



Data with Turiyam Set for Fourth Dimension Quantum Information Processing

Prem Kumar Singh^{1,*}

¹Department of Computer Science and Engineering,
Gandhi Institute of Technology and Management-Visakhapatnam,
Andhra Pradesh 530045, India

* Correspondence: premsingh.csjm@gmail.com , premsingh.csjm@yahoo.com

Abstract:

Recently, neutrosophic set is considered as one of the prominent tool to deal with human cognition in three-way fuzzy space. This set has given a way to characterize the human cognition in conscious, unconscious, or indeterminate state. The problem arises when a person realizes all of three states independently as silent mode. It is observed at voting time of Indian democratic system where some people vote in a favor of a party, do not vote in favor of a party, being absent and choose none of the above. The last consciousness is turiyam state which is independent from all. It also observed at time of feedback or rating given by an expert towards which used to based on internal communication rather than true, false and uncertain activity. The internal communication which provides the opinion towards rating about any organization or employee is called as Turiya or Fourth dimension cognition. This paper try to introduce this fourth dimension of human cognitions as a new set called as Turiyam set with its graphical visualization via an illustrative example.

Keywords: Cognitive science; Neutrosophic set; Three-way decision space; Turiyam set; Fourth dimension

1. Introduction

The precise representation of human thought and characterization of uncertainty is considered as major issues by researchers. Three-way fuzzy space given a way to deal with human cognition based on its acceptance, rejection and uncertain part [1-4]. The theory of Neutrosophic set [4-8] and its extensive properties help a lot to deal with human cognition in three-dimension, independently. The problem arises when someone wants to deal with attributes like trust, ego, fear. This type of attributes based on internal communication of human cognition rather than body, mind

or external communications. The definition of trustworthy player is beyond win, draw or loss of match. Similarly, female fear to complain about victimization of sexual assault due to social discrimination or prestige of family. It is beyond truth, false or uncertainty of crime. This type of data set and their analysis hidden in collected or uncollected dark data set. Very few people paid attention towards dark data analysis as it requires new dimension and analysis. The another reason is dark data contains pure consciousness as Chaturtha dimension watching each state of acceptance, rejection and uncertain regions¹⁻². It is distinct from each of the three state as given below³⁻⁴ :

1. The first state is the waking state which everyone is aware in our daily world. This is the gross body. It can be considered as true or acceptance region.
2. The second state is the dreaming mind. This is the subtle body. It can be considered as indeterminant region.
3. The third state is the state of deep sleep. This is the causal body. It can be considered as false region.

It means turiyam is beyond all these three states i.e. acceptance, rejection and uncertain which is recently called as NOTA⁵. Psychology says it is Advaita which can be described as pure consciousness. It can be measured as the state of liberation means experiencing the infinite (*ananta*) and non-different (*advaita/abheda*) from all the experiences. This type of act can be measured in sports. Let us consider the example of a cricket match where many people feel watching the match in ground in awake state, dreaming state that his/her team will win or deep sleep state. However the match is continuous and unaffected by these states which can be called as Turiya dimensions. In similar way, the win, loss or draw of a match is based on series outcome rather than a match outcome. It means a team may have won many matches, draw many matches or lost less matches does not mean holds many series. The series holding is turiya state for a team which is beyond the win draw or loss of a match. It can be also understood via India-Pakistan match where India (or Pakistan) may lose (or win) any match with any team in case Pakistan (or India) disqualify the series. The thought to disqualify one team from a series is beyond the win draw or loss of their match is called as fourth or Turiyam dimension. The precise representation of those matches where India (or Pakistan) lost the game for disqualification of Pakistan is complex tasks as it is beyond win, draw or loss of a particular match. To deal with this type of fourth dimension human thought, the mathematical algebra of turiyam set is introduced in this paper.

It is motivated from the ontological theory founded in Sanskrit chapters 8.7 and 8.12 of Chandoygya Upanishad. These chapters discuss the "four states of consciousness" as awake, dream-filled sleep, deep sleep, and beyond deep sleep. One of the earliest mentions of Turiya is in the Hindu scriptures, occurs in verse 5.14.3 of the Brihadaranyaka Upanishad. It can be considered as there is no beginning or end. In linguistic term every language can express the event in their own way but turiyam is liberated from all as the real mental pictures for each as one⁶. It can be understood as cows have many colours but the colour of the milk is one that is Turiya. It is like many-valued logic⁷⁻⁹ which received the attention of researchers recently [9-10]. Recently, the Turiyam set and its contextual representation is introduced in [11-12]. It is observed when Win, Draw or loss of match does not effect the qualification of particular team into semifinals of any trophy [13-14]. This type of quantum information used to deal with superconscious mind i.e. Turiyam. It is also discussed by Nagrajuna¹⁰⁻¹¹ as four conditions:

- (i) True quantum information: All things (dharma) both exist and do not exist: both affirmation and negation. In this case, the human cognition agreed the truth that both exists or both does not exists.
- (ii) False quantum cognition: All things (dharma) do not exist: affirmation of non-being, negation of being. In this case the human cognition says opposition of quantum that true does not exist only false exists.
- (iii) Indeterminate quantum cognition : All things (dharma) neither exist nor do not exist: neither affirmation nor negation. In this case, the human cognition agreed that truth or false exists or not who knows. In this case, the human cognition used to be in uncertain mode.
- (iv) Turiyam quantum cognition: All things (dharma) exist: affirmation of being, negation of non-being. In this case, the human cognition supports this is truth and this is false. It means accept the truth and reject the false is super conscious quantum state can be represented as Turiyam set.

