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A Brief Description on Fibonacci Series

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ABSTRACT
The Fibonacci arrangements of numbers as well as the related "Golden Ratio" shown in nature and certain masterpieces. This paper aims to prove that the "Power of Math" can be found with "Fibonacci Numbers". Fibonacci can be found in nature in the renowned bunny explore as well as in lovely blossoms. On the highest point of sunflower and seeds are squeezed in light of a particular objective so they track the case of Fibonacci plan. Since Fibonacci numbers has a main role in any individual's day-to-day life. One can see that a large number of regular things that follows Fibonacci succession. Apparently in natural situations like expanding in plants, phyllotaxis i.e., the way of arrangement of leaves, and organic thing fledglings of uncurling plant, and the game design of pinecone's bracts, and so on. At present Fibonacci numbers assumes a vital part in the coding hypothesis. Fibonacci numbers are in various structures and broadly applicable in developing security coding. The Fibonacci series can be used in improving the security of communication in the future.

Keywords
Fibonacci Numbers, Golden Ratio, Nature, Series, Sequence.

1. INTRODUCTION
Fibonacci numbers, first found by Leonardo Pisano. People also known him by his moniker, "Fibonacci". Fibonacci arrangement is succession wherein each of the term is amount of 2 numbers going before it. Fibonacci numbers can be characterized by repetitive connection defined by equation.

T_n is the sum of T_{n-1} and T_{n-2} where n is greater than or equal to 3

Tn addresses the nth of Fibonacci number. Fibonacci succession can complicatedly composed as {1,1,2,3,5,8,…,34,55,89,144,233… … .}.

Quite possibly most widely recognized analysis managing Fibonacci arrangement is the analysis using bunnies. He set a female and a male bunny in field. He guessed that bunnies living boundlessly as well as consistently another duo of a female and a male was created. Fibonacci tested the number of bunnies would-be-shaped in a year. Succeeding the succession, entirely bunny's proliferation resolved 144 bunnies. However unreasonable, the bunny succession permits individuals to join a profoundly developed series of complex numbers to a regular, legitimate, comprehendible idea. The application may include Computer Algorithms such as pile data structures and charts called Fibonacci cubes utilized for connecting equivalent and dispersed systems. There were many Mathematicians, out of which "Stargazer Johann Kepler" rediscovered the Fibonacci Numbers, and afterward numerous mathematicians followed him. One of the primary uses of Fibonacci numbers outside of the space of science is in the space of securities exchange investigation. Numerous financial backers use what is known as the Fibonacci Retracement Technique to assess the activity that the cost of a specific stock will take, in view of specific proportions found inside the Fibonacci numbers. And this winding holds the sunflower seed back from amassing out themselves, henceforth supporting them through perseverance. Petals of blooms & various plants can moreover related to Fibonacci progression in such a manner that they make fresh petals.

1.1. Flower's Petals
Undoubtedly all of us mostly have never considered of taking time to inspect carefully the arrangement of petals of flower. If anyone notices would found that the amount of flower petals that are still attached to it has not broken any, for many blossoms is Fibonacci number as shown in Figure 1.

- One petal: white calla lily
- Two petals: Euphorbia millii
- Three petals: Trillium, Lily
- Five petals: wild-rose, buttercup, larkspur, aquilegia
- Eight petals: Bloodroot
- Thirteen petals: Blacked eyed susan
- Twenty one petals: Shasta daisy
- Thirty Four petals: Pyrethrum, plantain

Figure 1: This shows the view of some flowers having petals in the Fibonacci pattern [1]

1.2. Fibonacci Spiral

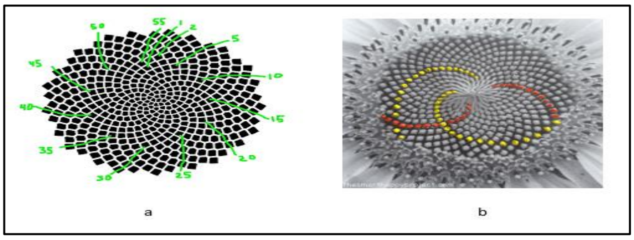

Figure 2: Illustrates the Fibonacci arrangement of seeds of the flower head. a) schematic arrangement, b) arrangement of sunflower seeds [2]

Fibonacci numbers likewise be seen in plan of bloom head's seeds. 55 twisting are spiralling away and thirty four twisting spiralling inside in most sunflower blooms. Pinecones unmistakably show the Fibonacci twisting in Figure 2. Fibonacci twisting are also seen in various turfs associated with our surrounding environment as shown in Figure 3. It is observed in shells, snails, waves, and the mixture of shadings in roses, and so on in such countless things made in our surrounding environment. But very few of us have time to study this wonder.

