Fibonacci Number and The Golden Ratio

Introduction

Fibonacci Numbers commonly denoted by F_n, from a sequence called the Fibonacci sequence. This sequence were used in Hindu-Arabic numeral system, But later Fibonacci also known as Leonardo Bigollo Pisano introduced it to the Europeans and hence the sequence was named after him.

In Fibonacci sequence each number is the sum of the two preceding once, starting from 0 and 1.

The sequence follows a formula,

$$F_n = F_{(n-1)} + F_{(n-2)}$$

Ratio of successive terms approaches a fixed value is known as The Golden Ratio.

The Fibonacci numbers strongly relates to the golden ratio, as the ratio of two consecutive Fibonacci numbes tends to increase at a golden ratio.

The Golden Ratio is also known as divine proportion and has a symbol 'Φ'.

$$\Phi = \frac{A+B}{A} = \frac{A}{B}$$

$$\Phi = \frac{1+\sqrt{5}}{2} = 1.618033.$$

Use in Mathematics

Golden ratio has unique mathematical properties. one of the properties is the concept that was originated in plane geometry, division of a line segment into two segments.

If we can divide a line in such a way that the ratio of the whole length to the length of the longer segment happens to be equal to the ratio of the length of the longer segment to the length of the shorter segment, then we can say the ratio is golden ratio.

Relationship with nature

In nature shape of everything can be described using Fibonacci numbers or the golden ratio. For example sea shells, wave in sea, spiderweb, parts in the human body and many more.

Relationship with Algorithm

Fibonacci numbers are important in computational run-time analysis, merge sort algorithm, binary tree, used in Fibonacci heap analysis, Fibonacci search technique and many more.

How they can be used in our life.

Golden ratio and Fibonacci numbers is always used in our life either knowingly or unknowingly. They are in nature, paintings, architecture, design, Finance, etc.