This paper focused on introducing this new dimension and its mathematical algebra for precise analysis of human cognition.

Rest part of the paper is organized as follows: Section 2 contains algebra of turiyam set and its introduction. Section 3 provides illustrative example of the Turiyam set and its application with comparative analysis. Section 4 includes conclusions followed by references.

2. Data With Turiyam Setting

In this section data with Turiyam set and its representation is shown for precise analysis of human cognition as follows:

Definition 1: (Data with Turiyam Set) [11]: Turiyam set is truth which is beyond three dimensions. The three-dimension can be visualized as cross section of Turiyam. It changes based on time can be noted mathematically as :

1. The first state is the waking state, in which we are aware of our daily world can be denoted as (t).
2. The second state is the dreaming state can be denoted (f).
3. The third state is the state of deep sleep (i).
4. Turiyam as Liberal State (l).

The fourth state is liberalization of child as the doctrine of temporal parts. It can be considered as ontological position that an object's persistence through time is like its extension as another dimensions. Turiyam Set can contain 4-tuple: truth (t), Indeterminacy (I), falsity (f), and liberalization (l). Each of the dimensions is independent to each other as: $0 \leq t + i + f + l \leq 4$. The turiyam value 0 represents the universal neutral values, -4 represents universal false cases and +4 represent the universal truth cases i.e. $T = \{ \langle x : t, i, f, l \rangle : x \in \mathcal{E} \}$. It means

this set contains a true, a false, an indeterminacy membership values and a liberalization values which can be characterized independently in $[0, 1]$. $T = \{ \langle k; t_t(k), I_t(k), F_t(k), l_t(k) \rangle : k \in \xi \}$ (1)

Whereas $0 \leq t(k) + I_t(k) + f_t(k) + l_t(k) \leq 4^+$(2)

The intersection of turiyam set T_1 and T_2 can be computed as follows:

$$(i) T_1 \wedge T_2 = ((t_1 \wedge t_2), (i_1 \vee i_2), (f_1 \vee f_2), (l_1 \wedge l_2)).$$

$$(ii) T_1 \wedge T_2 = (t_1 \cdot t_2, i_1 + i_2 - i_1 \cdot i_2, f_1 + f_2 - f_1 \cdot f_2, l_1 \cdot l_2).$$

The union of turiyam set T_1 and T_2 can be computed as follows

$$(i) T_1 \vee T_2 = ((t_1 \vee t_2), (i_1 \wedge i_2), (f_1 \wedge f_2), (l_1 \vee l_2)).$$

$$(ii) T_1 \vee T_2 = (t_1 + t_2 - t_1 \cdot t_2, i_1 \cdot i_2, f_1 \cdot f_2, l_1 + l_2 - l_1 \cdot l_2).$$

The complement of turiyam set can be computed as follows:

$$(i) \quad t' = f, i' = 1 - i, f' = t, l' = 1 - (t + i + f)$$

It means the complements of Turiyam is independent and provide maximum values of non-refusal. In this way the tuiyam set is way from Aristotle logic $a=b, b=c$, then $c=a$.

Example 1: Let us suppose COVID19 data set. It is known that the COVID19 data set contains fourth dimension representation. Some patients got recover from covid19 can be called as truth (t), some patient still active as covid19 can be considered as indeterminant (i), some patients may be died due to covid19 can be considered as false (f). The last one the patient who got vacciniated and watching all these three-regions can be called as Turiya dimensions (l) as represented in Table 3. In this case, people who has not effected till now by Covid19 can be found as $1 - (t + i + f + l)$. The entry (0.4, 0.2, 0.6, 0.1) represents that the 40 percent cases are active in State 1 in month of April among all confirm cases. There are 30 percent death happen in the given case, 60 percent people recovered and till now 10 percent people got vaccine. Same time people who has not affected can be found using the confirm cases.

Table 1 : A Turiyam context representation of COVID19 data set

	<i>April COVID Data</i>	<i>May COVID data</i>	<i>June COVID data</i>
<i>State 1</i>	(0.4, 0.2, 0.6, 0.1)	(0.4, 0.2, 0.7, 0.2)	(0.4, 0.1, 0.8, 0.3)
<i>State 2</i>	(0.5, 0.2, 0.6, 0.1)	(0.4, 0.3, 0.6, 0.25)	(0.4, 0.1, 0.6, 0.4)

State 3	(0.3, 0.2, 0.7, 0.1)	(0.3, 0.2, 0.6, 0.25)	(0.2, 0.1, 0.8, 0.45)
---------	-----------------------	-----------------------	-----------------------

The precise analysis of covid data sets can be done using the Turiyam context for recovery, death, active case and vaccination.

