Extraction and Prediction of Frequent Human Activity Patterns for Health care Application

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ABSTRACT- In recent years, there's associate ever-increasing migration of individuals to urban areas. Health care service is one among the foremost difficult aspects that greatly affected by the vast influx of people to town centers. Consequently, cities round the world square measure finance heavily in digital transformation in a shot to produce healthier eco systems for individuals. In such a change, innumerable homes square measure being equipped with good devices (e.g., good meters, sensors), that generate huge volumes of fine-grained and fact knowledge that maybe analyzed to support good town services. During this project, we tend to propose a model that utilizes good home huge knowledge as a method of learning and discovering human action patterns for health care applications. We tend to propose the employment of frequent pattern mining, cluster analysis, and prediction to live and analyze energy usage changes sparked by occupant's behaviour. Since people's habits square measure principally known by everyday routines, discovering these routines permits us to acknowledge abnormal activities that will indicate people's difficulties in taking look after themselves, like not making ready food or not employing a shower/bath. This project addresses the requirement to investigate temporal energy consumption patterns at the appliance level, that is directly associated with human activities.

Keywords: Smart Home, Data Mining, Classification

I INTRODUCTION

The Studies show that by year 2050, 66% of the globe populations are going to be living in urban areas. The demands for health care resources are going to be greatly stricken by this large flow of individuals to town centers. This unprecedented demographic modification places Massive burden on cities to rethink the normal approaches of providing health services to residents. In responding to the new desires and challenges, cities are presently grip huge digital transformation in an effort to support property urban communities, and supply healthier setting. In such transformation, a lot of homes are being equipped with sensible devices (e.g. smart meters, sensors etc.) that generate huge volumes of ne-grained and indexical data which will be analyzed to support health care services. Advancement of big data mining technologies, which offer means that of process vast quantity of data for actionable insights, can aid us in understanding how people go about their life. For example, monitoring the changes of appliance usage inside a smart home can be used to indirectly determine the person's wellbeing based on historical data. Since people's habits are largely known by everyday routines, discovering these routines permits us to acknowledge abnormal activities which will indicate people's difficulties in taking care after themselves, like not making ready food or not using shower/bath. The underlying correlation between appliance usage within the sensible home and routine activities is employed by health care applications to find potential health issues. This is not only going to alleviate the burden on health care systems, but also providing 24 hour monitoring services that automatically identify normal and abnormal behaviours for independently living patients or those with self-limiting conditions.

II RELATED WORK

1. Paper Name: Incremental Mining of Frequent Power Consumption Patterns from Smart Meters Big Data

In this paper, author proposed incremental mining of frequent power consumption patterns from smart meters big data. There model exploits the benefits of pattern growth strategy and mine in quantum of 24 hour period, i.e. frequent patterns are extracted from data comprising of appliance usage tuples for 24 hours period, in a progressive manner. The details and the results of evaluating the proposed mechanism using real smart meters dataset are presented in this paper.

2. Paper Name: Safe Detecting Activities of Daily Living with Smart Meters
This paper reflects methods that can be used to analyze smart meter data to monitor human behavior in single apartments. Two approaches are explained in detail. The Semi-Markov-Model (SMM) is used to train and detect individual habits by analyzing the SMM to find unique structures representing habits. A distribution of the most possible executed activity (PADL) will be calculated to allow an evaluation of the currently

executed activity (ADL) of the inhabitant. The second approach introduces an impulse based method that also allows the detection of ADLs and focuses on temporal analysis of parallel ADLs. Both methods are based on smart meter events describing which home appliance was switched.

3. Paper Name: Detecting Household Activity Patterns from Smart Meter Data
This paper proposes an algorithm for identifying domestic activities from non-intrusive smart meter aggregate data. Author distinguish two types of activities: Type I activities are those that can be recognized using only smart meter data and Type II activities are recognized by combining smart meter data with basic environmental sensing (temperature and humidity). For both types of activities, they start by disaggregating the total power usage down to individual electrical appliances. Then, they build an indicative activity model to reason four domestic activities using the Dempster-Shafer theory of evidence. To validate their algorithms, they use real energy and environmental data collected in an actual UK household over a period of three months, benchmarked on a time-stamped log of activities.

