Electricity Bill Prediction

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Abstract: Classical electrical distribution systems have been used to transport electrical energy generated at a central power plant by increasing voltage levels and then deliver it to the end users by gradually reducing voltage level. Traditional whole building energy modeling suffers from several factors, including the large number of inputs, required for building characterization, simplifying assumptions and the gap between the as-designed and as-built building. Prior work has attempted to mitigate these problems by using sensor based machine learning approaches to statistically model energy consumption, applying the techniques primarily to commercial building data, which makes use of hourly consumption of data. It is unclear however, whether these techniques can translate to residential buildings since the energy usage patterns may vary significantly. Until now, most residential modeling research only had access to monthly electrical consumption data.

This application will offer opportunities to progress within a layout by providing many facilities and work to be done in the operation of the distribution network that is not limited to the energy supply and demand balance, but to ensure providing the quality criteria of energy and energy measurement. One of the biggest challenge for this application scenarios will be handling the massive amount of data that is expected to be collected from various sources and treated to optimize its operation. In this respect, different machine learning techniques such as artificial neural networks, fuzzy systems, evolutionary programming and other artificial intelligence methods and their hybrid combinations can significantly contribute to solve problems. A machine learning technique, Least Square Support Vector Machines method works best in this domain. It establishes performance for predicting hourly residential consumption. Work shows that Least Square Support Vector Machine is the best predictor.

I. INTRODUCTION

Forecasting of future loads is also important for network planning, infrastructure development and so on. However, power system load forecasting is a two dimensional concept: consumer based forecasting and utility based forecasting. Thus the significance of each forecast could be handled disjointedly. Consumer based forecasts are used to provide some guidelines to optimize network planning and investments, better manage risk and reduce operational costs. In basic operations for a power generation plant, forecasts are needed to assist planners in making strategic decisions with regards to unit commitment, hydrothermal co-ordination, interchange evaluation, and security assessments and so on. This type of forecast deals with the total power system loads at a given time, and is normally performed by utility companies. With the skyrocketing growth of power system networks and the increase in their complexity, many factors have become influential in electric power generation, demand or load management. Load forecasting is one of the critical factors for economic operation of power systems.

II. SUPPORT VECTOR MACHINE

Support vector machine (SVM) is a kind of maximum margin classifier which was originally proposed to solve the problem of binary classification. Among a large number of training data vectors, only a few are selected as support vectors that define the maximum margin. Only the support vectors are utilized in predicting the classes of the testing data vectors, thus leading to a good generalization. Later, it was realized that SVM can be adapted to solve the problem of regression

III. EXISTING SYSTEM

For a planner to neither underestimate nor overestimate the load, convenient forecasting techniques with reasonable degree of accuracy need to be developed. Therefore, there is a need for development of optimal and accurate based load forecasting models to improve (minimize) the forecast error. However, load forecasting is a difficult task because the consumption is influenced by many factors, such as weather conditions, vacations, economy status, and idiosyncratic habits of individual customers. Inaccurate load forecasts may increase operating costs. Evidently, a poor load forecast misleads planners and often results in wrong and expensive expansion plans.

IV. PROBLEM STATEMENT

To develop optimized Support Vector Regression-based model for Short-Term Load Forecasting and apply the resulted model to a real life cases to evaluate the performance of the proposed approach and provide one month ahead forecast. In the research, we will focus on a specific problem of forecasting the peak load (i.e., the maximum electricity usage) of a particular consumer entity for a future time unit.

V. PROPOSED SYSTEM

In our proposed system, for each target peak load value in the historical record, we construct a feature vector covering the above mentioned attributes associated with the target. Then, we train our least square SVR system using a set of feature vector, target pairs for a large enough number of days. The result of this training process is a least-squares regressor model. We can use the resultant regressor model to forecast the peak load value Pd of a given day d. For that, we have to construct a feature vector for the day d in the same manner as in the training step. In constructing the feature vector, we need to know the forecasted temperature of the day d (if it is in the future) and whether it is a holiday (which can be easily known in advance). Then, the feature vector of day d is supplied to the regressor model to generate the forecasted peak load value of that day. After the day d is already passed and its actual peak load value (the target) already known, the regressor model is updated with the feature vector, actual target pair for the day d.