Definition 2: (Hypersphere for Turiyam context visualization) [12]: In case someone wants to visualize the Turiyam context then the spherical geometry i.e. up/down, left/right, and forwards/backwards need to be extended as Hypersphere shown in Figure 2. It means the hypersphere will contain four tuples to represent the Turiyam set as quadruples of real numbers (t, i, f, l) . In this way the a sphere can rotate in fourth dimension via equation $t^2 + i^2 + f^2 + l^2 = 1$ in the given globe. Turiyam context provides an alternative way to visualize the changes in length, width and height based on given phase of time.

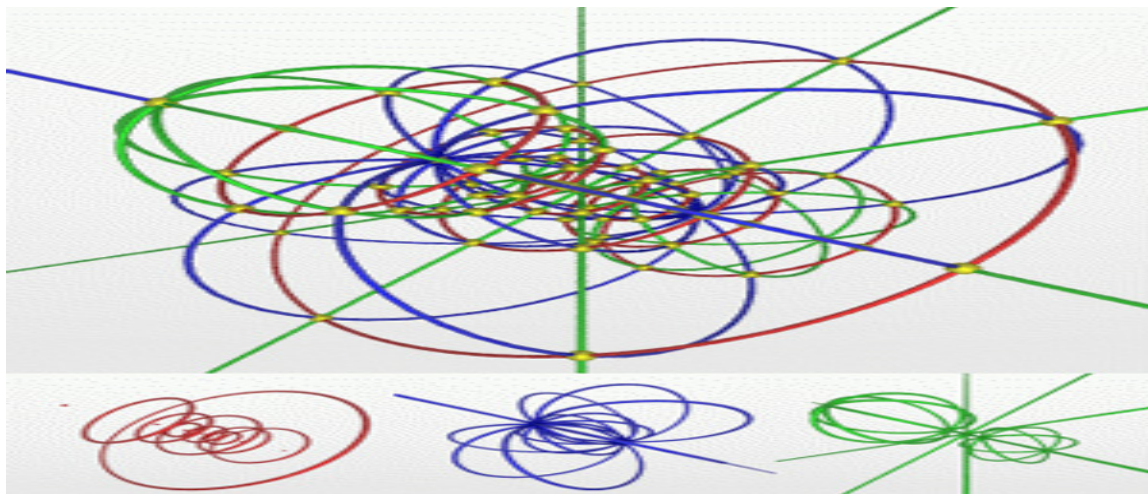


Figure 2: The Hypersphere to visualize the rotation of sphere

In the next section a method is proposed to deal with data of Turiyam attributes for multi-decision process.

3. Proposed Method

In this section a method is proposed to visualize the turiya attribute using vertex and edges of a graph.

Step 1. Let us suppose the data set having turiyam attributes is quadruple $A=(t, i, f, l)$ where t represents the acceptance, f represents the rejection and i represents the uncertain values, l represents the Turiyam or liberation values.

Step 2. It can be represented using Turiyam context as shown in Table 2. The Object represents the event whereas attributes represents the properties. The R represents the relationship among $O \times A \rightarrow R(t, i, f, l)$ where $0 \leq \sum t + \sum i + \sum f + \sum l \leq 4$. It can also be normalized as $0 \leq \sum t + \sum i + \sum f + \sum l \leq 1$. The problem is how to visualize the turiyam attributes using vertex and edges of graph for knowledge processing tasks.

Table 2 : A fourth dimension or Turiyam context

	A_1	A_2	...	A_m
O_1	$R_{11}(t_{11}, i_{11}, f_{11}, l_{11})$	$R_{12}(t_{12}, i_{12}, f_{12}, l_{12})$	...	$R_{1m}(t_{1m}, i_{1m}, f_{1m}, l_{1m})$
O_2	$R_{21}(t_{21}, i_{21}, f_{21}, l_{21})$	$R_{22}(t_{22}, i_{22}, f_{22}, l_{22})$	...	$R_{2m}(t_{2m}, i_{2m}, f_{2m}, l_{2m})$
...				
O_n	$R_{n1}(t_{n1}, i_{n1}, f_{n1}, l_{n1})$	$R_{n2}(t_{n2}, i_{n2}, f_{n2}, l_{n2})$	...	$R_{nm}(t_{nm}, i_{nm}, f_{nm}, l_{nm})$

Step 3. The Turiyam graph $T_G = (V, E, \sigma, l)$ where (V) represents the attributes as vertex, (E) represents the edges among them. The Turiyam graph contains two types of relationship one is uncertainty measurement for the human cognition (σ) and another one is Turiyam (l). The σ represents the characterization of events based on human cognition in three-way fuzzy space i.e. acceptance, rejection and uncertain whereas the Turiyam (l) represents liberation state about the event. It means the knowledge about the vertex can be retrieved using these two relationship while information extraction. It is one of the significant output of the proposed method beyond non-euclidean geometry.

Step 4. Write each of the vertexes as: $\frac{(t,i,f,l)}{v}$. The vertex having Turiyam or Liberation value can be considered as Liberal otherwise it is just a three-way fuzzy space with some hyperspace graph.

Step 5. Write the edges for each of the vertexes as: $\frac{(t,i,f,l)}{E(V_i, V_j)}$. The edges having Turiyam degree for the particular vertex shows that these vertexes are liberal. In this way the Turiyam, non-turiyam and uncertain vertex make a cluster which helps in knowledge processing tasks.

