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IMPLEMENTATION OF BIORHYTHM GRAPH WITH TRIGONOMETRIC FUNCTIONS USING PYTHON

Kang Gyu Bee
Student, My Paul School, Goesan, Republic of Korea
scarlet.lisa.heart@gmail.com

Jeon Ye Won
Student, My Paul School, Goesan, Republic of Korea
yewon707506@gmail.com

Abstract

This study aimed to implement the researcher's biorhythm graph using a programing language called Python in relation to trigonometric functions. The etymology of biorhythm is a combination of two Greek words, Bio, which means life, and Rhythm, which means regular and accurate rhythm, and means the rules of human life rhythm. In other words, the biorhythm is a theory that everyone is governed by three rhythm curves called physical rhythm, emotional rhythm, and intellectual rhythm that start inside the body from birth to death. During this study, biorhythm and trigonometric functions were studied, and biorhythm graphs were implemented with trigonometric functions when the researcher's date of birth was entered through Python. A biorhythm graph was implemented based on Python, the most used programming language. The Python syntax used in the algorithm is typically a sympy function, a datetime function, arrange function, and a function.

The value obtained after implementing the algorithm using this grammar is as follows. This is the result of implementing a biorhythm graph using the algorithm implemented by the two researchers. This paper can be used in various fields related to the relationship between biorhythms and trigonometric functions.

Keyword

Python, Trigonometric Functions, Biorhythm, Science, Math

1. Introduction

This study started to implement the researcher's biorhythm graph using a coding language called Python in connection with trigonometric functions. As we entered the era of the 4th industrial revolution, we found biorhythm while looking for what fields are developing in medical technology that is developing at the same time among the evolving IT technologies. Python, one of the most used coding languages, was used to directly shape a graph representing a biorhythm. This thesis was written while researching the biorhythm using this. And while I was researching biorhythms, I came to know that biorhythms are not science, but pseudo-science, but are recognized as science by many people and are separate from the actual applied biorhythms. Several questions arose in this regard, which prompted me to proceed with the research. This study was conducted to find out that the graph representing the biorhythm is related to the trigonometric function and the use cases of the biorhythm. During this study, the in-depth part about biorhythms and trigonometric functions is explored, and the desired results are produced through them. The goal of this study is to implement a biorhythm graph with a trigonometric function when a researcher's date of birth is input through Python. At this time, the graph is implemented using the fact that a biorhythm graph can be drawn with a sine function using the date of birth of the subject. In addition, it aims to learn, refer to, and use concepts that can be obtained during research, such as the relationship between biorhythms and trigonometric functions. This paper can be used in various fields related to the relationship between biorhythms and trigonometric functions.

2. Body

2.1. Biorhythm

Biorhythm is also called the human periodicity and is also called the PSI doctrine after the first letter of the body, emotion, and intellect.

The etymology of the word biorhythm is a combination of two Greek words: Bio, meaning life, and Rhythm, meaning regular and precise rhythm. In other words, the biorhythm theory is a theory that everyone is governed by three rhythm curves, called the physical rhythm, emotional rhythm, and intellectual rhythm, that start inside the body from birth to death. These three rhythms influence and dominate an individual's physical, emotional, and intellectual state. Research on such a cycle started in Hippocrates 1400 years ago, and it is said that clinical observations were made on the physiological changes of the human body, and the patient was instructed to distinguish good days from bad days and heal them (Korea Occupational Health Association, 1988).

Biorhythm (Biorhythm) is a false theory that "the state of the body and mind in human's changes with a certain regular cycle". The origin of this theory is that in 1906, a German doctor, Fritz, was examining a patient's medical history card, thinking that he had regular symptoms. Fritz found that the male factor was given at 23 days and the female factor at 28 days. This biorhythm refers to a chemical and perceptual force that changes with a certain period to change a person's behavioral patterns, etc. Draw a graph, and at the intersection of the first half and the second half, there is a day of the week or a dangerous day (Jongho Lee, Yeonsuk Kwak, 1990). Along with birth, the human body follows three biorhythms: the physical cycle, the emotional cycle, and the intellectual cycle. According to this theory, the above three cycles are repeated based on a person's date of birth.

A biorhythm can be represented as a sinusoid that is part of a trigonometric function. If the sinusoid is above the horizontal axis, it is good, and if it is below it, it is a depressed period. When the sinusoid meets the horizontal axis, it is an unstable point where the air currents of the body, emotion, and intellect change. It is said that by looking at the three cycle curves of the biorhythm comprehensively, the state of the day and the state of the future can also be predicted. Since biorhythm is a rhythm based on the date of birth, people born on the same day have the same physical rhythm, intellectual rhythm, and emotional rhythm for the rest of their lives.

