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Data Prioritization for the Healthcare Networks for the Priority based Data Propagation

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Research Article

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ABSTRACT

The healthcare networks have grown up to the very large scale in the recent years and still occupying the healthcare sector in the variety of the areas in order to propagate the health related information to the centralized servers. The healthcare networks are being utilized in the post-treatment patient's health analysis application or the telemedicine applications for the assessment of the person's health in the remote areas for the correct medicine prescription. The proposed model has been designed for the prioritization of the healthcare data according to the criticality level of the information. The critical data handling and the primary categorization method has been designed in the proposed model for the handling of the critical data in the healthcare applications. The proposed model has been designed for the prioritization of the healthcare data according to the multi-level criticality assessment. The proposed model has been undergone the performance evaluation on the basis of the throughput and end-to-end delay parameters. The proposed model has been found efficient based upon the parameters evaluated from the proposed model simulation.

INTRODUCTION

The new term based upon the smart city is evolving over the recent years along with the rise in the technology. The smart cities are being made capable of connecting the residents with the technology for the higher level services, which includes the transport updates, service application updates and status information, security and natural hazard related applications, etc. Also the smart cities are adding the revolutionary technologies of the new age such as the smart power generation (wind or solar power plants), high tech hospitals and many other such related techniques. Technology is driving the manner town officers act with the community and therefore the town infrastructure. Technology will be used as AN enabler to inform what's happening within the town, however town is evolving, and the way to alter an improved quality of life.

The smart cities utilizes the smart information propagation and management mediums in order to make the whole communication infrastructure to handle the large volume communications across the intranet and internet architectures laid down in the cities [1-3]. The technologies are evolving for the smart cities specifically in the smart governance, transport and traffic management [2], healthcare networks, water, sanitation [4], agriculture and other similar service management applications are being integrated in the smart city management and connectivity applications [5,6]. The smart cities require the vital connectivity and robust network flexibility for the provision of the lossless connections and information delivery guarantee with the minimum failure rate [3].

The internet of things (IoT) has grown over the recent years and has grown its popularity in the healthcare, home security and many other fields. The IoT based networks are empowering the major industries across the big cities and connecting the more number of people with the city centric services to help them in the routine life. The smart cities are utilizing the different dimensions of the IoT networks in order to create the smart service environment across the cities [1,4]. In this paper, the primary area of exploration lies with the assessment of the primary role of the internet of things (IoT) in the implementation of the networks for the realization of the smart cities by creating the great opportunities and for tackling the severe challenges using the smart IoT based networks [3]. The IoT networks are empowered with the low power enabled computationally less-efficient devices to fulfill the small objectives (usually single function abilities) such as the healthcare monitoring and other such services to provide the smart services to the citizens. The usually IoT services includes the following [7]:

- Smart sensor technology to grab the smarter information

- Microcontroller enabled low-power sensors are utilized to analyze the device while staying connected wirelessly
- Efficient cloud enabled sensor networks (or sensor clouds) are utilized to offer the large scale services

LITERATURE REVIEW

De Domenico et al. [1] has developed the tactic for personalised routing for multitudes in sensible cities. During this paper, the authors have projected associate accommodative routing strategy that accounts for individual constraints to suggest personalised routes and, at identical time, for constraints obligatory by the collectivity as an entire. Using huge knowledge sets recently discharged throughout the medium Italy huge knowledge Challenge, they need shown that our algorithmic program permits U.S.A. to cut back the traffic in a very sensible town because of cooperative effects, with the participation of people within the system, taking part in a vital role Nallur et al. [2] has developed the sensible route coming up with strategies using open knowledge and democratic sensing. During this paper, the authors have given a wise route coming up with ASCII text file system; SMART-GH utilizes open knowledge and democratic sensing, wherever voters actively participate in collection knowledge regarding the town in their daily setting, e.g., noise, pollution, etc. Cardozo et al. [3] has worked on enabling democratic routing employing a sensible routing platform. They need argued that this may result in bigger participation, in addition as bigger interest in varied aspects of a town which will be collaboratively mapped. Al-Fuqaha et al. [5] has been conducted the survey upon net of things, that is focusing upon the technologies, protocols, and applications for Iots.

EXPERIMENTAL DESIGN

In the existing models, the authors have utilized the distributed network architecture for the smart sensor cloud along with the traditional distance vector routing algorithms for the efficient metric calculation for resolve the problems related to the data communications across the smart cities. The existing routing solution proves its capability for the efficient-routing across the large networks connections, and has found the required path towards the perfect destination, when it comes to the uni-traffic paradigm, where the network responsibility lies in the propagation of the data of the single service. The existing routing model following the proactive paradigm, which is associated with the pre-computed network routes, which suites the stationary nodes, but not quite feasible with the moving nodes across the cities. Hence the proposed model has been designed with the smarter and quicker reactive routing with continuous route updation for the smart devices in the smart cities. The tree based routing algorithm has been proposed under the proposed model for the robustness of the data delivery in the smart city application, which is based upon the integration or clustering of the network data across the smart city cluster for the robust and accurate delivery of the service request an service delivery between the server and client nodes.

