Universal Forecasting Scheme

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Abstract

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

Theory

Firstly, we define the definitions of Similarity and Dissimilarity using author’s [1] 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

\[ y_{(n+1)S} = \sum_{i=1}^{n} y_i \left( \frac{\text{Total Exhaustive Similarity}(y_i, y_j)}{\text{Total Exhaustive Similarity}(y_i, y_j) + \text{Total Exhaustive Dissimilarity}(y_i, y_j)} \right) \]

and

\[ y_{(n+1)DS} = \sum_{i=1}^{n} y_i \left( \frac{\text{Total Exhaustive Dissimilarity}(y_i, y_j)}{\text{Total Exhaustive Similarity}(y_i, y_j) + \text{Total Exhaustive Dissimilarity}(y_i, y_j)} \right) \]

The definitions of Total Exhaustive Similarity and Total Exhaustive Dissimilarity are detailed as follows:
Similarly, we can write the Total Exhaustive Similarity and Total Exhaustive Dissimilarity for \( y_i, y_j \),

**Total Exhaustive Similarity**

\[
\text{Total Exhaustive Similarity}(y_i, y_j) = \text{Similarity}(y_i, y_j) + \text{Similarity}(S_1, S_2) + \text{Similarity}(S_3, S_4) + \text{Similarity}(S_5, S_6) + \ldots + \text{Similarity}(S_k, S_{k+1}) \text{ till } S_k = S_{k+1}
\]

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

where \( S_3 = \{\text{Smaller}(S_1, S_2)\} \) and \( S_4 = \{\text{Larger}(S_1, S_2) - \text{Smaller}(S_1, S_2)\} \)

where \( S_5 = \{\text{Smaller}(S_3, S_4)\} \) and \( S_6 = \{\text{Larger}(S_3, S_4) - \text{Smaller}(S_3, S_4)\} \)

and so on so forth.

**Total Exhaustive Dissimilarity**

\[
\text{Total Exhaustive Dissimilarity}(y_i, y_j) = \text{Dissimilarity}(y_i, y_j) + \text{Dissimilarity}(S_1, S_2) + \text{Dissimilarity}(S_3, S_4) + \text{Dissimilarity}(S_5, S_6) + \ldots + \text{Dissimilarity}(S_k, S_{k+1}) \text{ till } S_k = S_{k+1}
\]

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

where \( S_3 = \{\text{Smaller}(S_1, S_2)\} \) and \( S_4 = \{\text{Larger}(S_1, S_2) - \text{Smaller}(S_1, S_2)\} \)

where \( S_5 = \{\text{Smaller}(S_3, S_4)\} \) and \( S_6 = \{\text{Larger}(S_3, S_4) - \text{Smaller}(S_3, S_4)\} \)

and so on so forth.

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

References