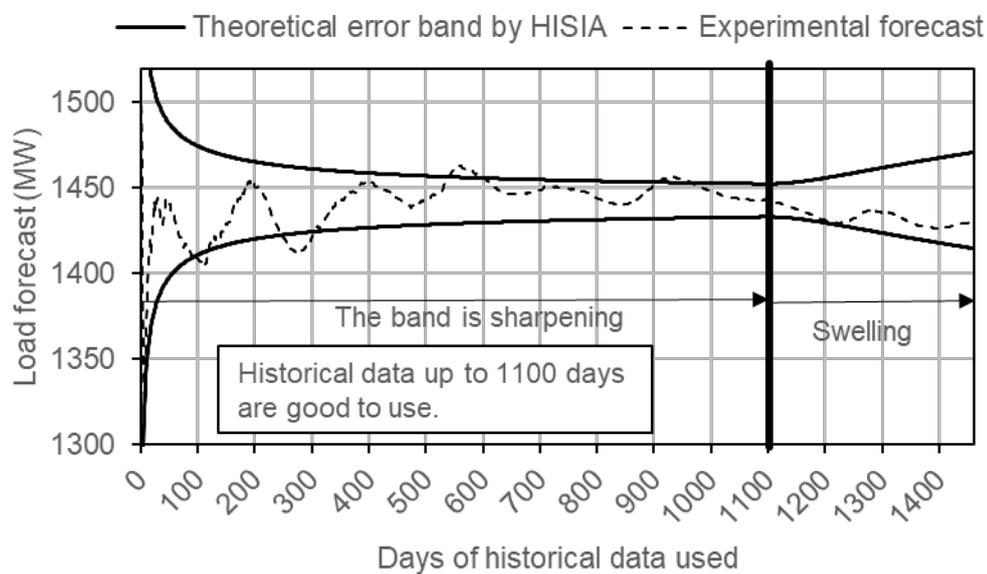




## Hitachi and the Indian Statistical Institute Bangalore develop a theoretical method to determine useful clusters of data necessary for efficient forecasting

*Use case with electric load forecasting to be presented at the 10<sup>th</sup> IFAC Conference on Control of Power and Energy Systems*



Example of identifying useful historic data for Electric Load Forecast

**Tokyo and New Delhi, September 3, 2018** --- Hitachi India Pvt. Ltd. ("Hitachi India"), a wholly owned subsidiary of Hitachi, Ltd. (TSE: 6501, "Hitachi"), and the Indian Statistical Institute today announced the joint development of HISIA, a data analysis method that identifies the type and amount of historic data effective for accurate forecasting. HISIA, is an acronym for "Hitachi and ISI Analysis" and provides a theoretical assessment to judge the amount of data that can minimize the estimation error for a given confidence level<sup>(1)</sup>.

Big data analytics continues to transform organizations as they seek ways to improve efficiency and competitiveness. While it is generally believed that an increase in data size will enhance accuracy in applications, such as preventive diagnostics and demand forecast, this is not always the case, particularly when the data is heterogeneous, i.e. contains various types or dissimilar data. To give an example, prediction accuracy may

not be significantly improved by increasing the database for an electricity demand forecasting model based on the maximum and minimum temperature of historic data from the past several decades, as the preconditions that influence demand, such as lifestyle, electricity tariff and energy-efficiencies of equipment, may have changed.

The Research & Development Centre of Hitachi India and the Indian Statistical Institute, Bangalore Centre (“the team”), investigated this issue to determine the type and amount of data necessary to achieve accurate forecasting, and minimize time and money spent on collecting data that may not significantly contribute to results. The team developed HISIA, which performs a theoretical check on the structural changes in historic data and quantifies the error in estimation, both before and after the change. This assists data scientists to determine the limitations in improving the accuracy of estimates and optimizing the granularity of clustering. The structural changes in the historic data are like the “tipping point” beyond which more data does not significantly increase accuracy but instead contributes to “noise” due to the heterogeneity.

The HISIA model was then applied to the case of electric load forecasting. For this case study, it was found that the electric load for a New York utility at 8:00 AM could be estimated with minimal quantified mean square error<sup>(2)</sup> using just three years of historic load data.

The technical report on this study will be presented by the team at the 10<sup>th</sup> IFAC<sup>(3)</sup> Control of Power and Energy Systems conference to be held from 4<sup>th</sup> to 6<sup>th</sup> September 2018 at Meiji University in Tokyo, Japan.

Hitachi will continue to improve and increase applications of HISIA in digital solutions such as predictive maintenance, healthcare and finance.

- (1) Confidence level in statistics refers to the probability with which the estimation of statistical parameter in a sample is also true for the population.
- (2) Mean square error measures the average squared difference between the estimated values and actual values
- (3) IFAC (International Federation of Automatic Control) was founded in September 1957. As a multinational federation, it is concerned with automatic control and its representation in the fields of engineering, science and the impact of control technology on society. The symposium on Control of Power and Energy System is organized by its technical committee TC6.3.  
<https://www.cpes2018.com/>

### **About the Indian Statistical Institute**

The Indian Statistical Institute (ISI) is a unique institution devoted primarily to the research, teaching and application of statistics and related disciplines. Founded by Professor P.C. Mahalanobis in Kolkata on 17th December 1931, the institute gained the status of an Institution of National Importance by an act of the Indian Parliament in 1959. The Headquarters of ISI is located in the northern fringe of the metropolis of Kolkata. Additionally, there are four centres located in Delhi, Bangalore, Chennai and Tezpur. Research in Statistics and related disciplines is the primary activity of the Institute. Teaching activities are undertaken mainly in Kolkata, Delhi and Bangalore. Offices of the Institute located in several other cities in India are primarily engaged in projects and consultancy in Statistical Quality Control and Operations Research. For more information on Indian Statistical Institute, please visit the website at [www.isical.ac.in](http://www.isical.ac.in)

The Bangalore Centre of the Indian Statistical Institute (ISIBC) was conceived by Professor P.C. Mahalanobis during 1960s, but it was left to Professor G. Kallianpur, the Director of ISI during 1976-78, to revive the idea, and to develop the campus. For more information about the Bangalore Centre of the Indian Statistical Institute, please visit the website at [www.isibang.ac.in](http://www.isibang.ac.in)

### **About Hitachi in India**

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Hitachi, Ltd. (TSE: 6501), headquartered in Tokyo, Japan, delivers innovations that answer society's challenges, combining its operational technology, information technology, and products/systems. The company's consolidated revenues for fiscal 2017 (ended March 31, 2018) totaled 9,368.6 billion yen (\$88.4 billion). The Hitachi Group is an innovation partner for the IoT era, and it has approximately 307,000 employees worldwide. Through collaborative creation with customers, Hitachi is deploying Social Innovation Business using digital technologies in a broad range of sectors, including Power/Energy, Industry/Distribution/Water, Urban Development, and Finance/Social Infrastructure/Healthcare. For more information on Hitachi, please visit the company's website at <http://www.hitachi.com>.

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For more information regarding this release, please contact the Research & Development Group, Hitachi, Ltd.

<https://www8.hitachi.co.jp/inquiry/hqrd/news/en/form.jsp>

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