VI. METHODOLOGY

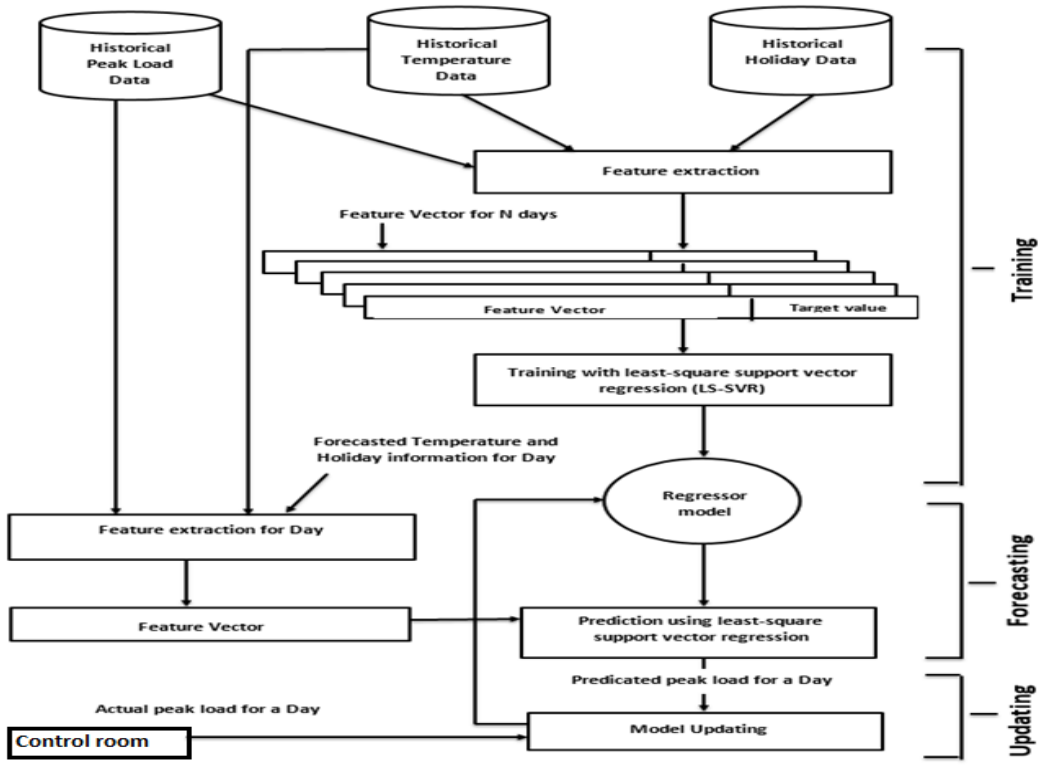

Figure: Proposed Methodology

We construct a Feature vector covering the above mentioned attributes associated with the target. Then we train our least square SVR system using a set of feature vector target pairs for a large enough number of days. We can use the resultant regressor model to forecast the peak load value of given month. We have to construct a feature vector for the month in the same manner, then this feature vector of month is supplied to the regressor model to generate the forecasted peak load value of that day. After the month is already passed and its actual peak load value is already known the regressor model is updated with the feature vector, actual target pair for the day, thus resulting in a fresh model which best reflects the latest trend of events.

VII. SOFTWARE AND HARDWARE REQUIREMENTS

HARDWARE REQUIREMENTS:

- Processor: 1.5 GHz or above.
- RAM: 4GB or more.
- HDD: 100GB or above.

SOFTWARE REQUIREMENTS

- Operating System: Windows/Linux.
- Languages: Java (Frontend), Python (Backend).
- Software: Netbeans, Matlab, Visual Studio.
- Database: MySQL server 2012.

VIII. CONCLUSION

This project gives information on costs, demands and supply of power. It explains how consumers will both receive and contribute power to the smart grid from ultimately anywhere in the world. It gives information on how to develop technologies for new applications in distribution, communication, analysis and control and how millions on new products and devices will be required.

IX. FUTURE SCOPE

This system will increase the involvement of customer in the power supplying system. The opportunity of service contributor has been limited in the power transmission and distribution systems across the world. However, the wish to improve the service quality of the power delivery system has led to incorporation of new features in the system. This system is considered as the next generation system, which supply bi-directional flow of electricity and information, with better power grid reliability, security, and efficiency of electrical system from generation to transmission and to distribution. As this continues to develop, realization of a reliable and stable system is necessary.

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XI. REFERENCES

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