Step 6. The contradiction degrees $T(v_i, v_j) = 0$ due to which the edges can be represented as $(E_T \subseteq V \times V - E)$.

Step 7. The Turiyam graph can be visualized as shown in Figure 3.

Step 8. The edges having Turiyam degrees 1 can be make a cluster of information, same time 0 means other cluster and (t, i, f) as acceptance can be considered as uncertain. It means the validation of uncertainty can be done using Turiyam degrees.

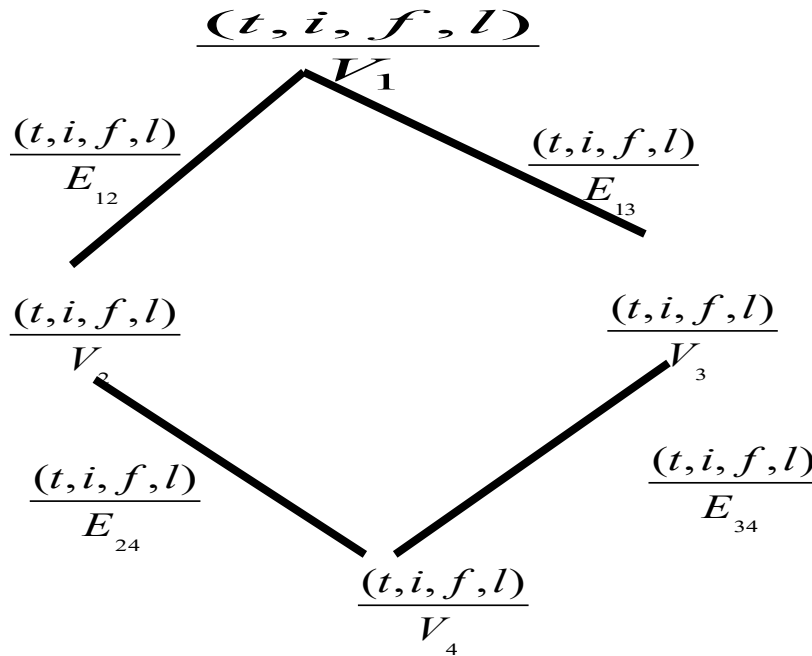


Figure 3: A generalized representation of Turiyam Graph

Step 9: The volume of this Turiyam sphere can be found as : $V = \frac{\pi^2 r^4}{2}$ for adequate analysis of hidden quantum information.

Time complexity: Let us suppose, there are n -number of turiyam vertices in the graph. In this case drawing the turiyam graph can take $O(n^2)$ whereas computing the turiyam membership values again a loop will execute till n -vertex. In this case the proposed method maximum takes $O(n^3)$ time complexity. The most significant outcome is that it provides precise representation of turiyam or liberal state for the given data set in compact way. It helps a lot in knowledge processing tasks.

4. Some Application of Data with Turiyam Attributes

Recently, many multi-attributes contains the attributes beyond third dimensions [11-14]. One of the examples is cricket[3] and Olympic data sets [13] where win, draw or loss of match does not impact the quality of team or a player. It is convicted in many matches that India used to loss a match just to stop the Pakistan in a tournament and vice versa. It means the win, draw or loss of match is based on partial fulfillment of some agenda. It means the third

dimension is cross section of the fourth dimensions. This fourth dimension is called as Turiyam graph. In this section, some of the example for the proposed method is discussed with its Turiyam graph.

Example 1: (Cricket or Sports Data) [3, 13]: It is known that the win, draw or loss of some matches does not impact on qualification of a team in quarterfinals of ODI world cup or even for semifinal for T20 ICC world cup. It happens with India and South Africa (Pakistan and England) that the final match win, defeat or loss does not effected their disqualification (or qualification) in T20 ICC 2021. Each of the people knows that these matches have no impact using their superconscious human cognition or Turiyam state. It can be represented using Turiya context beyond Win, Draw or Loss where qualification and disqualification can be considered as Turiya attributes as shown in Table 3. The first entry i.e. (*Team 1*, Turiyam Attribute) i.e. (0.8, 0.1, 0.1, 1.0) represents that the *Team 1* has win 80 percent matches, lossed 10 percent matches whereas 10 percent match result was draw/tie due to which this Team is qualified (i.e. 1.0). In similar way other attributes can be defined. It can be visualized using the Turiyam graph as shown in Figure 4.

Table 3 : A Turiyam context representation of Four Team in ICC Trophy

	<i>Turiya Attributes (Win, Draw, Loss, Qualification)</i>
<i>Team 1</i>	(0.8, 0.1, 0.1, 1.0)
<i>Team 2</i>	(0.6, 0.2, 0.2, 0.0)
<i>Team 3</i>	(0.6, 0.2, 0.2, 1.0)
<i>Team 4</i>	(0.3, 0.6, 0.1, 0.0)

