Finding The Next Term Of Any Time Series Type Or Non Time Series Type Sequence Using **Total Similarity & Dissimilarity {Version 6}**

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Abstract

In this research investigation, the author has detailed a novel scheme of finding the next term of any given time series type or non-time series type sequence.

Theory

Given any Sequence of the Time Series kind,

 $S = \{y_1, y_2, y_3, \dots, y_{n-1}, y_n\}$ which represent some Time Series data of concern, we write a **Truth Statement Equation as follows:**

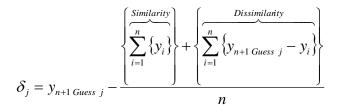
$$y_{n+1} = \frac{\left\{ \begin{array}{c} Direct Similarity \\ \sum_{i=1}^{n} \{y_i\} \\ \end{array} \right\} + \left\{ \begin{array}{c} Direct Dissimilarity \\ \sum_{i=1}^{n} \{y_{n+1} - y_i\} \\ \end{array} \right\}}{n}$$

Equation 1

The above Equation cannot be solved for y_{n+1} but can be used to find y_{n+1} by guessing its value. For the correct guess, i.e., the true value of y_{n+1} , i.e., the next Term of the Sequence, the above Equation is satisfied, i.e., LHS=RHS.

One can note that this Grand Equation can be used to find the Next Prime as well, given a sequence of Primes from the beginning, while considering 1 as Prime as well, i.e., the beginning or first Prime. One can note the concepts of Similarity & Dissimilarity from author's [1]. The author calls $\sum_{i=1}^{n} \{y_i\}$ as Direct Dissimilarity and $\sum_{i=1}^{n} \{y_{n+1} - y_i\}$ as Direct Dissimilarity.

For Guessing, we can usually start with a Guess value much smaller than the smallest data value of the dataset and and keep increasing its value by very small increments till the value of the δ_j tends to zero within the limits of our computational ability to guess. The δ_i is given by



Equation 2

where $y_{n+1 \text{ Guess } j}$ is the j^{th} Guess for y_{n+1}

Example

For the data given below

Exported from a	datamarket.com											
Date exported	1 2017-11-22 07:10											
View online	https://datamarket.com/data/set/22wo/annual-gnp-deflator-us-1889-to-1970#!ds=22wo&display=line											
license	Unknown; please assume a restricted license (all rights reserved); contact DataMarket if you need different licensing											
Provider	Time Series Data Libr											
Source URL												
Units												
	Annual GNP deflator,	U.S. 1889 to 1970		Annual GNP defl	ator, U.S., 1889 to 1970		Annual GN	IP deflator, U.S., 1889 to	1970		Annual GNP defl	ator, U.S., 1889 to 1
'ear	and an article activition,	, 1005 to 1570	Year	den den	, 5151, 2005 10 1570	Year			Yea			
1889	25.9		1913	31.1		1937	44.5			1961	104.6	
1890			1914			1938				1962	105.8	
1891	24.9		1915	32.5		1939	43.2			1963	107.2	
1892	24		1916	36.5		1940	43.9			1964	108.8	
1893	24.5		1917	45		1941	47.2			1965	110.9	
1894	23		1918	52.6		1942	53			1966	113.9	
1895	22.7		1919	53.8		1943	56.8			1967	117.6	
1896	22.1		1920	61.3		1944	58.2			1968	122.3	
1897	22.2		1921	52.2		1945	59.7			1969	128.2	
1898	22.9		1922	49.5		1946	66.7			1970	135.3	
1899	23.6		1923	50.7		1947	74.6					
1900	24.7		1924	50.1		1948	79.6					
1901	24.5		1925	51		1949	79.1					
1902	25.4		1926	51.2		1950	80.2					
1903	25.7		1927			1951						
1904			1928			1952						
1905			1929			1953						
1906			1930			1954						
1907			1931			1955						
1908			1932			1956						
1909			1933			1957						
1910			1934			1958						
1911	. 29.7		1935			1959						
1912	30.9		1936	42.7		1960	103.3					

The above stated authors algorithm predicted the 83rd data element (corresponding to the year 1970) correctly as 135.3 when the first 82 data elements (corresponding to the years 1889-1917) were used to predict the 83rd data element.

Furthermore, when the author used the first 74 data elements (corresponding to the years 1889-1961) to predict the 75th data element, the Prediction Error was zero. Similarly, this Accumulated Progressive Error of Prediction (for the next 10 steps) was Zero for the next 10 steps, i.e., until we predicted the last 83rd data element. By Accumulated Progressive Error (for One Step), we mean the Prediction Error obtained using the last Predicted data element to Predict the next data element. If we get a non-Zero Prediction Error in the beginning, the Accumulated Progressive Error of Prediction keeps increasing.

References

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