4. Patient State Recognition System for Healthcare Using Speech and Facial Expressions
Authors designed the system in such a way that it provides good recognition accuracy, provides low-cost modeling, and is scalable. The system takes two main types of input, video and audio, which are captured in a multisensory environment. Speech and video input are processed separately during feature extraction and modeling; these two input modalities are merged at score level, where the scores are obtained from the models of different patients' states. For the experiments, 100 people were recruited to mimic a patient's states of normal, pain, and tensed.

5. Smart-Energy Group Anomaly Based Behavioural Abnormality Detection
In this paper, Authors proposed a data analytic approach that helps detect energy usage anomalies corresponding to the behavioral abnormality of the residents. Their approach relies on detecting everyday appliances usage from smart meter and smart plug data traces in regular activity days and then learning the unique time segment group of each appliance's energy consumption. They focus on detecting behavioral anomalies over a set of energy source data points rather than pinpointing individual odd points. Authors employ hierarchical probabilistic model-based group anomaly detection to interpret the anomalous behavior and therefore, detect potential tendency towards behavioral abnormality.

III OBJECTIVE

Objective of this project is to propose a model that utilizes smart home big data as a means of learning and discovering human activity patterns for health care applications. People's habits are mostly identified by everyday routines, discovering these routines allow us to recognize anomalous activities that may indicate people's difficulties in taking care for themselves.

IV EXISTING SYSTEM

Smart meters data are also used for activity recognition using Non-intrusive Appliance Load Monitoring (NALM) and Dempster-Shafer (D-S) theory of evidence. The study collects pre-processed data from homes to determine the electrical appliance usage patterns and then employs machine learning-based algorithm to isolate the major activities inside the home. The issue is that the study has to perform two steps on the data to completely isolate the main activities. Although same existing systems do not utilize smart meters data, they use Internet of Things (IoT) infrastructures in smart cities for developing applications that monitor and provide health services for patients.

V DISADVANTAGES OF EXISTING SYSTEM

1. Existing system is time consuming as the study has to perform two steps on the data to completely isolate the main activities.
2. In some case existing system fail to analysis human activities.
3. Existing system has less accuracy in result.

VI PROPOSED SYSTEM

We propose a system which collects data from smart home. As each smart home has its own smart meter that measures the amount of electricity consume by each home appliance. We will collect data of that smart meter and will store that data on server. From that data set we can help to people by analyzing their day today activity. As people's habits are mostly identified by everyday routines, discovering these routines allows us to recognize anomalous activities that may indicate people Difficulties in taking care for themselves, For instance, if the "Oven" is ON, the operation of this appliance is most Likely associated with activity "Preparing Food". The time (e.g. morning or evening) of this operation may also indicate the type of the meal such as breakfast or dinner. The proposed model observes and analyzes readings from smart meters to recognize activities and

changes in behavior. Disaggregated power consumption readings are directly related to the activities performed at home. And our system then sends alert to them if system found any anomalous activities.