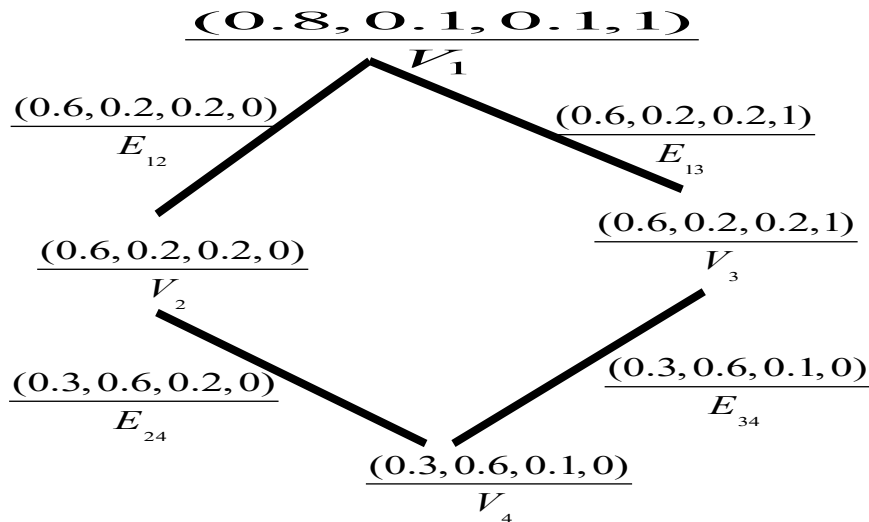


Figure 4: A Turiyam graph representation for the context shown in Table 3

Example 2: (4-dimension Roller)¹²: The 4th dimension roller is one of the examples from mechanical engineering which contains rotating seat forward or backward via 360 degrees in a controlled spin. It is done by 4-rails on the given track among them 2 train act as normal whereas other two train control the spin of the seats as follows: (i) Rotation of Seats, (ii) Seat on Axle, (iii) Rack Gear, (iv) Four rails which is shown in Figure 5.

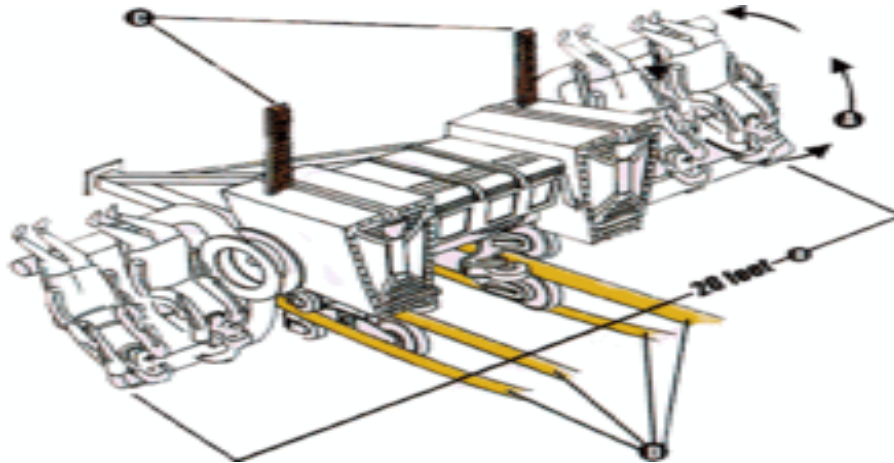


Figure 5: The aerodynamics seat rotation in Fourth Dimension

Example 3: (Chemistry)¹³⁻¹⁴: The periodic block to define the Electron configuration based on shells and subshells using the s , p , d , f orbital structure for any element as shown in Table 4. It used to define the symmetry of any molecular based on fourth dimension blaock as shown in Figure 6.

Table 4 : A Turiyam context representation of Chemistry Electron Configuration

Period	Element	Configuration
1	He	$1s^2$
2	Ne	$1s^2 2s^2 2p^6$
3	Ar	$1s^2 2s^2 2p^6 3s^2 3p^6$
4	Kr	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
5	Xe	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$
6	Rn	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6$
7	Og	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6 7s^2 5f^{14} 6d^{10} 7p^6$

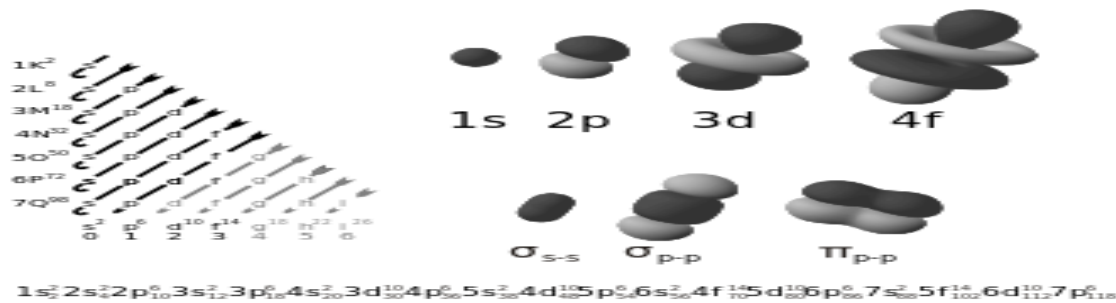


Figure 6: The fourth dimension orbital representation of any molecules

Example 4: (Honesty or Loyalty measurement) [11-12]: The precise analysis of honest or loyal employee in the given organization is one of the crucial tasks for the mangemen team. It depends on dark data like log files, attendance system and his act. Each of the act done by any employee in favor of organization, in disfavor of organization or uncertain act have a motive to uplift the organization of defame it. Some time the employee act will be in favor of organization but the super conscious proves that this act is done to defame the organization and vice versa. These types of data set can be quantified using Turiyam context based on outcome of true, false or uncertain act done by an employee in the given period of time. It will help the organization to control the loyalty drain and its ordering using the Turiyam graph.

