Universal Forecasting Scheme

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Abstract

In this research investigation, the author has detailed a novel method of forecasting.

Introduction

The best known methodology of Forecasting is that of Time Series Forecasting. A lot of literature is available in this domain.

Theory (Author's Forecasting Model)

Firstly, we define the definitions of Similarity and Dissimilarity as follows:
Given any two real numbers a and b, their Similarity is given by

$$Similarity(a,b) = \begin{matrix} a^2 \; if \; a < b \\ b^2 \; if \; b < a \end{matrix}$$

and their Dissimilarity is given by

$$Dissimilarity(a,b) = \begin{matrix} ab - a^2 \; if \; a < b \\ ab - b^2 \; if \; b < a \end{matrix}$$

Given any time series or non-time series sequence of the kind

$$S = \{y_1, y_2, y_3, ..., y_{n-1}, y_n\}$$

We can now write y_{n+1} as

$y_{(n+1)} = y_{(n+1)S} + y_{(n+1)DS}$ where

$y_{(n+1)S} =$

$$\sum_{i=1}^{n} y_i \left\{ \frac{\sum_{\substack{j=1 \\ j \neq i}}^{n} \left(\frac{Total\ Exhaustive\ Similarity(y_i, y_j)}{Total\ Exhaustive\ Similarity(y_i, y_j) + Total\ Exhaustive\ Dissimilarity(y_i, y_j)} \right)}{\sum_{r=1}^{n} \sum_{\substack{j=1 \\ j \neq r}}^{n} \left(\frac{Total\ Exhaustive\ Similarity(y_r, y_j)}{Total\ Exhaustive\ Similarity(y_r, y_j) + Total\ Exhaustive\ Dissimilarity(y_r, y_j)} \right)} \right\}$$

and

$$y_{(n+1)DS} =$$

$$\sum_{i=1}^{n} y_i \left\{ \frac{\sum_{\substack{j=1 \\ j\neq i}}^{n} \left(\frac{Total\ Exhaustive\ Dissimilarity(y_i, y_j)}{Total\ Exhaustive\ Similarity(y_i, y_j) + Total\ Exhaustive\ Dissimilarity(y_i, y_j)} \right)}{\sum_{r=1}^{n} \sum_{\substack{j=1 \\ j\neq r}}^{n} \left(\frac{Total\ Exhaustive\ Dissimilarity(y_r, y_j)}{Total\ Exhaustive\ Similarity(y_r, y_j) + Total\ Exhaustive\ Dissimilarity(y_r, y_j)} \right)} \right\}$$

The definitions of Total Exhaustive Similarity and Total Exhaustive Dissimilarity are detailed as follows:

$$Total\ Exhaustive\ Similarity(y_i, y_j) =$$
$$Similarity(y_i, y_j) + Similarity(S_1, y_i) + Similarity(S_2, y_i) + Similarity(S_3, y_i) +$$
$$..... + Similarity(S_k, y_i)\ till\ \ S_k = 0\ \ for\ some\ k$$
$$where\ \ S_1 = \{Larger(y_i, y_j) - Smaller(y_i, y_j)\}$$
$$S_2 = \{Larger(S_1, y_i) - Smaller(S_1, y_i)\}$$
$$S_3 = \{Larger(S_2, y_i) - Smaller(S_2, y_i)\}$$
.....
.....
.....
.....
$$and\ so\ on\ so\ \ forth\ till$$
$$S_k = \{Larger(S_{k-1}, y_i) - Smaller(S_{k-1}, y_i)\}$$

Similarly, we write

$$Total\ Exhaustive\ Dissimilarity(y_i, y_j) =$$
$$Dissimilarity(y_i, y_j) + Dissimilarity(S_1, y_i) + Dissimilarity(S_2, y_i) + Dissimilarity(S_3, y_i) +$$
$$..... + Dissimilarity(S_l, y_i)\ till\ S_l = 0$$
$$for\ some\ l$$
$$where\ S_1 = \{Larger(y_i, y_j) - Smaller(y_i, y_j)\}$$
$$S_2 = \{Larger(S_1, y_i) - Smaller(S_1, y_i)\}$$
$$S_3 = \{Larger(S_2, y_i) - Smaller(S_2, y_i)\}$$
.....
.....
.....
.....
$$and\ so\ on\ so\ forth\ till$$
$$S_l = \{Larger(S_{l-1}, y_i) - Smaller(S_{l-1}, y_i)\}$$

Similarly, we can write the Total Exhaustive Similarity and Total Exhaustive Dissimilarity for (y_r, y_j)

References

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