-1: The attribute when (heredity)is removed from F_4, $\mathcal{M}/(\mathcal{F}_4 - H) = \{\{a\rho t\}, \{abu\rho t\hbar srq\}, \{c\}\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_4-H)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset,\{abu\rho t\hbar srq\}, ,\{bu\hbar srq\}, \{a\rho t\}\}$. So the set $\mathbb{B}_{(\mathcal{F}_4-H)\mathcal{P}}$ =$\{\mathcal{M}, \emptyset, \{abu\rho t\hbar srq\}\}$is basis forℑ$_{(\mathcal{F}_4-H)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_4-H)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$.

Phase 4-2-2: The attribute when (the child's arrangement in the family)is removed from F_4 $\mathcal{M}/(\mathcal{F}_4 - CA) = \{abu\hbar r\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_4-CA)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset\} = \mathbb{B}_{(\mathcal{F}_4-CA)\mathcal{P}}$ is basis forℑ$_{(\mathcal{F}_4-CA)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_4-CA)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_4\mathcal{P}}(\mathbb{X})$.

Note : the variables are independent on each other.

Case 5 : Here $\mathcal{M} = \{a,b,c, u, \rho,t, \hbar, s, r, q\}$, $\mathcal{F}_5 = \{PA, NPA\}$and a set $\mathcal{D}$ of decision attribute. Let $\mathcal{M}/\mathcal{F}_5$ =$\{\{abcut\hbar s\},\{\rho rq\}\}$.

Decision 5-1: Obese Children with respect to $\mathcal{F}_5$, Then $\mathfrak{I}_{\mathcal{F}_5\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{abcut\hbar s\},\{\rho rq\}\}$, so $\mathbb{B}_{\mathcal{F}_5\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset\}$isbasis for $\mathfrak{I}_{\mathcal{F}_5\mathcal{P}}(\mathbb{X})$.

Phase 5-1-1: The attribute when(Child engaging in physical activity)was removed from F_5, $\mathcal{M}/(\mathcal{F}_5 - PA)$ = $\{\rho rq\}$, we obtain $\mathfrak{I}_{(\mathcal{F}_5-PA)\mathcal{P}}(\mathbb{X})$ =$\{\mathcal{M}, \emptyset, \{\rho rq\}\}$= $\mathbb{B}_{(\mathcal{F}_5-PA)\mathcal{P}}$ is the basis for $\mathfrak{I}_{(\mathcal{F}_5-PA)\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(F_5-PA)\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_5\mathcal{P}}(\mathbb{X})$.

Phase 5-1-2: The attribute when (Child not engaging in physical activity)is removed from $\mathcal{F}_5$, $\mathcal{M}/(\mathcal{F}_5 - \text{NPA})$ ={$abcut\hbar s$}, we obtain $\Im_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}(\mathbb{X})$ ={ $\mathcal{M}, \emptyset, \{abcut\hbar s\}$}=$\mathbb{B}_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}$ is the basis for$\Im_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_{5\mathcal{P}}}(\mathbb{X})$.

Note : the variables are independent on each other.

Decision 5-2: children who are overweight with respect to $\mathcal{F}_5$,

Then $\Im_{\mathcal{F}_5\mathcal{P}}(\mathbb{X}) = \{\mathcal{M}, \emptyset, \{abcut\hbar s\}, \{\rho rq\}\}$, so $\mathbb{B}_{\mathcal{F}_{5\mathcal{P}}}(\mathbb{X})$ ={ $\mathcal{M}, \emptyset$}is basis for $\Im_{\mathcal{F}_5\mathcal{P}}(\mathbb{X})$.

Phase 5-2-1: The attribute when (Child engaging in physical activity)is removed from $\mathcal{F}_5$, $\mathcal{M}/(\mathcal{F}_5 - \text{PA}) = \{\rho rq\}$, we obtain $\Im_{(\mathcal{F}_5-\text{PA})\mathcal{P}}(\mathbb{X})$ ={ $\mathcal{M}, \emptyset, \{\rho rq\}$} = $\mathbb{B}_{(\mathcal{F}_5-\text{PA})\mathcal{P}}$ is the basis for$\Im_{(\mathcal{F}_5-\text{PA})\mathcal{P}}(\mathbb{X})$, then $\mathbb{B}_{(\mathcal{F}_5-\text{PA})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_{5\mathcal{P}}}(\mathbb{X})$.