2.2. Trigonometric Functions

In mathematics, the size of an angle expressed as a triangle is called a trigonometric function. The etymology of the angle method is the trigonometric measure (Crossfield, Shepherd, Stein, & Williams, 2009: 183). Triangle measurement was invented in 2000-3000 BC, and it became a function of angle as an applied tool of astronomy in the Greek era when geometry

blossomed. After algebraic symbolism developed, it was included in hermeneutics in the 17th century became (David, 1925: 600). The term trigonometry was first introduced by Piticus in Germany in 1595 as a book title (Adamek, PenKalski, & Valentine, 2005). There are basic functions in trigonometric functions, and they are called sine (sin), cosine (cos), and tangent (tan).

When the opposite sides of the triangle above are a, b, and h

$$\sin A = \frac{a}{h}$$

$$\cos A = \frac{b}{h}$$

$$\tan A = \frac{a}{b}$$

Cosecant, secant, and cotangent are inverses of the above three functions, and their definitions are as follows.

$$\csc A = \frac{h}{a} = \frac{1}{\sin A}$$

$$\sec A = \frac{h}{b} = \frac{1}{\sin A}$$

$$\cot A = \frac{b}{a} = \frac{1}{\tan A}$$

According to the figure above, a circle centered at the origin and having a radius r of length 1 is called a unit circle. For a point A(x,y) on this unit circle, when is a straight angle connecting the x-axis, point A, and the origin, it can be defined as follows.

Figure 3: *Trigonometric Formula 1*

$$sin\,\theta\,A = \frac{y}{r}$$

$$cos\,\theta = \frac{x}{r}$$

$$tan\,\theta = \frac{sin\,\theta}{cos\,\theta} = \frac{y}{x}$$

$$sec\,\theta = \frac{1}{cos\,\theta}$$

$$csc\,\theta = \frac{1}{sin\,\theta}$$

$$cot\,\theta = \frac{1}{tan\,\theta} = \frac{cos\,\theta}{sin\,\theta}$$

(Source: Authors' Own Illustration)

Sine, cosine, cosecant, and secant have periodicity. These four functions are periodic functions with a period of 2π. Tangent and cotangent are periodic functions with period π. The trigonometric function used in this study is a sine function, and its basic form is sin=y/r.

2.3. Relationship between Biorhythm and Trigonometric Functions

Trigonometric functions are used to describe and represent various phenomena with periodicity. Since the biorhythm is the human periodic rate expressed in three cycles, it is also used for granted in the biorhythm. Although biorhythms are made of a sinusoidal curve, which is a kind of trigonometric function, the shape of the graph is different because the cycles of the three rhythms are different. When looking at the biorhythm graph, if the sinusoid is on the horizontal axis, it means that the examiner is in good condition. If it is located below, it means that it is an unfavorable and stagnation period, and the time when the sinusoidal curve meets the horizontal axis is regarded as a dangerous day.

As above, the biorhythm repeats the physical cycle, the emotional cycle, and the intellectual cycle. Therefore, a curve representing three periods can be described as a sinusoid. The physical cycle based on 23 days is expressed as y=sin 2π/23 x, the emotional cycle based on 28 days is expressed as y=sin 2π/28 x, and the intellectual cycle based on 33 days is y It is expressed as =sin 2π/33 x. The overall biorhythm can be expressed as a box of sine numbers as follows. y=sin 2π/23 x +sin 2π/28 x +sin 2π/33 x. The curves of trigonometric functions and biorhythms are very similar, so it is easy to recognize them briefly when several equations are implemented as graphs.

Through this, they were mistaken to know the state of the day and the state of the future. This is because the state was guessed by looking at the height of the graph. Although the biorhythm

graph can be implemented through trigonometric functions, it can be known that it is difficult to see that it has an effect because it is not scientifically proven.

