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
\[ \text{Similarity}(a,b) = \begin{cases} a^2 & \text{if } a < b \\ b^2 & \text{if } b < a \end{cases} \]
and their Dissimilarity is given by
\[ \text{Dissimilarity}(a,b) = \begin{cases} ab - a^2 & \text{if } a < b \\ ab - b^2 & \text{if } b < a \end{cases} \]

Given any time series or non-time series sequence of the kind
\[ S = \{y_1, y_2, y_3, \ldots, y_{n-1}, y_n\} \]
We can now write \( y_{n+1} \) as
\[ y_{(n+1)} = y_{(n+1)S} + y_{(n+1)DS} \]
where
\[ y_{(n+1)S} = \sum_{i=1}^{n} \left( \frac{\text{Total Exhaustive Similarity}(y_i, y_j)}{\text{Total Exhaustive Similarity}(y_i, y_j) + \text{Total Exhaustive Dissimilarity}(y_i, y_j)} \right) \]
and
\[ y_{(n+1)DS} = \sum_{j=1}^{n} \sum_{i=1}^{n} \left( \frac{\text{Total Exhaustive Similarity}(y_i, y_j)}{\text{Total Exhaustive Similarity}(y_i, y_j) + \text{Total Exhaustive Dissimilarity}(y_i, y_j)} \right) \]
The definitions of Total Exhaustive Similarity and Total Exhaustive Dissimilarity are detailed as follows:

*Total Exhaustive Similarity* 
\[ \text{Total Exhaustive Similarity}(y_i, y_j) = \]
\[ \text{Similarity}(y_i, y_j) + \text{Similarity}(S_1, y_i) + \text{Similarity}(S_2, y_i) + \text{Similarity}(S_3, y_i) + \]
\[ \ldots + \text{Similarity}(S_k, y_i) \text{ till } S_k = 0 \text{ for some } k \]
\[ \text{where } S_i = \{\text{Large}(y_i, y_j) - \text{Small}(y_i, y_j)\} \]
\[ S_2 = \{\text{Large}(S_1, y_i) - \text{Small}(S_1, y_i)\} \]
\[ S_3 = \{\text{Large}(S_2, y_i) - \text{Small}(S_2, y_i)\} \]
\[ \ldots \]
\[ \ldots \]
\[ \ldots \]
\[ \text{and so on so forth till} \]
\[ S_k = \{\text{Large}(S_{k-1}, y_i) - \text{Small}(S_{k-1}, y_i)\} \]

Similarly, we write
Total Exhaustive Dissimilarity \( y_i, y_j \) =

\[
\text{Dissimilarity}(y_i, y_j) + \text{Dissimilarity}(S_1, y_i) + \text{Dissimilarity}(S_2, y_i) + \text{Dissimilarity}(S_3, y_i) + \\
\ldots + \text{Dissimilarity}(S_l, y_i) \text{ till } S_l = 0
\]

for some \( l \)

where \( S_l = \{\text{Larger}(y_i, y_j) - \text{Smaller}(y_i, y_j)\} \)

\( S_2 = \{\text{Larger}(S_1, y_i) - \text{Smaller}(S_1, y_i)\} \)

\( S_3 = \{\text{Larger}(S_2, y_i) - \text{Smaller}(S_2, y_i)\} \)

\[ \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \]

\[ \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \]

\[ \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \]

and so on so forth till

\( S_l = \{\text{Larger}(S_{l-1}, y_i) - \text{Smaller}(S_{l-1}, y_i)\} \)

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

References

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