I J C T A, 9(15), 2016, pp. 7641-7647

Prediction of location with high level accuracy using social interplay

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ABSTRACT

The prediction of location using cellular network traces has obtained lots of attention by using internet of things. The location prediction using mobile traces is an important and challenging task due to the ambiguity view of human mobile patterns, since there is fuzziness of patterns in cell towers. Here, the aim is to reduce the noise and overlapping of data through strong correlation and Co-occurrence of cell towers at the same time by using call patterns of users, which reduces the usage of GPS coordinates. In this paper we present the architecture to reduce the noise and overlapping of data using data pre-processing and call patterns recognitions. We have designed the Social interplay along with data preprocessing to reduce the noise at cell towers and to predict location with high level of accuracy. We have also implemented the mechanism of sending encrypted short messages across the country in order to notify the location of a person. Here the main aim is to design and implement the social interplay to predict the location along with encrypted short messages in order to maintain the privacy. As a result, the prediction achieves higher precision accuracy by calling cell tower level in recurring intervals.

Keywords: InternetofThings, GPS Coordinates, Data preprocessing, Social Interplay, cell towers, short messages

1. INTRODUCTION

The Internet of things is generally defined as the network of devices, vehicles, buildings and some more physical objects where the IoT is used to collect and transfer the data. The IoT permits physical devices to be controlled across the network. This results in improved efficiency, high accuracy and more benefits economically. The devices can be uniquely identifiable but are not able for inter-operation in the existing current infrastructure. IoT is a system of computing devices that is related to each other through a connected network that has ability to exchange data without interception of human which means human-computer interaction is not required.

IoT was emerged from the convergence of wireless technologies and Micro services in which it can be used in devices as embedded system control and it also improves the unstructured data to be analyzed for insight users. The advantage of Internet of Things is the device connection will be observed and they act as living objects in the physical world.

The IoT (Internet of Things) is a mechanism where the everyday objects can be embedded by identifying and sensing the networking and processing capabilities that will allow the things to communicate with each other devices and also with other devices. It services over the Internet to give some objective without human interaction. Ultimately, IoT devices [6] will be unique from other, context known devices (such that the devices will be programmed) and will enable ambient intelligence which reduces the work load of human.

The IoT is a technology that grows rapidly in the telecommunication without wired network i.e., wireless. The idea of IoT is to connect the things around us using [3] RFID tags, sensors etc., as mentioned earlier [4] “The Internet of Things: A Survey”; the survey gives the details about

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- Provides the readers the various versions of scientific groups with different versions
- It checks and gives the review of technologies and explain the use of IoT in daily life cycle
- It gives the details of issues that the scientific groups have to face

IoT has a wide range of applications in many industries such as precision agriculture where the agriculture is done by IoT devices, buildings can be constructed using IoT management, health care, energy and transporting department.

2. TRANSFORMATION OF DATA

Data must be properly formatted and normalized in order to load into the data warehouse [7]. Data pre-processing is a major process in data mining which is used in the transformation of raw data into understandable format by following some set of rules. The data pre-processing involves a few steps where the raw data will be filtered and converted into structured format by using analysis and knowledge discovery methods.

The Data Pre-Processing method is also used to reduce the noise present in the data so that the output obtained will be more efficient and works effectively with call pattern to decide the interplay module

The figure 1 explains how the raw data transforms into call pattern after performing the actions reading, filtering, re-sampling, generating and spatializing the data.

