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Abstract

In this research investigation, the author has presented ‘A Locally Parameter Element Wise Linear Transformations Based Forecasting Model For Dynamic State Systems With Large Number Of Parameters’.

Theory

Firstly, we represent any Dynamic State System using a State Vector (Row Vector) of a specified size, say

\[ V_i = [V_i(1) \ V_i(2) \ V_i(3) \ . \ . \ . \ V_i(n-2) \ V_i(n-1) \ V_i(n)] \]

That is,

\[ \hat{V}_i = [V_i(1) \ V_i(2) \ V_i(3) \ . \ . \ . \ V_i(n-2) \ V_i(n-1) \ V_i(n)] \]

\[ \hat{V}_i = \sum_{j=1}^{n} \{[V_i(j)]^2\} \]

Here, the State Vector has \( n \) parameters that are Evolving with time.

For the time instant \( i = k \), we have the State Vector given by

\[ \bar{V}_k = [V_k(1) \ V_k(2) \ V_k(3) \ . \ . \ . \ V_k(n-2) \ V_k(n-1) \ V_k(n)] \]

Let the State Vector be defined for \( i = 1 \) to \( i = m \) instants.

We now Normalize all \( \bar{V}_i \) for \( i = 1 \) to \( i = m \).

The Normalization is given by

\[ \hat{V}_i = \frac{\bar{V}_i}{\left\{ \sum_{j=1}^{n} [V_i(j)]^2 \right\}^{1/2}} \]

That is,
\[ \hat{V}_i = \frac{\sum_{j=1}^{n} [V_i(j) \hat{e}_j]}{\left(\sum_{j=1}^{n} [V_i(j)]^2\right)^{1/2}} \]

We now define \( T_{s_j \rightarrow (s+1)_j}(j) = \frac{\hat{V}_{(s+1)_j}(j)}{\hat{V}_{s_j}(j)} \)

We define

\[ \hat{V}_{m+1}(j) = \left\{ \hat{V}_m(j) \right\} \left[ (r_{u_j \rightarrow (u+1)_j}(j)) + \hat{V}_{m_j}(j) - \hat{V}_{u_j}(j) \right] \left\{ \frac{(r_{(u+1)_j \rightarrow (v+2)_j}(j)) - (r_{u_j \rightarrow (v+1)_j}(j))}{\hat{V}_{(u+1)_j}(j) - \hat{V}_{u_j}(j)} \right\} \]

where \( \hat{V}_{u_j}(j) < \hat{V}_{m_j}(j) < \hat{V}_{(u+1)_j}(j) \) for \( 1 \leq u_j < m \).

Using the constraint that all the \( |V_i| \) for \( i = 1 \) to \( i = m+1 \) form One Normal Data Set, we calculate the value of \( |\overline{V}_{m+1}| \)

i.e., we calculate \( \alpha \) at around the value of \( |\overline{V}_{m}| \) such that \( |\overline{V}_{m+1}| = |\overline{V}_{m}| + \alpha \) such that the \( |\overline{V}_{i}| \) for \( i = 1 \) to \( i = m+1 \) form One Normal Data Set, where \( \alpha \) is a Real Scalar Value.

Finally, we have

\[ \overline{V}_{m+1} = |\overline{V}_{m+1}| \hat{V}_{m+1} \]

**Conclusion**

This Scheme can be used to predict the One Step Evolution of any Dynamic State System with Large Number of Parameters.

**Moral**

*Clear Waters Run Deep.*
References

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Dedication

All of the aforementioned Research Works, inclusive of this One are Dedicated to Lord Shiva.