Phase 5-2-2: The attribute when (Child not engaging in physical activity)is removed from F_5, $\mathcal{M}/(\mathcal{F}_5 - \text{NPA})$ = {$abcut\hbar s$}, we obtain $\Im_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}(\mathbb{X})$ ={ $\mathcal{M}, \emptyset, \{abcut\hbar s\}$}= $\mathbb{B}_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}$ is the basis for$\Im_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}(\mathbb{X})$,then $\mathbb{B}_{(\mathcal{F}_5-\text{NPA})\mathcal{P}}(\mathbb{X}) \neq \mathbb{B}_{\mathcal{F}_{5\mathcal{P}}}(\mathbb{X})$.

Note : the variables are independent on each other.

3. Compare and analyze

Example 3.1

We are going to discuss the difference problem and the relationship based depending on the approximations and finding the Nano Penta degree in all cases, from the ideal combination of the five < bad health habit ,social factors, the economic factor, family history, physical activity> to rid a child of obesity.

Table 2 showed an integrated information system and is given by ($\mathcal{M}, \mathcal{F}$), where

$\mathcal{M}$ = {a, b, c, u, ρ, t, ħ, s, r, q}set of children and $\mathcal{F}$ ={bad health habit ,social factors, the economic factor, family history and physical activity}, set of variables from table 2 .

$\mathcal{M}/\mathcal{F}_1$ = {{abq} , {ut}, {sr}, {c}, {ρ}, {ħ}}

$\mathcal{M}/\mathcal{F}_2$ = {{a}, {bcupt$\hbar$srq}}

$\mathcal{M}/\mathcal{F}_3$ ={{abq} ,{cus}, {tr},{ρħ}}

$\mathcal{M}/\mathcal{F}_4$ ={ {a} , {rq},{busr}, {ρt},{c}}

$\mathcal{M}$ / $\mathcal{F}_5$ ={{$abcut\hbar s$},{ρrq}}

Table-3: Table of information on obesity children

i=1,2,3,4 ,5	$\mathcal{M}/\mathcal{F}_1$	$\mathcal{M}/\mathcal{F}_2$	$\mathcal{M}/\mathcal{F}_3$	$\mathcal{M}/\mathcal{F}_4$	$\mathcal{M}/\mathcal{F}_5$
$\mathcal{L}_{Fi}(\mathbb{X})$	{ħ}	{ħ}	∅	{ħ}	∅
$\text{U}_{Fi}(\mathbb{X})$	{$abut\hbar srq$}	$\mathcal{M}$	$\mathcal{M}$	{$abut\hbar srq$}	$\mathcal{M}$
$\text{B}_{Fi}(\mathbb{X})$	{$abutsrq$}	{bcupt$\hbar$srq}	$\mathcal{M}$	{bu$\hbar$srq}	$\mathcal{M}$

Decision 1: Let $\mathbb{X}$ = {$abu\hbar r$}, the set of Obese Children. Hence

$\underline{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}$ ($\mathbb{X}$) ={$a\hbar$}

$\overline{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}$ ($\mathbb{X}$) = {$abu\hbar srq$} ,to get the results

$\Im_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathbb{X})$ = { $\mathcal{M}, \emptyset, \{a\hbar\}, \{abu\hbar srq\}, \{busrq\}$} .

So $\mathbb{B}_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathbb{X})$ ={$\mathcal{M}$, {$a\hbar$}, {busrq}} is the basis for $\Im_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathbb{X})$.

Decision 2: Let $\mathbb{X}$ = {cρtsq}, the set of Children are not obese .

Table-4: Information table for overweight children

i=1,2, 3,4,5	$\mathcal{M}/\mathcal{F}_1$	$\mathcal{M}/\mathcal{F}_2$	$\mathcal{M}/\mathcal{F}_3$	$\mathcal{M}/\mathcal{F}_4$	$\mathcal{M}/\mathcal{F}_5$
$\mathcal{L}_{\mathcal{F}_i}(\mathbb{X})$	{cρ}	∅	∅	{cρt}	∅
$\text{U}_{\mathcal{F}_i}(\mathbb{X})$	{$abcu\rho tsrq$}	{bcuρt$\hbar$srq}	$\mathcal{M}$	{bcuρt$\hbar$srq	$\mathcal{M}$
$\text{B}_{\mathcal{F}_i}(\mathbb{X})$	{$abutsrq$}	{bcuρt$\hbar$srq}	$\mathcal{M}$	{bu$\hbar$srq}	$\mathcal{M}$

We got the results as following

$\underline{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}$ ($\mathbb{X}$) = {cρt},

$\overline{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}$ ($\mathbb{X}$) = {bcuρt$\hbar$srq} ,

$\Im_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathbb{X})$ = {$\mathcal{M}$, ∅, {cρt}, {bcuρt$\hbar$sr}, {busrq}}.