3. DESIGN OF SOCIAL INTERPLAY

The interplay modules is classified into 2 types, periodicity based module and interplay based module, where the periodicity based module depends on the static information like latitude and longitude where as the interplay module is dynamic and it requires the cellular pattern and recognizes the location of cell

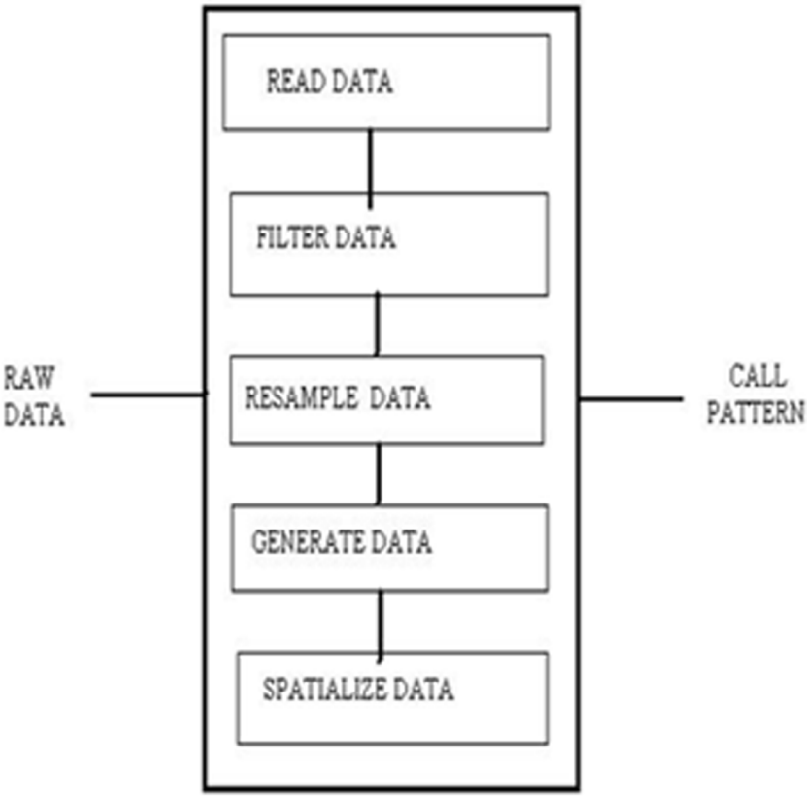

Figure 1: Data Preprocessing

tower. Since the periodicity module, is static and could not recognize the call pattern we rely on interplay module where it requires the cellular pattern to recognize the location .

We created the database, where the users across the country can register to share the locations to notify their friends with encrypted short message.

Fig 3 shows the encrypted short message shared by Person A will reach the person B through mail, where the role of privacy in sharing the location is maintained through encrypted short messages between both. It also helps in finding out the usage of internet and can be able to send the short messages with the