Example 5: (Arts)¹⁵: There are many images drawn by several artist in hypercubes to display the forth dimensions as shown in Figure 7.

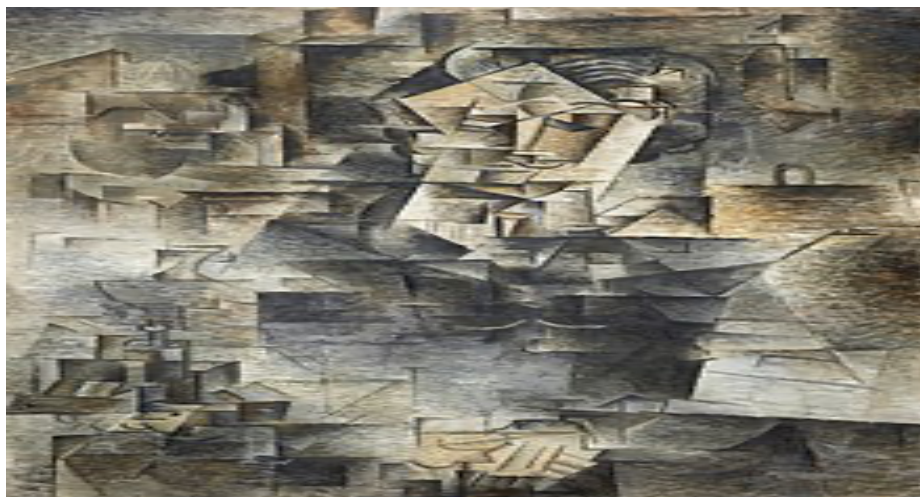


Figure 7: The fourth dimension arts drawn by Pablo Picasso

Example 6: (Love) [11-12]: It is observed that many girls (or boys) loves the boyes (or girls) for time pass in college days. In this case, their each like, dislike and uncertain likes depends on the choice of boys (or girls). All

these act done in superconscious mind to do time pass, utilize the knowledge to pass, to utilize respect, to utilize the money or sexual desire from the boy (or girl). This hidden desire which forced to do the like, dislike or uncertain act is called as Turiyam cognition. This type of Turiyam state a boy or girl used to understand after some time that they misused. This happened due to search of love. In this case, precise analysis of lovable one can be done using the Turiyam context and its graph. It will save many boys and life career in case a psychologist can explain the Turiyam cognition of a girl (or Boys).

Example 7: (Research paper Quality) [2]: A research paper is good or bad cannot be decided based on indexing, non-indexing or retraction. Similarly, the paper cannot be decided based on top journal publication, low quality journal or open access journal. It cannot be decided based on relevant citation, irrelevant citation or uncitation. There are many researchers who got Nobel Prize without indexing due to distinct language than English. Same time many researchers got Nobel with less citation. It means the superconscious cognition says that the quality of paper is depends on novel and significant ideas rather than indexing, journal or citation. This superconscious is Turiyam set. Hence any paper and quality can be precise analyzed using the Turiyam context.

Example 8: (Journal Quality) [2]: One of the suitable examples is finding relevant journal for paper publication in the given domain is based on Turiyam attributes which comes after hard work. It never depends on indexing of journal, impact factor or its publishers. It depends on relevant authors and their paper publication in the given journal at the current time. In case the journal contains papers in the given area then it can be represented as truth-membership value (t). In case journal donot contain any paper related to given topic then it can be represented as false membership-value(f). In case the researcher is uncertain about the publication of given journal on the topic which can be represented as indeterminant-membership value (i). The last one is Turiyam cognition that this journal is good quality as contains all the researchers of my field rather than impact factor or indexing. In this case, the author Turiyam attributes can be represented as turiyam (l) membership as this journal is fit for his/her paper or not. The refusal degree that the author donot want to submit his/her paper in the given journal can be found using complement operator as $1-(t+i+f+l)$. The problem with author is finalizing some good journal for his/her publication can be resolved using the Turiyam context as shown in Table 5.

Table 5 : A Turiyam context representation of researchers towards selection of a Journal

	<i>Journal 1</i>	<i>Journal 2</i>	<i>Journal 3</i>
<i>Researcher 1</i>	(0.4, 0.4, 0.2, 0.6)	(0.4, 0.5, 0.1, 0.7)	(0.4, 0.3, 0.3, 0.5)
<i>Researcher 2</i>	(0.5, 0.3, 0.2, 0.6)	(0.4, 0.4, 0.2, 0.6)	(0.4, 0.4, 0.1, 0.5)
<i>Researcher 3</i>	(0.4, 0.4, 0.2, 0.5)	(0.4, 0.3, 0.3, 0.7)	(0.4, 0.4, 0.2, 0.5)

The entry (0.4, 0.4, 0.2, 0.6) represents the Turiyam cognition of Researcher 1 about the Journal 1. He/she agreed that Journal 1 contains 40 percent papers of the particular topic, 40 percent uncertain papers in the given topic, 20 percent papers not on the given topic. Even though the researcher 1 agreed that the Journal 1 is 60 percent good in the given topic. In similar way other turiyam cognition of researchers can be utilized which says that Journal 2 is better among all for the given topic whereas Journal 1 stands as second.

