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ELECTRICAL POWER THEFT DETECTION

A model approach to Identify Electricity Theft by Consumers using Data mining Technique

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ABSTRACT: *Distribution of electricity involves significant Technical as well as Non-Technical Losses (NTL). Illegal consumption of electricity or electricity theft constitutes a major share of NTL. This project discusses several methods implemented by illegal consumers for stealing. With the advent of advanced metering technologies, real-time energy consumption data will be available at the utilities end, which can be used to detect illegal consumers. This project presents an encoding technique that simplifies the received customer energy consumption readings (patterns) and maps them into corresponding irregularities in consumption. Then, this project elucidates operation of intelligent classification techniques on customer energy consumption data to classify genuine and illegal consumers. These classification models are applied on regular energy consumption data as well as the encoded data to compare corresponding classification accuracies and computational overhead. Depending on abnormal consumtion behaviour suspected consumers are onspected .Using data mining techniques suspected customers profiles are loaded .The approach of this project is to deal with power loss activity like detecting the illegal power consumers.*

Keywords: *Electricity theft, Extreme learning machine (ELM), Online Sequential Extreme learning machine (OSELM), Expert System. Intelligent systems.*

INTRODUCTION

Electricity generation , transmission and distribution involves operational losses. Losses while generation of electricity can be technically defined, but losses taking place while transmission and distribution cannot be only technical but also non-technical losses are involved .Technical losses which are occurring can be due to power dissipation in transmission lines , transformers, leaking and loss of power ,overloading of lines.

Technical losses can be detected can be control to some extent and they are computed with information about total load and total energy bill. Non technical losses are occurred due to some immoral activities. Power Theft is the non ignorable crime and also affects the economy of the nation adversely. For elimination of electricity theft we have designed this system. Not completely but 95% of electricity theft can be avoided. This system works independently without human intervention. Implementation of this system will not only avoid the issue of electricity theft but also will increase the number of consumers and will increase the economy of the nation. Increasing economy is most important in developing country like INDIA.

OBJECTIVES

- Goal of our project is to avoid electricity theft by the end users.
- Objective of our project is that most accurate analysis of theft detection and identification .

LITERATURE SURVEY

In Assesment of Electric Energy Losses Aiming at Detection of Thefts of Electricity. Author Dimo Stoilov, Ivan Zagorchev,Velichko Atanasov,2016 IEEE has proposes the relations between technical, nontechnical and total electric energy

losses in power systems and presents an innovative methodology for their accurate assessment aiming at detection of thefts of electricity in the distribution networks. Vigilant Energy Metering System (VEMS) is a proposed energy metering system that can fight electricity theft. It has the ability to collect, transfer and process data between other energy meters, local station and base station. It also identifies probable locations of theft and helps the utilities to control theft. A remote billing system can also be developed modifying this model . Paper.

Electricity Theft Detection in Low Voltage Networks with Smart Meters Using State Estimation. Author has dChun-Lien Su, Wei-Hung Lee Chao-Kai Wen,2016 IEEE has described a methodology based on distribution state estimation to detect customer tampered data. In order to obtain better results, a semi-definite programming method is used to solve this problem. The convex semi-definite relaxation technique renders the non-convex robust state estimation problem be effectively solvable. Paper

Electricity Theft detection techniques for Metered Power Consumer in GUVNL, GUJARAT, INDIA..Author Bharat Dangar, S. K. Joshi, Electrical Engg Dept, 2015 IEEE has suggested the approach which provides a method of data mining and involves feature extraction from historical customer consumption data. This model preselects suspected customers to be inspected onsite for fraud based on abnormal consumption behavior. The proposed approach uses customer load profile information to expose abnormal behavior that is known to be highly correlated with Distribution Power Loss activities.

In a statistical method to minimize electrical energylosses in a local electricity distribution network Sept. 2004. Author J. W. Fourie, and J. E. Calmeyer,.has described the Illegal consumption of electricity can be detected by using a remote check meter based on the amount of losses and time stamp of the check meter. This method is implemented before inspecting the illegal consumers personally by the vigilance officials, based on the data at the proper frequency of the consumer measurements.

In Power utility non-technical loss analysis with extreme learning machine model. Author A.H.Nizar, Z.Y.Dong & Y.Wang ,August 2008 has given the Vagilant Energy Metering System (VEMs) which is a energy management system that can fight Electricity Theft. It has ability to collect ,transfer & process data between other energy meter, local station & base station.

In Environmental & utility Planning implications of electricity loss reduction in a developing country: A comparative study of technical options Author M.A.Ram & Shrestha , 2004 has proposed utilization of a central observer meter at secondary terminals of distribution transformer . The value of energy read by the central observer meter is compared with the sum of energy consumption values read by all energy meters in range.

In Electricity theft :A comparative analysis 2004 Author T.B.Smith has described Teamsare arranged for inseption and detection of illegal consumers of electricity, and their reward depends upon the number of cases they inspect. Such incentives are proportional to the total number of illegal consumption cases they detect.