Figure 2: Location Sharing

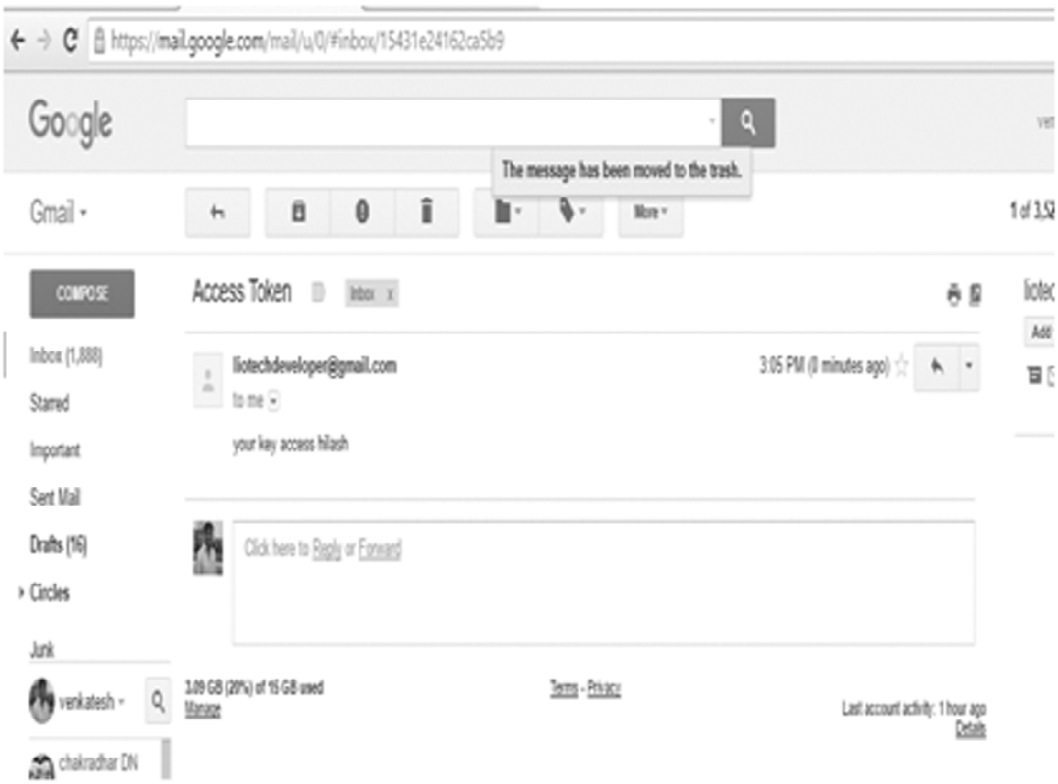

Figure 3: Access of Secret Key through Email

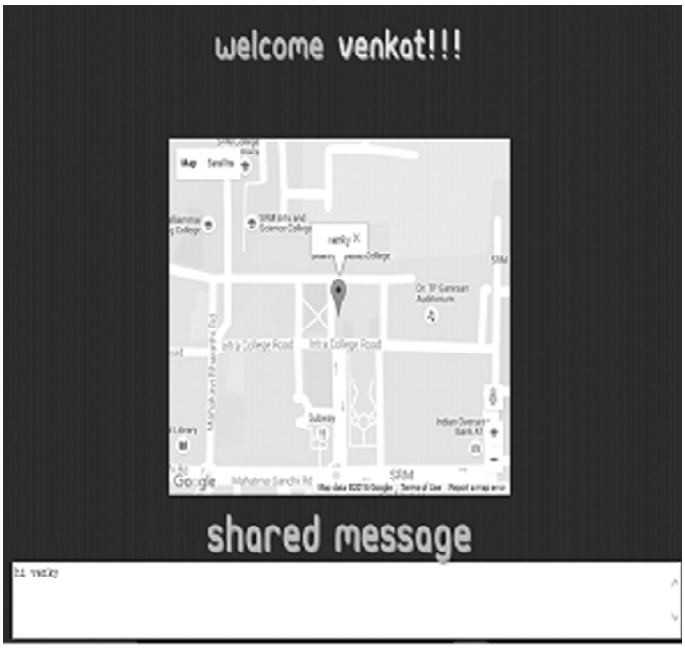

Figure 4: Prediction of Location along with Encrypted message

location which is more useful for the user using it. The term social interplay defines the usage of short message and internet with the location service.

Person B is notified with Person A's location along with encrypted short messages. The Fig 4 describes the notification of location and short message.

4. ARCHITECTURE

Each module is determined and the architecture is more efficient and it also helps to reduce noise as both the data pre processing and call pattern recognition are in same module.

In the figure 5, the architecture consists of three modules where the first modules comprises of data preprocessing and call pattern recognition, the second module consist of periodicity and interplay modules and the last module is aggregation.

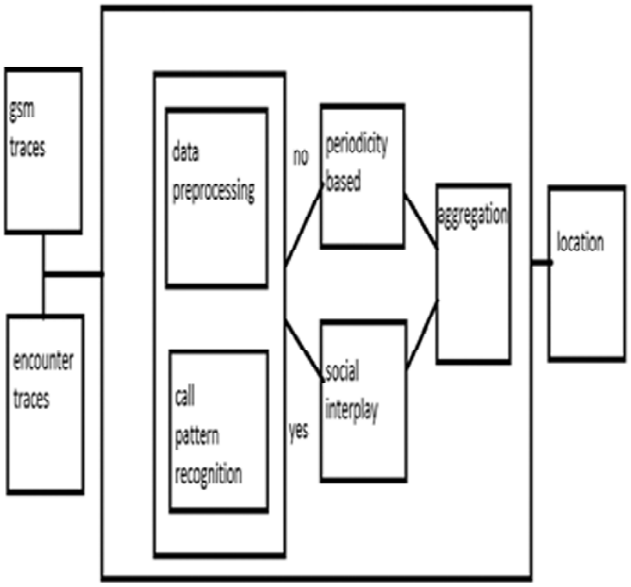

Figure 5: Architecture

4.1. Data Pre-processing

Data Pre-Processing transforms the raw data by following the steps described in the figure 1.