Example 9: (Medical Diagnoses Data Set) [11-12]: The turiyam set can be useful to deal with medical diagnoses data sets. Let us suppose, a doctor gives medicine to some patient for controlling the given disease. The medicine will be highly effective, the medicine will be partially effective, the medicine will be badly effective, or the medicine will be effective or destructive does not known to doctor. This type of data set can be easily written via Turiyam set. Same time the doctor can classify that these type of medicines should not be given to particular patients due to allergy. It can be easily found using the refusal degree as: $1-(t+i+f+l)$.

Example 10: (Air Craft Analysis) ¹⁶: The changes in aircraft and its orientation like pitch, roll and yaw can be measured by engineer as Turiya state. It means real visualization and rotation of aircraft done in fourth dimension which can be precisely represented using Turiyam Graph.

Example 11: (Voting Data Sets in Democratic Country) [6] : One of suitable example is voting system in democratic country like India where some people vote in favor of a party (t), some people vote against the party (f), some people used to absent due to some unavoidable reason (l), some people vote None of the Above i.e. NOTA(l). These are the people who vote in conscious mind that none of the leader is good at the time without harming anyone. Recently, it became hot topic when many activist went to supreme court to deal with NOTA vote. This type of information can be written precisely using the Turiya set. The people who refused to vote can be investigated using $1-(t+i+f+l)$. In this way, the turiyam set established a way to deal with data having four independent dimensions.

Example 12. (Human Decision) [2-5]: It used to happen that in many cases a Professor used to punish the students due to his/her behavior in the class. Some time they leave the best student for the same act. Sometime the professor used to be uncertain about punishment due to time constraint. The Turiyam is after punishment of best students the professor quantum always entanglement with the given student. It means Turryam is super conscious quantum information which is beyond the punishment, not-punishment or uncertainty. It can be understood by court law. Sometime a poor person got convicted by the court for a act and got jail, another powerful person or same party fellow convicted from court but not got jail, the last one is law is not defined for same act. In all these laws and order public respect towards the same person is Turiyam cognitions. As Gandhi went to jail by British but he considered as Mahatma by Indian people i.e. Highly respected Turiyam state. In this way the Turiyam set provides a way to represent the human cognition and its state in form of Justice. Same time the knowledge and intellectual is also part of Turiyam set which is beyond the pass, fail and uncertainty of marks.

Example 13. (Citation Data Analysis) [14]: It is considered as citation and its measurement is vague. The problem arises when multiple authors, interdisciplinary and irrelevant document count and citation count started by monkey and ghost researchers. In this case a paper having 1 citation used to receive all of them as 1 citation. In this case, the precise measurement of citation and its analysis is major issues while intellectual measurement. One of the reason is many researchers just cite or publish the document without knowing the founding paper. Same time the citation done for retracted papers. Some time posthumous authors also exists in the paper. To resolve this issue, Turiyam set can be useful to characterize the relevant citation, irrelevant citation, fake or uncertain citation and last turiya citation. The paper cited by domain based expert or the author who is considered as one of the top researchers in the given field. In this way the turiya set provides a way to measure the intellectual measurement of acceptance of research and its analysis as follows:

- (i) Relevant Citation (1, 0, 1, 0): In this case author just cited the relevant papers without knowing the founding papers. These types of citation can be considered as relevant citation.
- (ii) False citation (0, 1, 0, 0): These types of citation falsely cited within the host conference, within the same department forcefully, irrelevant ways, without match of any title of keyword. Some time it may cited without relevant to methods just to manipulate the h -index. The retracted papers citation can be counted as false citation. The posthumous authors publications and its honor citation can be consted as false.
- (iii) Uncertain (0, 0, 1, 0): These types of citation happens when author lacks in knowledge and just cited the paper without founding papers. Some time author donot have indexing access in particular university. In this case, the author uncertain about some papers due to access. In same time the paper belongs to interdisciplinary areas due to that the measurement of citation become uncertain.
- (iv) Turiyam citation (t, i, f, l): These are citation which received by domain experts. In this case, the author may take all the papers which belongs to the given papers and its idea. It comes due to hard work and super consciousness in the given research fields. It is called Turiyam citation as for example the day anyone starts works on Fuzzy Sets. He/she first cite Zadeh paper. In same time all the milestone work done in the given field is cited in the paper can be considered as Turiyam citation. It will provide an idea that how much degree given paper reference is in Turiyam space.

It can be observed that the turiyam set is useful for dealing with sports data, medical diagnoses data more precisely. It helps in finding that, the medicine is highly effective, the medicine will be partially effective, the medicine will be badly effective, or the medicine will be effective or destructive does not known to doctor. This type of data set can be easily written via Turiyam set. Same time the doctor can classify that these type of medicines should not be given to particular patients due to allergy. It can be easily found using the refusal degree as: $1-(t+i+f+l)$. In future, the author will focus on connection of Turiyam with quaternion set [10-13] for measuring the changes in human thought at given phase of time beyond the Non-Euclidean geometry [14].