So $\mathbb{B}_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathbb{X})$ ={$\mathcal{M}$, {cρt}, {busrq}}is the basis for $\Im_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathbb{X})$.

We have $\mathcal{M}_\mathcal{D}$ = {$\mathcal{D}_\text{O}$, $\mathcal{D}_\text{OW}$ } , $\mathcal{D}_\text{O}$={$abu\hbar r$}, $\mathcal{D}_\text{OW}$ = {cρtsq}, where $\mathcal{M}/\mathcal{D}$ = {{$abu\hbar r$}, {cρtsq}}.

To get the Nano Penta degree from table (2,3,4), we calculate

1.

$\mathcal{L}_{\mathcal{F}_{1\mathcal{P}}}(\mathcal{D}_\text{O}) = \emptyset$ and $\mathcal{L}_{\mathcal{F}_{1\mathcal{P}}}(\mathcal{D}_\text{OW}) = \emptyset$,

$\gamma[\mathcal{F}_{1\mathcal{P}}, \mathcal{D}] = \frac{1}{|\mathcal{M}|}\left[\left|\mathcal{L}_{\mathcal{F}_{1\mathcal{P}}}(\mathcal{D}_\text{O})\right| + \left|\mathcal{L}_{\mathcal{F}_{1\mathcal{P}}}(\mathcal{D}_\text{OW})\right|\right] = 0$

2.

$\mathcal{L}_{\mathcal{F}_{2\mathcal{P}}}(\mathcal{D}_\text{O}) = \{a\}$ and $\mathcal{L}_{\mathcal{F}_{2\mathcal{P}}}(\mathcal{D}_\text{OW}) = \emptyset$,

$\gamma[\mathcal{F}_{2\mathcal{P}}, \mathcal{D}] = \frac{1}{|\mathcal{M}|}\left[\left|\mathcal{L}_{\mathcal{F}_{2\mathcal{P}}}(\mathcal{D}_\text{O})\right| + \left|\mathcal{L}_{\mathcal{F}_{2\mathcal{P}}}(\mathcal{D}_\text{OW})\right|\right] = \frac{1}{10}$

3.

$\mathcal{L}_{\mathcal{F}_{3\mathcal{P}}}(\mathcal{D}_\text{O}) = \emptyset$ and $\mathcal{L}_{\mathcal{F}_{3\mathcal{P}}}(\mathcal{D}_\text{OW}) = \emptyset$,

$\gamma[\mathcal{F}_{3\mathcal{P}}, \mathcal{D}] = \frac{1}{|\mathcal{M}|}\left[\left|\mathcal{L}_{\mathcal{F}_{3\mathcal{P}}}(\mathcal{D}_\text{O})\right| + \left|\mathcal{L}_{\mathcal{F}}(\mathcal{D}_\text{OW})\right|\right] = 0$

4.

$\mathcal{L}_{\mathcal{F}_{4\mathcal{P}}}(\mathcal{D}_\text{O}) = \{a\}$ and $\mathcal{L}_{\text{F}_{4\mathcal{P}}}(\mathcal{D}_\text{OW}) = \emptyset$,

$\gamma[\mathcal{F}_{4\mathcal{P}}, \mathcal{D}] = \frac{1}{|\mathcal{M}|}\left[\left|\mathcal{L}_{\mathcal{F}_{4\mathcal{P}}}(\mathcal{D}_\text{O})\right| + \left|\mathcal{L}_{\mathcal{F}_{4\mathcal{P}}}(\mathcal{D}_\text{OW})\right|\right] = \frac{1}{10}$

5.

