Mining Human Activity Patterns From Smart Home Big Data For Health Care Applications

Sayali Inamdar

D Y Patil College of Engineering, Ambi

Abstract- In recent years, there is associate ever-increasing migration of people to urban areas. Health care service is one amongst the foremost troublesome aspects that greatly littered with the immense flow of individuals to city centres. Consequently, cities around the world area unit finance heavily in digital transformation in an exceedingly shot to provide healthier eco systems for people. In such a modification, innumerous homes area unit being equipped with sensible devices (e.g., sensible meters, sensors), that generate large volumes of fine-grained and reality information that perhaps analyzed to support sensible city services. throughout this project, we tend to tend to propose a model that utilizes sensible home large information as a technique of learning and discovering act patterns for health care applications. we tend to tend to propose the utilization of frequent pattern mining, cluster analysis, and prediction to measure and analyze energy usage changes sparked by occupant's behaviour. Since people's habits area unit in the main known by everyday routines, discovering these routines permits US to acknowledge abnormal activities that may indicate people's difficulties in taking take care of themselves, like not preparing food or not using a shower/bath. This project addresses the necessity to research temporal energy consumption patterns at the appliance level, that's directly related to human activities.

Keywords- Smart Home, Data Mining, Clustering, Classification

I. INTRODUCTION

The Studies show that by year 2050, sixty six of the world populations area unit getting to be living in urban areas. the stress for health care resources area unit getting to be greatly full of this massive flow of people to city centres. This new demographic modification places large burden on cities to rethink the traditional approaches of providing health services to residents. In responding to the new wishes and challenges, cities area unit presently grip large digital transformation in a shot to support property urban communities, and provide healthier setting.

In such transformation, a great deal of homes area unit being equipped with wise devices (e.g. good meters, sensors etc.) that generate large volumes of ne-grained and fact knowledge which can be analyzed to support health care services. Advancement of huge data processing technologies, which supply implies that of method immense amount of knowledge for unjust insights, will aid US in understanding however folks move their life. as an instance, observation the changes of appliance usage within a sensible home is wont to indirectly verify the person's welfare supported historical knowledge. Since people's habits area unit for the most part known by everyday routines, discovering these routines permits US to acknowledge abnormal activities which can indicate people's difficulties in taking care once themselves, like not preparing food or not exploitation shower/bath. The underlying correlation between appliance usage inside the wise home and routine activities is utilized by health care applications to search out potential health problems. this is often not solely getting to alleviate the burden on health care systems, however additionally providing twenty four hour observation services that mechanically determine traditional and abnormal behaviours for severally living patients or those with self-limiting conditions.

In the projected model [1], there's home equipped with good devices from that the information is collected by the good meter placed within the smart home. currently the good meter knowledge is keep in numerous sorts of databases like Mongolian monetary unit, information and statistic. The Mongolian monetary unit info could be a versatile and climbable document info. the information also can be keep within the information type with none transformation for the information. The statistic info stores sequences of values or events obtained over continual measurements of your time (e.g., hourly, daily, weekly).

The good meter knowledge from the info is taken for performing arts numerous processes. 1st it starts by cleansing that the noises and inconsistent knowledge area unit removed. Then bunch of the supply knowledge happens that the information having similar properties area unit sorted into categories of knowledge referred to as clusters. Next FP (Frequent Pattern) mining of the supply knowledge happens. it's method of finding oft occurring patterns within the supply

knowledge. Through FP mining, the appliance to appliance association is obtained i.e. that appliances area unit in operation along. Next section is progressive mining and bunch. The progressive mining could be a kind of mining that maintains the already discovered patterns with the present patterns and new discovered patterns whenever info gets updated. Then bunch happens to search out the appliance to time association details i.e. that appliances area unit in operation at what time. These associations area unit keep within the info. Then AN entomb appliance association is inferred that helps to come up with association rules among appliances. These association rules area unit a kind of representing oft associated patterns. The association rules area unit keep within the info. From the info the appliance to time associations additionally because the association rules area unit haunted by a graphical probabilistic model referred to as theorem network. this is often a directed acyclic graph that consists of nodes and edges. The nodes represent random variables and edges represent probabilistic dependency. This network is employed for prediction method that could be a knowledge analysis technique. the method predicts the human activities within the good home. These activities area unit learned by specific health care application to observe the health issues so as to produce specific health care to the particular user.