5. Conclusions

This paper introduces a Turiyam set to measure the dark data set and its analysis. The Turiyam set is useful for dealing the human quantum cognition and its orientation for precise analysis of its orientation. To achieve this a goal method is proposed in the Section 3. Some of the real life data sets having Turiyam attributes is discussed in Section 4. In near future the author will try to introduce some new techniques for dealing the Turiyam attributes and its fluctuation at given phase of time.

Acknowledgements: Author thanks the editorial team for the valuable time.

Funding : Author declares that, there is no funding for this paper.

Conflicts of Interest: Author declares that, there is no conflict of interest.

Ethics approval: This article does not contain any studies with human or animals participants.

Footnotes:

- [1] <https://www.tribuneindia.com/news/archive/lifestyle/turiya-the-fourth-dimension-of-being-448113>
- [2] <https://en.wikipedia.org/wiki/Turiya>
- [3] https://en.wikipedia.org/wiki/Four-dimensional_space
- [4] http://yogananda.com.au/g/g_turiya.html
- [5] <https://sreenivasaraos.com/tag/turiya/>
- [6] https://en.wikipedia.org/wiki/None_of_the_above
- [7] <https://www.speakingtree.in/blog/significance-of-mounam-or-silence>
- [8] https://en.wikipedia.org/wiki/Many-valued_logic
- [9] https://www.pitt.edu/~jdnorton/teaching/HPS_0410/chapters/four_dimensions/index.html
- [10] <https://en.wikipedia.org/wiki/Nagarjuna>
- [11] <https://en.wikipedia.org/wiki/Nagarjuna>
- [12] https://en.wikipedia.org/wiki/4th_Dimension_roller_coaster
- [13] https://en.wikipedia.org/wiki/Electron_configuration
- [14] [https://en.wikipedia.org/wiki/Block_\(periodic_table\)](https://en.wikipedia.org/wiki/Block_(periodic_table))
- [15] https://en.wikipedia.org/wiki/Fourth_dimension_in_art
- [16] <https://www.grc.nasa.gov/www/k-12/UEET/StudentSite/dynamicsofflight.html>

References

- [1] Singh P. K., “Three-way fuzzy concept lattice representation using neutrosophic set”, International Journal of Machine Learning and Cybernetics”, Vol 8(1), pp. 69-79, 2017.
- [2] Singh P. K., “Multi-granular based n-valued neutrosophic context analysis”, Granular Computing, Vol 5(3), pp. 287-301, 2020.
- [3] Singh P. K., “Plithogenic set for multi-variable data analysis”, International Journal of Neutrosophic Sciences, Vol 1(2), pp. 81-89, 2020. doi: 10.5281/zenodo.3689808.

- [4] Smarandache F., “Neutrosophy logic and set, nss”, 1995, <http://fs.gallup.unm.edu/neutrosophy.htm>
- [5] Smarandache F., “Neutrosophy. Neutrosophic probability, set, and logic, ProQuest Information and Learning”, Ann Arbor, Michigan, USA, 1998.
- [6] Smarandache F., “n-valued refine neutrosophic logic and its applications to physics”, Progress in Physics, Vol 4, pp. 143-146, 2013
- [7] Smarandache F., “Plithogeny, Plithogenic Set, Logic, Probability, and Statistics”, Pons Publishing House, Brussels 2017.
- [8] Smarandache F., “Extension of Soft Set to hyperSoft Set, and then to Plithogenic Hypersoft set”, Neutrosophic Set and System, Vol 22, pp. 168-170, 2018.
- [9] Srinivasan N., “Consciousness without content: A look at evidence and prospects”, Front. Psychology, Vol 11, pp. 1992, 2020, <https://doi.org/10.3389/fpsyg.2020.01992>
- [10] Atangana A., Mekkaoui T., “Triniton the complex number with two imaginary parts: Fractal, chaos and fractional calculus”, Chaos Solitons and Fractals, Vol 128, pp. 366-381, 2019.
- [11] Singh P. K., “Turiyam set a fourth dimension data representation”, Journal of Applied Mathematics and Physics, Vol. 9(7), pp. 1821-1828, 2021, DOI: [10.4236/jamp.2021.97116](https://doi.org/10.4236/jamp.2021.97116)
- [12] Singh P. K., “Fourth dimension data representation and its analysis using Turiyam Context”, Journal of Computer and Communications, Vol. 9(6), pp. 222-229, 2021. DOI: [10.4236/jcc.2021.96014](https://doi.org/10.4236/jcc.2021.96014)
- [13] Singh PK, “Single-valued Plithogenic graph for handling multi-valued attribute data its context. International Journal of Neutrosophic Sciences, Vol 15(2), pp. 98-112, 2021, Doi : [10.5281/zenodo.5482171](https://doi.org/10.5281/zenodo.5482171)
- [14] Singh, P. K., “NeutroAlgebra and NeutroGeometry for Dealing Heteroclinic Patterns”. In: Theory and Applications of NeutroAlgebras as Generalizations of Classical Algebras, IGI Global Publishers, 2021, (Accepted for Publications)