$\mathcal{L}_{\mathcal{F}_{5\mathcal{P}}}(\mathcal{D}_\text{O}) = \emptyset$ and $\mathcal{L}_{\mathcal{F}_{5\mathcal{P}}}(\mathcal{D}_\text{OW}) = \emptyset$,

$\gamma[\mathcal{F}_{5\mathcal{P}}, \mathcal{D}] = \frac{1}{|\mathcal{M}|}\left[\left|\mathcal{L}_{\mathcal{F}_{5\mathcal{P}}}(\mathcal{D}_\text{O})\right| + \left|\mathcal{L}_{\mathcal{F}_{5\mathcal{P}}}(\mathcal{D}_\text{OW})\right|\right] = 0$

and then obtain

$\mathcal{L}_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathcal{D}_\text{O}) = \{a\hbar\}$ and $\mathcal{L}_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathcal{D}_\text{OW}) = \{c\rho t\}$

We get

$\gamma[\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}, \mathcal{D}] = \frac{1}{|\mathcal{M}|}\left[\left|\mathcal{L}_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathcal{D}_\text{O})\right| + \left|\mathcal{L}_{\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}}(\mathcal{D}_\text{OW})\right|\right] = \frac{5}{10}$

Now from the above it is possible to review the following result.

$\gamma[\mathcal{F}_{1\mathcal{P}}, \mathcal{D}] \leq \gamma[\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}, \mathcal{D}]$,

$\gamma[\mathcal{F}_{2\mathcal{P}}, \mathcal{D}] \leq \gamma[\sum_{\mathcal{P}=1}^{5}\mathcal{F}_\mathcal{P}, \mathcal{D}]$,

$\gamma[\mathcal{F}_{3\mathcal{P}}, \mathcal{D}] \leq \gamma[\sum_{\mathcal{P}=1}^{5} \mathcal{F}_{\mathcal{P}}, \mathcal{D}]$,

$\gamma[\mathcal{F}_{4\mathcal{P}}, \mathcal{D}] \leq \gamma[\sum_{\mathcal{P}=1}^{5} \mathcal{F}_{\mathcal{P}}, \mathcal{D}]$,

$\gamma[\mathcal{F}_{5\mathcal{P}}, \mathcal{D}] \leq \gamma[\sum_{\mathcal{P}=1}^{5} \mathcal{F}_{\mathcal{P}}, \mathcal{D}]$.

Observation 3.2: By using the measure named as Nano Penta degree of dependence on X , for all the cases we infer that the Multi- Granular Nano Penta topology became more accurate than the Nano Penta topology.

4.CONCLUSION

As a result of the intervention of many biological and social factors, children could get overweight or obese, we noticed that the family history , the Economic Factor and physical activity an ideal combination for children to reach an ideal weight. Proper care and behavioral change can prevent the risk of childhood obesity. It was concluded that the Multi-Granular Nano Penta topology more accurate than the Nano Penta topology

REFERENCES

[1] A.S. Qadouri, N.J. Mohammed and Z. T.Abdel Qader ,“ Use Factor Analysis in Determining Most Important Factors Affecting Childhood Obesity,” Turkish Journal of Computer and Mathematics Education ,12 (12) 2021,pp .4621-4630.

[2] E. Salh and T. Jasim , “On Certain Types of Set in Micro Topological Spaces with an Application in Thalassemia Sick, ” Tikrit Journal of Pure Science,26(2), 2021, pp.103-107.

[3] J.F. AL arjan ,“The Prevalence of Obesity, Overweigh and Underweight Among Students of Al-Balqa Applied University in Jordan,” Educational Sciences Studies, 38(6), 2011, pp .2019-2036.

[4] L. Thivagar and C. Richard, “On Nano Forms Of Weakly Open Sets,” Iternational Journal Math. Stat. Inven.,1 (1), 2013, pp. 31–37.

[5] L. Thivagar and C. Richard, “Computing technique for recruitement process viananotopology,”Sohag J. Math. 3(1), 2016, pp. 37–45.

[6] M. Khan andG.Khan,“ p-Continuity and p-Homeomorphism in Penta Topological Spaces,” European International Journal of Science and Technology,7,(5), 2018, pp.1-8.

[7] MD. Seema and S. Aaron, “Review of Childhood Obesity: From Epidemiology, Etiology, and Comorbidities to Clinical Assessment and Treatment,” Mayo Clin,92(2), 2017, pp.251-265.

[8] R.B.Yaseen, A. Shihab and M. Alobaidi , “On Nano Penta Topological Spaces ”AIP Publishing(ICCEPS-2021) accepted.

[9] R.B. Yaseen, A. Shihab and M. Alobaidi “Characteristics of Penta- open sets in Penta topological spaces ” Int. J. Nonlinear Anal. Appl.,12,(2), 2021, pp. 2463-2475, http://dx.doi.org/10.22075/ijnaa.2021.5388.