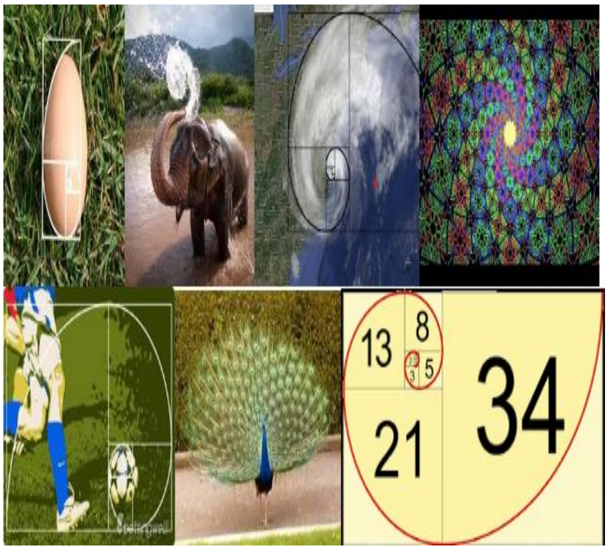

Figure 3: Illustrates the Fibonacci spiral found in various fields associated with nature [3]

Mother Nature is not attempting to utilize the Fibonacci sequence, they are displaying up as an effect of a more deep actual cycle. Hence the reason why spirals are not perfect. Plant is reacting to real objectives, not to mathematical law. All things considered, the best space for all of the shoots. This point separates the total circle in the splendid segment, 0.618033989…

1.3. Human Body Organs

Fibonacci characteristics are exhibit in Humans as shown in Figure 4. Each and every humanoid has an equal number of two hands, each and every one of these has a total number of five fingers on each hand and each finger has three segments which are distanced by two joints/knuckles. Additionally, the sizes of hand and the bones in hand are in Fibonacci.

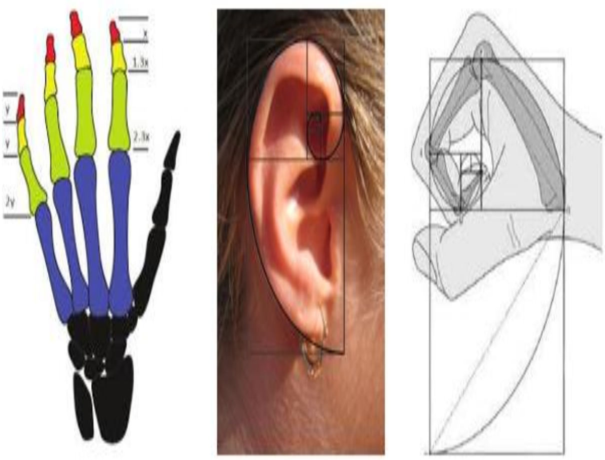

Figure 4: Illustrates characteristics of the Human body such as the shape of the ear, fingers [4]

1.4. In Triangle of Pascal's

Pascal's Triangle also one can see the use of Fibonacci Numbers. Entrance is the total amount of the two figures/numbers on one or the other side of it, however in the above row. Pascal's Triangle is shown in Figure 5 the diagonal sum is the Fibonacci numbers.