II. RELATED WORK

Nowadays there has been a growing trend in utilizing good home technologies so as to observe human action patterns for health care applications. the most aim is to be told and find out human behaviours so as to predict the human activities within good homes which will facilitate in distinguishing health problems.

1. Paper Name: progressive Mining of Frequent Power Consumption Patterns from good Meters huge knowledge

In this paper, author projected progressive mining of frequent power consumption patterns from good meters huge knowledge. There model exploits the advantages of pattern growth strategy and mine in quantum of twenty four hour amount, i.e. frequent patterns area unit extracted from knowledge comprising of appliance usage tuples for twenty-four hours amount, in an exceedingly progressive manner. the main points and also the results of evaluating the projected mechanism exploitation real good meters dataset area unit conferred during this paper.

2. Paper Name: Safe police investigation Activities of Daily Living with good Meters

This paper reflects ways which will be wont to analyze good meter knowledge to watch human behavior in single flats. 2 approaches area unit explained intimately. The Semi-Markov-Model (SMM) is employed to coach and observe individual habits by analyzing the SMM to search out distinctive structures representing habits. A distribution of the foremost potential dead activity (PADL) are calculated to permit AN analysis of the presently dead activity (ADL) of the someone. The second approach introduces AN impulse based mostly technique that additionally permits the detection of ADLs and focuses on temporal analysis of parallel ADLs. each ways area unit supported good meter events describing that household appliance was switched.

3. Paper Name: police investigation house Activity Patterns from good Meter knowledge

This paper proposes AN rule for distinguishing domestic activities from non-intrusive good meter combination knowledge. Author distinguish 2 styles of activities: kind I activities area unit those who is recognized exploitation solely good meter knowledge and sort II activities area unit recognized by combining good meter knowledge with basic environmental sensing (temperature and humidity). For each styles of activities, they begin by disaggregating the overall power usage right down to individual electrical appliances. Then, they build AN indicative activity model to reason four domestic activities exploitation the Dempster-Shafer theory of proof. To validate their algorithms, they use real energy ANd environmental knowledge collected in an actual United Kingdom of Great Britain and Northern Ireland house over a amount of 3 months, benchmarked on a time-stamped log of activities.

4. Patient State Recognition System for aid exploitation Speech and Facial Expressions

Authors designed the system in such how that it provides sensible recognition accuracy, provides inexpensive modeling, and is climbable. The system takes 2 main styles of input, video and audio, that area unit captured in an exceedingly multisensory surroundings. Speech and video input area unit processed singly throughout feature extraction and modeling; these 2 input modalities area unit united at score level, wherever the scores area unit obtained from the models of various patients' states. For the experiments, one hundred folks were recruited to mimic a patient's states of traditional, pain, and tensed.

5. Smart-Energy cluster Anomaly based mostly activity Abnormality Detection

In this paper, Authors projected an information analytic approach that helps observe energy usage anomalies cherish the behavioural abnormality of the residents. Their approach depends on police investigation everyday appliances usage from good meter and good plug knowledge traces in regular activity days then learning the distinctive time section cluster of every appliance's energy consumption. They specialize in police investigation behavioural anomalies over a collection of energy supply knowledge points instead of pinpointing individual odd points. Authors use stratified probabilistic model-based cluster anomaly detection to interpret the abnormal behavior and so, observe potential tendency towards behavioural abnormality.

III. OBJECTIVE

Objective of this project is to propose a model that utilizes good home huge knowledge as a way of learning and discovering human action patterns for health care applications. People's habits area unit principally known by everyday routines, discovering these routines enable US to acknowledge abnormal activities that will indicate people's difficulties in taking look after themselves.