2.4. Implementation of Graph using Python

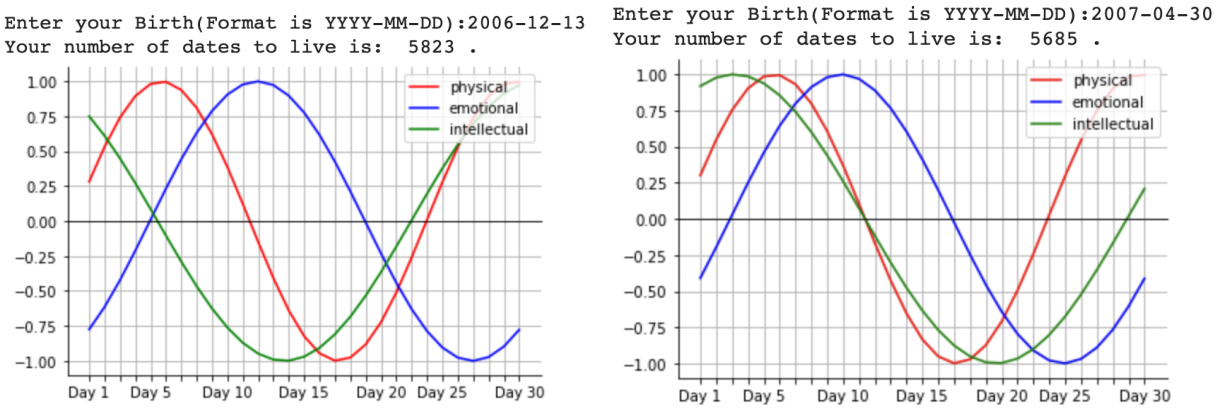
For visualizing the graph, we used function datetime, sympy, matplotlib, numpy. The datetime package provides datetime class that stores both date and time, date class that stores only date, time class that stores only time, and timedelta class that stores time interval information. To find the number of days of survival by comparing the current date with the researchers' birth dates, the datetime function was imported and the current date was called. Sympy is a symbolic math library. We imported sympy for importing all of functions in sympy library. We also, imported matplot library for graphing our data. We can draw the graph using matplotlib.pyplot. Lastly, we imported numpy that is a package to speed up matrix-related calculations. After we imported all of functions, we use input function to get information of the birthday for calculating number of dates to live. Input form was YYYY-MM-DD. After got the information of birthday data, the datetime function was used to convert a string into a date format. Datetime.strptime can make string type data to date format. We put this data on variable named “birth.” We made another variable named “today,” and we put current date using datetime.now function. After made all of variable, we lastly made variable named “t” is number of dates to live, its format is (today-birth). days. now we could print the number of dates to live.

We put the data to variable “x”, number of dates to live to after thirty days using numpy arrange function. After that, we designated variable named “p, e, i” respectively. Each variable had sin function about physical, emotional, and intellectual cycle. Its format is $sin\,sin\,(\frac{2\pi t}{23})$, $sin\,sin\,(\frac{2\pi t}{28})$, $sin\,sin\,(\frac{2\pi t}{33})$ respectively assuming t is the number of days to live. Fig, ax = plt. subplots () are used to clearly distinguish between figure and axis. After we calculated all of data using many kinds of functions, we designed the graph using plt. plot. we designated graphs’ color differently and we put the legend located upper right. Also, we set up x labels to day 1 to day 30, and we designated grid.

3. Conclusion

In this study, a biorhythm graph was implemented in Python. Results about all this process is as follow:

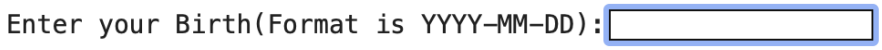
Illustration 1: *Results of Algorithm*



(Source: Authors' Own Illustration)

The graph is implemented as shown in the picture above.

Illustration 2: *Process of Algorithm*



(Source: Authors' Own Illustration)

When we go through the same process as in the picture above, you will get a graph like the picture presented above. Set the date of birth to be received in the form of 8-character - in input. Although the researcher of this study went through numerous trials and errors while conducting the research, but we had finally able to draw biorhythm trigonometric function graphs using Python. A trigonometric function and a biorhythm graph can be related with a sine function, and intelligence, emotion, and body indices can be expressed as a sine function graph. In this paper, the concept of trigonometric functions, the origin and detailed concept of biorhythms, and the programming language Python are all intertwined to calculate the number of days a person lives and build an algorithm that displays a graph of the person's biorhythm when the person's date of birth is entered. This study can be cited in trigonometric or biorhythm studies and is reliable. From a different perspective, the scientific truth of the concept of biorhythm needs to be questioned.

Although the researcher of this study went through numerous trials and errors while conducting the research, but we had finally able to draw biorhythm trigonometric function graphs using Python. To reiterate once again, trigonometric function and a biorhythm graph can be related with a sine function, and intelligence, emotion, and body indices can be expressed as a sine function graph. In this paper, the concept of trigonometric functions, the origin and detailed

concept of biorhythms, and the programming language Python are all intertwined to calculate the number of days a person lives and build an algorithm that displays a graph of the person's biorhythm when the person's date of birth is entered. This study can be cited in trigonometric or biorhythm studies and is reliable.

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