The raw data will be pulled into the target data using selection and then the preprocessing and transformation takes place to reduce the noise and unreliability of data to give clean data. Data mining method acts on the clean data to form the clusters of different patterns of data and spatialise data involves in the process of interpretation, evaluation and validation data that gives the understandable and structured format of data. The output obtained is given as input to the call pattern recognition.

4.2. Call pattern recognition

The call pattern recognition decides which sub module has to be chosen for the prediction of location. Call pattern recognition mechanism uses the smart phones or IoT connected devices to get the environment analysis, which results in choosing the sub module of periodicity or social interplay

4.3. Interplay based module

If there is no critical call pattern then the periodicity based module is activated. If the critical call pattern is present then the social interplay module takes place where the method is invoked to estimate user location and can find the mobile traces more accurately by reducing noise. The interplay module gives the location of the user which also gives the details of usage of internet.

4.3.1. Periodicity module

It takes the historical locations as input and gives the future location as output which will be very less accurate and it also predicts the location using periodicity of user patterns.

4.3.2. Social Interplay

To reduce the workloads we can turn off the periodicity based module and we can use social interplay to obtain the location which will be more accurate and the location traced will be checked in regular intervals. As a result, the prediction achieves higher precision accuracy by calling cell tower level in recurring intervals.

4.4. Aggregation

The aggregation module combine the output of interplay and periodicity based module and then gives the location region of the application as the output .The filter transformation is used to combine the results of the two modules and gives the output in which location or details of the periodicity is more useful to find location.

5. WORKING OF ARCHITECTURE

The gsm traces and telecom traces obtained will be given as input followed by the data preprocessing module where the data is converted from raw to structured format and the output of pre-processing module will be given as input to the call pattern recognition where the co-relation happens and it activates the sub-modules based on call pattern. If the call pattern is critical then interplay based sub-module will be activated else the periodicity based sub-module will be activated which gives the static details of the network. Social interplay is used to predicate the user location and the aggregation module is used to combine the results of both modules and gives the user location as output. Thus the working architecture has a major role in determining every module application. As an addition the social interplay is used to send the encrypted short messages to the users. Message Digest 6 encryption algorithm has been used. Here the message will be sent along with the location such that the user can be able to share the location easily by using social interplay. Thus the social interplay will be more effective in using Internet of Things

6. RESULT

The prediction scheme based on spatial and temporal would not yield high level precision and also leads to the overlapping of cell towers .Therefore by implementation of social interplay along with encrypted short message; we can achieve the location with high level accuracy and high level of security.

7. LITERATURE SURVEY

Security [6] plays the major role where three standards are analyzed, and identifies the problems in routing protocols and also provides measures to protect the infrastructure of industry

The literature review [4] describes the explanation and usage of IoT, and also the advantages of IoT in real world, thus proved that IoT embedded devices are real objects in the physical or material world.

As per the survey [2] the various problems to be faced by scientific groups, describes the use of IoT in daily life cycle, and it also checks and describes the growth of technology.

The social interplay[1] was introduced that affects the user short term mobility by investigating the large scale mobile traces from telecom logs and also proposed a prediction scheme named NextMe used to predict location(Longitude and Latitude) at region level

8. CONCLUSION AND FUTURE ENHANCEMENTS

As the usage of IoT is increasing rapidly, prediction of accurate location are vital in the field of telecommunication. Apart from prediction, maintaining privacy also plays a major role .In this paper, we have implemented social Interplay to predict the location with higher level of accuracy for larger area and security through short messages. We proposed architecture to reduce the noise and predicting location with higher accuracy.