IV. EXISTING SYSTEM

Smart meters knowledge are used for activity recognition exploitation Non-intrusive Appliance Load observation (NALM) and Dempster-Shafer (D-S) theory of proof. The study collects pre-processed knowledge from homes to work out the electrical appliance usage patterns then employs machine learning-based rule to isolate the main activities within the house. the difficulty is that the study needs to perform 2 steps on the information to utterly isolate the most activities. though same existing systems don't utilize good meters knowledge, they use net of Things (IoT) infrastructures in good cities for developing applications that monitor and supply 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.
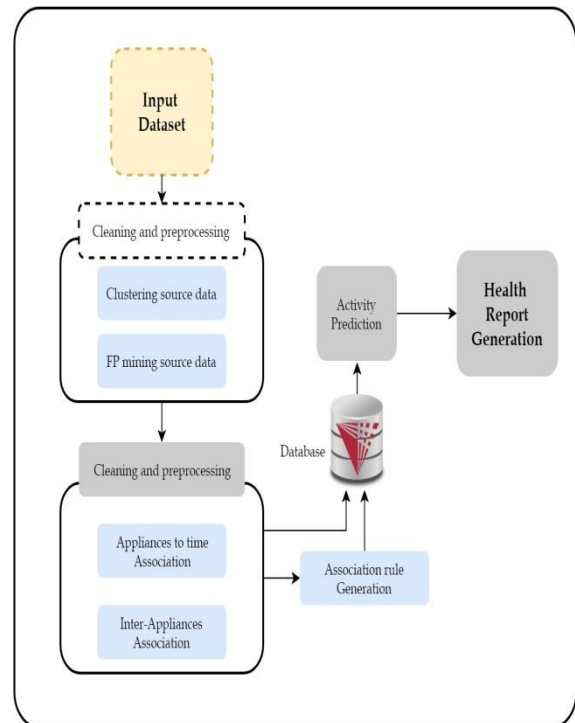3. Existing system has less accuracy in result.

**Fig 1: System Architecture**

VI. PROPOSED SYSTEM

We propose a system that collects knowledge from good home. As every good home has its own good meter that measures the number of electricity consume by every household appliance. we are going to collect knowledge of that good meter and can store that knowledge on server. From that knowledge set we will facilitate to folks by analyzing their day nowadays activity. As people's habits area unit principally known by everyday routines, discovering these routines permits US to acknowledge abnormal activities that will indicate folks Difficulties in taking look after themselves, for example, if the "Oven" is ON, the operation of this appliance is presumably related to activity "Preparing Food". The time (e.g. morning or evening) of this operation may indicate the sort of the meal appreciate breakfast or dinner. The projected model observes and analyzes readings from good meters to acknowledge activities and changes in behavior. Disaggregated power consumption readings area unit directly regarding the activities performed reception. And our system then sends awake to them if system found any abnormal activities.

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. RESULT
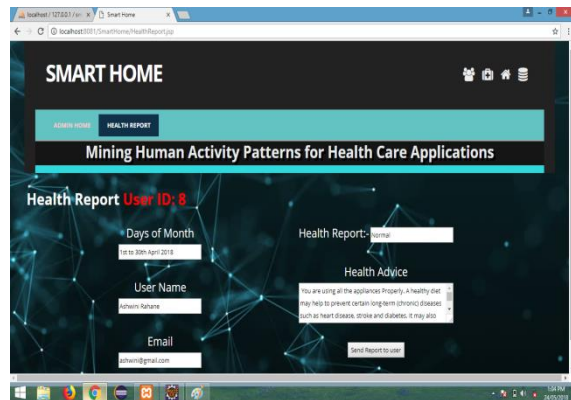
IX. CONCLUSION AND FUTURE SCOPE

Our Model for recognizing human activities patterns from low resolution good meters knowledge. Occupants' habits and behavior follow a pattern that might be employed in health applications to trace the welfare of people living alone or those with self-limiting conditions. Most of those activities is learned from appliance-to-appliance and appliance-to-time associations. we tend to conferred progressive frequent mining and prediction model supported theorem network.

REFERENCES

[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] Bongale, Anupkumar M., Anand Swarup, and Shashank Shivam. "EiP-LEACH: Energy influenced probability based LEACH protocol for Wireless Sensor Network." IEEE International Conference on Emerging Trends & Innovation in ICT (ICEI), 2017.

[8] Bongale, Anupkumar M., and C. R. Nirmala. "EOICHD: A Routing Scheme for Wireless Sensor Network Based on Energy and Optimal Inter Cluster Head Distance." International Journal of Applied Engineering Research, Vol. 11, Issue 11, 7256-7266, 2016.

[9] 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.

[10] 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.

[11] 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.

[12] 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.