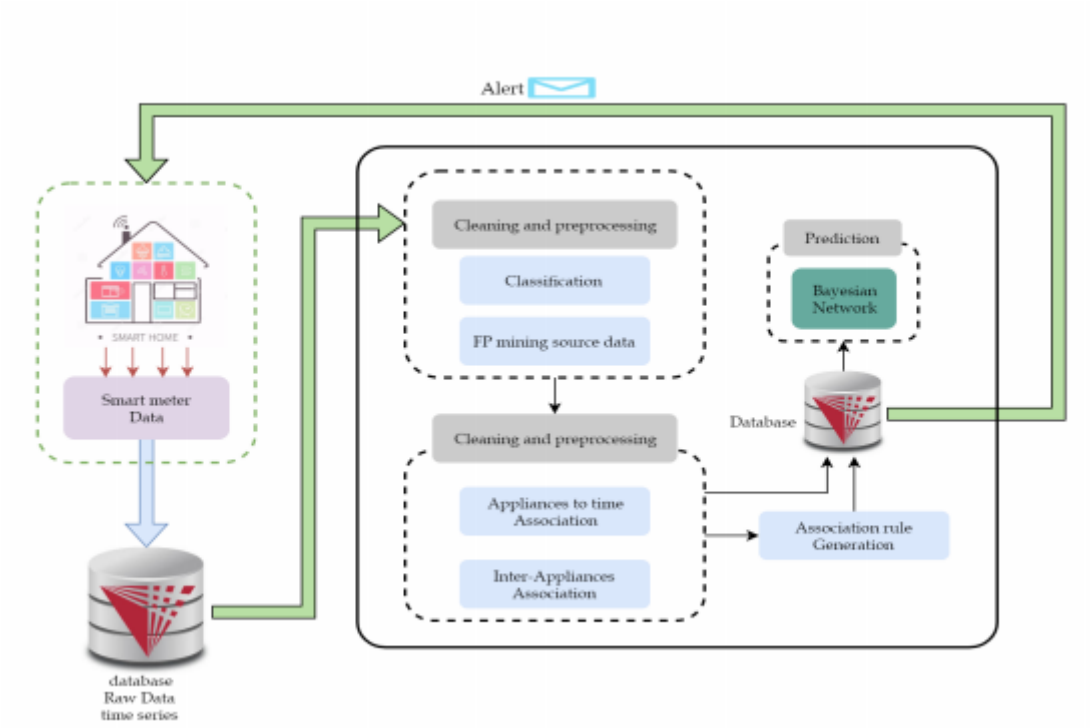

Fig 1: System Architecture

VII ADVANTAGES

1. In this project we demonstrate how visualization can enhance not only security but also usability by proposing two visual authentication protocols
2. Improve the user experience
3. Resist challenging attacks, such as the key-logger and malware attacks.

VIII CONCLUSION AND FUTURE SCOPE

Our Model for recognizing human activities patterns from low resolution smart meters data. Occupants' habits and behavior follow a pattern that could be used in health applications to track the wellbeing of individuals living alone or those with self-limiting conditions. Most of these activities can be learned from appliance-to-appliance and appliance-to-time associations. We presented Incremental frequent mining and prediction model based on Bayesian network.

IX REFERENCES

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[1] J. Clement, J. Ploennigs, and K. Kabitzsch, “Detecting activities of daily living with smart meters,” in Advance Technology and Societal Change. Heidelberg, Germany: Springer,2014,pp.143160.[Online].Available: https://link.springer.com/chapter/10.1007/978-3-642-37988-8_10

[2] Q. Ni, A. B. G. Hernando, and I. P. de la Cruz, ``The Elderly's independent living in smart homes: A characterization of activities and sensing infrastructure survey to facilitate services development," Sensors, vol. 15, no. 5, pp. 11312_11362, 2015. [Online]. Available: http://www.mdpi.com/1424-8220/15/5/11312

[3] J. Liao, L. Stankovic, and V. Stankovic, ``Detecting household activity patterns from smart

meter data," in Proc. Int. Conf. Intell. Environ. (IE),vol. 6. Jul. 2014, pp. 71_78.

[4] M. Ul Alam, N. Roy, M. Petruska, and A. Zemp, ``Smart-energy group anomaly based behavioral abnormality detection," in Proc. IEEE Wireless Health (WH), Oct. 2016, pp. 1_8.

[5] S. Singh, A. Yassine, and S. Shirmohammadi, ``Incremental mining of frequent power consumption patterns from smart meters big data," in Proc.IEEE Electr. Power Energy Conf. (EPEC), Oct. 2016, pp. 1_6.

[6] C. Chalmers,W. Hurst, M. Mackay, and P. Fergus, ``Smart meter pro_ling for health applications," in Proc. Int. Joint Conf. Neural Netw. (IJCNN),Jul. 2015, pp. 1_7.

[7] M. S. Hossain, ``A patient's state recognition system for health care using speech and facial expression," J. Med. Syst., vol. 40, no. 12,pp. 272:1_272:8, Dec. 2016.

[8] M. S. Hossain and G. Muhammad, ``Cloud-assisted industrial Internet of Things (IIoT)_Enabled framework for health monitoring," Comput.Netw., vol. 101, pp. 192_202, Jun. 2016.

[9] P. Pouladzadeh, P. Kuhad, S. V. B. Peddi, A. Yassine, and S. Shirmoham-madi, ``Mobile cloud based food calorie measurement," in Proc. IEEE Int.Conf. Multimedia Expo Workshops (ICMEW), Jul. 2014, pp. 1_6.

[10] S. V. B. Peddi, P. Kuhad, A. Yassine, P. Pouladzadeh, S. Shirmohammadi,and A. A. N. Shirehjini, ``An intelligent cloud-based data processing broker for mobile e-health multimedia applications," Future Generat. Comput. Syst. J., vol. 66, pp. 71_86, Jan. 2017.