As future enhancement, we will develop a system for mobile application by making use of IoT series.

REFERENCES

[1] Next Me: Localization Using Cellular Traces Daqiang Zhang, Senior Member, IEEE, Shengjie Zhao, Senior Member, IEEE, Laurence T. Yang,in Internet of Things Min Chen, Yunsheng Wang, and Huazhong Liu.

[2] S. Li, L. Xu, and S. Zhao, “The internet of things: A survey,” Inf. Syst.Frontiers, pp. 1–17, 2014, doi: 10.1007/s10796-014-9492-7.

[3] D. Giusto, A. Iera, G. Morabito, L. Atzori (Eds.), The Internet of Things, Springer, 2010. ISBN: 978-1-4419-1673-0.

[4] Internet of Things (IoT): A Literature Review Author: Somayya Madakam, R. Ramaswamy, Siddharth Tripathi - IT Applications Group, National Institute of Industrial Engineering (NITIE), Vihar Lake, Mumbai, India.

[5] Predicting Location Using Mobile Phone Calls Author: Daqiang Zhang- Nanjing Normal University – China, Athanasios V. Vasilakos- NationalTechnical University – Greece, National Technical University.

[6] Alcaraz, C., & Lopez, J. (2010). A security analysis for wireless sensor mesh networks in highly critical systems. IEEE Transactions on Systems, Man, and Cybernetics Part C: Applications and Reviews, 40(4), 419–428.

[7] C. Jin, F. Li, M. Wilamowska-Korsak, L. Li, and L. Fu, “BAP-GA:A new genetic algorithm for system optimization and excellent schemaselection,” Syst. Res. Behav. Sci., vol. 31, no. 3, pp. 337–352, 2014.

[8] B. Huang, C. Li, and F. Tao, “A chaos control optimal algorithm forQos-based service composition selection in cloud manufacturing system,” Enterp. Inf. Syst., vol. 8, no. 4, pp. 445–463, 2014.

[9] D. Zhang, M. Chen, M. Guizani, H. Xiong, and D. Zhang, “Mobility pre-diction in telecom cloud using mobile calls,” IEEE Wireless Commun.,vol. 21, no. 1, pp. 26–32, Feb. 2014.

[10] D. Zhang, A. V. Vasilakos, and H. Xiong, “Predicting location usingmobile phone calls,” in Proc. ACM SIGCOMM Conf. Appl. Technol.,Archit., Protoc. Comput. Commun., Helsinki, Finland, Aug. 2012, pp. 295–296.

[11] W.S. Soh and H. S. Kim, “Qos provisioning in cellular networks basedon mobility prediction techniques,” IEEE Commun. Mag., vol. 41, no. 1, pp. 86–92, Jan. 2003.

[12] W. Tan et al., "A trust evaluation model for e-learning systems," Syst. Res.Behav. Sci., vol. 31, no. 3, pp. 353–365, 2014.

[13] A. Roy, S. K. Das, and A. Misra, "Exploiting information theory for adap-tive mobility and resource management in future cellular networks," IEEEWireless Commun., vol. 11, no. 4, pp. 59–65, Aug. 2004.

[14] K. Kumar and Y.H. Lu, "Cloud computing for mobile users: Can offload-ing computation save energy?" Computer, vol. 43, no. 4, pp. 51–56, 2010.

[15] T. Hossmann, T. Spyr, and F. Legendre, "Putting contacts into context:Mobility modeling beyond inter-contact time," in Proc. 12th MobiHoc, Paris, France, 2011, pp. 199–208.

[16] E. Cho, S. A. Myers, and J. Leskovec, "Friendship and mobility: User movement in location-based social networks," in Proc. 17th ACMSIGKDD Int. Conf. Knowl. Discovery Data Min., San Diego, CA, USA,2011, pp. 1082–1090.