PROPOSED METHODOLOGY

Module A: Preprocessing

- Input: Electricity distribution data in Excel
- Process: Identifying attributes
- Output: Preprocessed data

Module B: K means Clustering

- Input: Preprocessed data
- Process: Data point and distance calculation
- Output: Cluster

Module C: Gaussian Distribution and ANN

- Input: K means clusters
- Process: Gaussian distribution probability and neuron formation
- Output: Fine grained clusters

Module D: Fuzzy Logic

- Input: Fine grained clusters

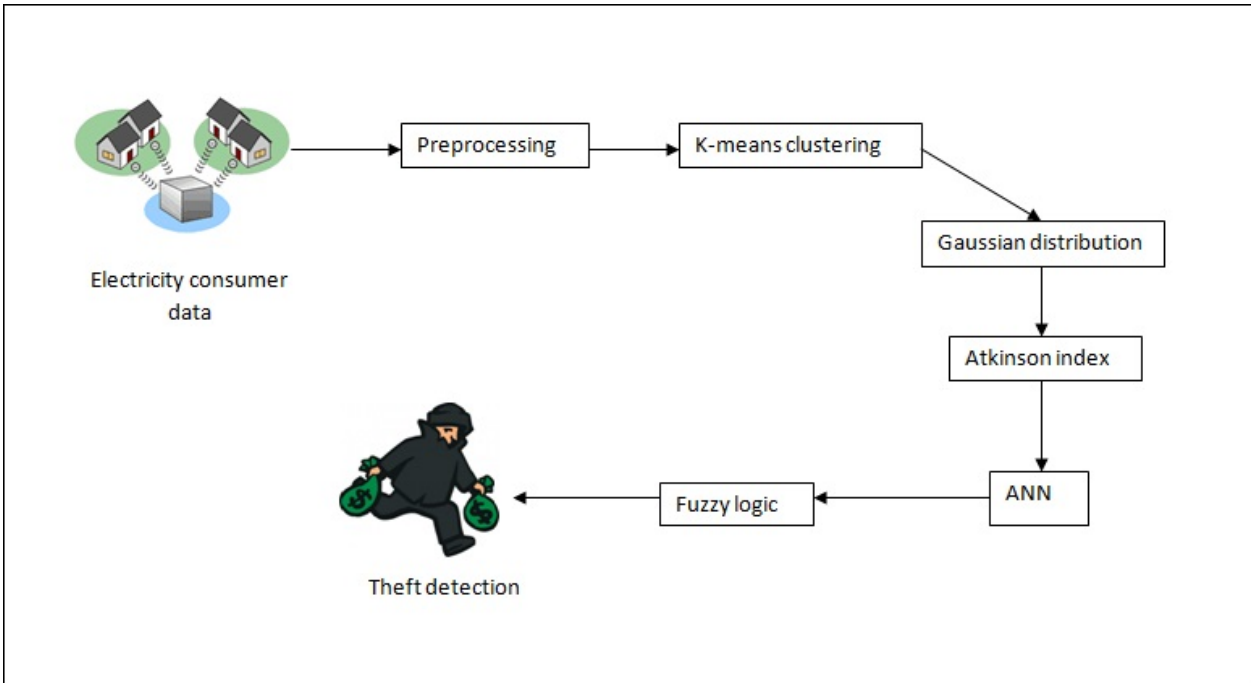
- Process: Fuzzy crisp values and fuzzy parameters
- Output: Approximate theft detected data

ALGORITHM

Input: All the attributes

Output: Weight
Step 0: Start
Step 1: Read all the attributes
Step 2: Find n clusters C1, C2, C3, and C4 ….Cn using K means
Step 3: Find SD, mean and Gaussian function of each cluster
Step 4: find minimum range and maximum range of each clusters
Step 5: minimum range =mean
If (Gaussian value > (mean *2))
Maximum range=mean + SD
Else
Maximum range =mean + Gaussian function
Step 6: Apply ANN on C1, C2, C3, and C4…. Cn to generate more clusters by using minimum range and maximum range
Step 7: store all the newly generated clusters to N_C
step 8: Set Fuzzy parameters
Step 9: For i=0 to N (where N is length of N_c)
Step 10: for each N_{ci} check for d1,d2,d3,d4
Step 11: If (more than 2 attributes are matched)
Step 12: Count++;
Step 13: end for
Step 14: find weight
Step 15: Find Inequality by Atkinson index
Step 16: weight=count/N_c size
Step 17: Stop

ARCHITECTURAL DESIGN



CONCLUSION

The progress in technology about electrical distribution network is a non stop process.New things and new technology are being invented.The proposed system found to be little complex as far as distribution network is Concerne ,but it's an automated system of theft detection. It saves time as well as profit margin for utility company working in electrical distribution network. Utility company can keep a constant eye on its costumers.

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