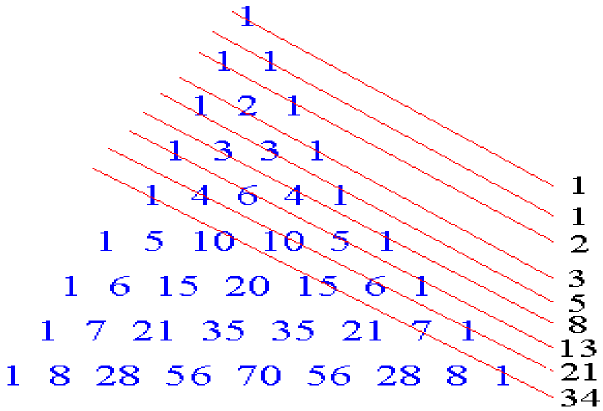

Figure 5: Illustrates the relationship of Pascal's Triangle with the Fibonacci series [5]

2. LITTERATURE REVIEW

Bortner et al. elaborately described the applications of Fibonacci numbers and their history. In this paper, the author discussed how Fibonacci numbers are experienced in many natural areas including, the winding bracts of a pinecone, and numerous other ideal examples of vegetation like branches on trees and shrubs. All the more regularly found are instances of equiangular twistings, which can be made utilizing Fibonacci numbers, in nautilus shells, hurricanes, ocean waves, and some growing fems [6].

Gend discussed the occurrence of the arrangement in the construction of the octave scale and furthermore takes note of the designing of instruments utilizing the golden ratio in instrument plan and some melodic works of creator Claude Debussy. This paper likewise presents a unique composition dependent on Fibonacci numbers, to investigate the inborn stylish allure of this numerical phenomenon. Golden ratio as well as Fibonacci sequence of numbers are shown in music. Numbers are available in octave, and the primary part of tune and concordance. Antonius Stradivarius utilized golden ratio to create the finest string instruments at any point made [7].

Raphel et al. examined cryptography utilizing the Fibonacci succession. In this paper, the author created strategies for tying down information to abstain from hacking just as furnishing the client with certain additional features like an integrity key and approval of the client. This procedure, can secure all kind of record utilizing Fibonacci series. This encryption/decoding calculation is lossless, key-subordinate. The present Fibonacci encoding/decoding calculation is carried out in sharp language C, and tried on two distinctive processors of Intel, and analysed its presentation. The outcomes uncover that Fibonacci encoding/decoding is the quickest among symmetric calculations [8].

3. FIBONACCI IN CODING

The communication might be protected by utilization of Fibonacci digits. Comparative use of Fibonacci to achieve enciphering is portrayed here [9]. Assume a Real Message "C A L L" to be encoded. It is transferred over an unsafe medium. The private key is selected on the basis of Fibonacci number. Anyone alphabet/character be selected as the 1st private key for creating cipher-text after that the Fibonacci sequence is utilized.

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3.1. Encoding Method

For a start, assume the first private key be selected to be 'G'.

Normal Text: C A L L

Alphabets/Characters: G H I J K L M N O P Q R S T U V W X Y Z A B C D E F G H.

Fibonacci: 1 2 3 5 ……..

Coded Text: G H I J

Coded Text transformed into Unicode signs and the text file is saved. Text file can be transferred over communication medium. This is 1st security level.

Transforming coded text to Unicode

Another security rank, American Standard Code For Information Interchange (ASCII) each alphabet's/character's code is gotten from the encrypted message and ASCII of the former alphabet, and the succeeding alphabet is summed to ASCII of the corresponding character in real text. The ASCII of 4 characters utilized as private key for advancing encryptions of characters obtainable in the cipher message to Unicode signs.

3.2. Decoding Method:

The Decoding procedure tracks the inverse process of Encoding. The receiver take out each representation from received message file and drew it to discover its estimate value of hexadecimal. The found value renewed in a numerical value for discovering the normal message utilizing key. Unless having the information of key, any unidentified individual not get the presence of any private info.

4. DISCUSSION

4.1. The Golden Ratio

The "golden ratio" could be an extraordinary relationship of numbers. Two figures are inside the golden ratio if the fraction of the sum of the figures (a, b) separated by the superior number (a) is equipped for the proportion of the number which is bigger divided by the smaller number (a/b). This ratio is addressed by the Greek letter Phi (Ø) [10].

$$Ø = 1.61803$$

How did 01.61803… come? Take a look at ratio of each number in The Fibonacci sequence to the one before it:

1.0/1.0 = 1.0, 2.0/1.0 = 2.0, 3.0/2.0 = 1.50,
5.0/3.0 = 01.6666667, 8.0/5.0 = 01.60, 13.0/8.0 = 1.6250
21.0/13.0 = 1.615384620, 34.0/21.0 = 1.6190476,
55.0/34.0 = 1.6176470, 89.0/55.0 = 1.61818,
144.0/89.0 = 1.617977530, 233.0/144.0 = 1.61805556

And if we keep on going, we get the value of "phi". It is denoted by Ø and the value of Ø = 1.6180339887

$$\lim_{m\to\infty} \frac{F_{m+1}}{F_m} = 1.618$$

Proof:

If two succeeding terms of the series, a, b, and a+b then,

$$\frac{b}{a} \cong \frac{a+b}{b}$$
$$\cong \frac{a}{b} + 1$$

The ratio, Ø lim of a/b,

$$Ø = \frac{1}{Ø} + 1$$
$$Ø^2 - Ø - 1 = 0$$
$$Ø = \frac{1+\sqrt{5}}{2} = 1.618$$

4.2. For Illustration

Take 2 sequential decimals from the sequence for instance 013.0 and 021.0 or 034.0 and 055.0.

Presently, a smallest number in miles is equals to the Kilometer (km), or The greater number in km is equals to the smallest value of Miles or vice versa.

34.0 Miles equals to 55.0 km

21.0 km equals to 13.0 Miles

For the distances that are not accurate in Fibonacci esteems, one can generally go on by parting distances into at least 2 Fibonacci esteems.

To change 15.0 km in miles one can continue as given below:

15.00 [km] = 013.00 [km] + 02.0 [km]

13.00 [km] - > 08 [mile]

02.00 [km] - > 01 [mile]

015.00 [km] - > 8.00+01.0 = 9.0 mile

For changing 170.0 km in miles one can continue as:

170.0 [km] = 010.0×17.0 [km], 017.0 [km] = 013.0 [km] + 02.0 [km] + 02.0 [km] = 08 + 01.0 + 01.0 miles = 010.0 miles

Now, 170.0 km = 10.0×10.0 miles = 0100.0 miles (roughly).

Along these lines, whichever way one can continue.

For greater numbers, one can continue as above [3].

5. CONCLUSION

Fibonacci numbers show up anywhere in Nature, in the form of leaf course of action in plants or the florets of a blossom, the pinecone bracts, or the lines in pineapple. Fibonacci numbers are end to end these lines material to advancement of all breathing thing, with solitary booth, 1 wheat grain, 1 honey bees hive, and surprisingly the entirety of humanity. Nature tails the Fibonacci digits incredibly. Be that as it may, practically nothing is observed by people the beauty of nature. If people examine the example of other normal things closely they will observe a considerable amount of the regular things among us follows Fibonacci numbers, in reality, which makes it bizarre around us. The investigation of nature is vital for students. It rises the curiosity of the researchers. The security in the system of communication is an interesting as well as important topic at present as digitalization is at its peak in India. A basic concept for securing/safety of data is discussed in this paper. To improve the security in communication more research can be done on this topic in the future.

REFERENCES

[1]. Mintex. Fibonacci Numbers in Nature Part-1 – minxtech.
[2]. Lisa. Fibonacci in a sunflower - The Smart Happy Project. Smart Happy project. 2015.
[3]. Sinha S. The Fibonacci Numbers and Its Amazing Applications. Int J Eng Sci Invent. 2017;6(9):7–14.
[4]. Persaud D, O JP. Citation: Persaud-Sharma D and O'Leary JP. Fibonacci Series, Golden Proportions, and the Human Biology. JP Fibonacci Ser. 2015;2(5).
[5]. Waterloo. Pascal's triangle and its relationship to the Fibonacci sequence - Application Center. 2000.
[6]. Bortner C, Peterson A. the History and Applications of Fibonacci Numbers. UCARE Res Prod. 2016;42.
[7]. Gend R Van. The Fibonacci sequence and the golden ratio in music. 2014;20(1):72–7.
[8]. Raphael AJ, Sundaram V. Secured Communication through Fibonacci Numbers and Unicode Symbols.

2012;3(4):1–5.
[9]. M E R, K C R. Application of Classical Encryption Techniques for Securing Data- A Threaded Approach. Int J Cybern Informatics. 2015 Apr;4(2):125–32.
[10]. Morley JJ. The golden ratio. Parabola. 2020;45(3):53–4.