The proposed model has been designed with the load balancing mechanism for the handling of the heavy traffic loads across the given network in the smart cities. The proposed model has been designed to propagate the information across the large scale smart city network by segregating or clustering the routing data across the smart city networks in order to propagate the different kinds of the information from the different regions to the target servers. The nodes are shortlisted among the IoT networks in the smart cities, which are selected after analyzing the hop count, link quality and adaptive route cost for the selection of the link along with the quality based assessment parameters of overall link delay, path integrity and data loss probability for route selections. The proposed algorithm has been evaluated using end to end delay/latency, packet delivery ratio and packet Efficiency of the alternative route. The data prioritization has been proposed along with the smart routing for the smarted delivery of the data among the smart city networks. The following algorithm defines the overall working of the proposed model.

Algorithm: Healthcare Data Prioritization

1. The vehicular nodes sense the hurdle or the collision within its path
2. The vehicular nodes collect the information for the hurdle or collision
3. It rearranges the update data and transmits the update to the smart units deployed on RSU
4. The RSU classifies the type of the vehicular update data
5. The QoS algorithm decides the priority of the update data
6. The vehicular network segmentation and isolation module classifies and segments the vehicular node which must receive the update data
7. The smart RSU node then propagates the data towards the target nodes
8. The congestion rate is studied and the load balance probability is assessed
9. If the congestion rate is found higher than the specific threshold

a. Forward the data over the multiple links under the load balance protocol

10. Otherwise

b. Forward the data through the best path for data propagation

11. The data is then delivered according to the decided protocol

12. Return the vehicular performance parameters

RESULT ANALYSIS

The routing becomes the very challenging task across the smart cities, especially when utilized in the heavily populated service areas. The healthcare, transport and other similar services are intended to produce the larger volumes of the data across the smart cities, which need to be delivered to the different destinations placed on the different geographic locations across the cities. The proposed model has been empowered with the efficient delivery mechanism across the smart city networks by utilizing the data stream clustering and other similar mechanisms for the propagation of the data across the busy network channels. The proposed has been proved to be efficient, as it has been recorded with the robust values for the target performance parameters **(Figure 1)**.

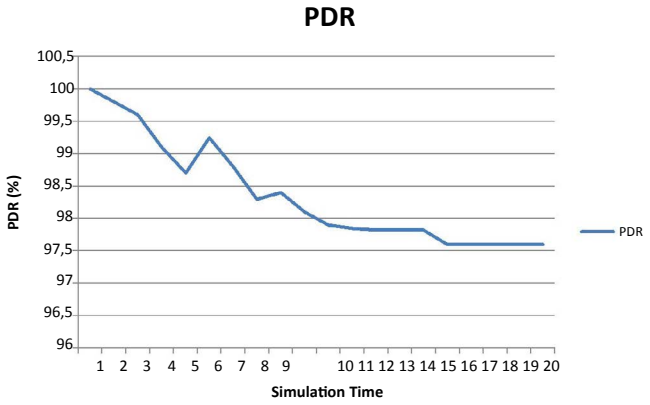

Figure 1. Packet delivery ratio.

The unsuitable routing and information propagation protocol may cause the heavy amounts of data dropped during the communication, which may reduce the overall reliability of the routing algorithm in the smart city environments. The smaller route costs along with the lower load across the routing paths can produce the healthy environment for the data propagation for the different services being offered in the smart city networks. The proposed model has been primarily analyzed on the basis of the two performance parameters to assess the network health, which includes the packet delivery ratio (PDR) and transmission or end-to-end delay. The packet delivery ratio parameter reveals the network performance in the successfully delivering the data to the servers of various services offered across the smart cities [8]. The transmission delay reveals the overall time taken for the transmissions across the smart cities. The proposed model has been recorded with the lowest value of nearly 97% from the 12th rotation to the end to the simulation the rotation, which marks the 120th second over the simulation time scale, as the recording interval has been set to 10 seconds.

The transmission delay has been recorded nearly at 0.25 seconds or 250 milliseconds at maximum, which is the highest value reached after the network convergence. The proposed model has been recorded for 200 seconds, where each interval of 10 seconds has been marked for the recording of the elapsed time. The proposed model can be declared efficient on the basis of both of the performance parameters, where it has shown the high-end performance for the smart city environments **(Figure 2)**.

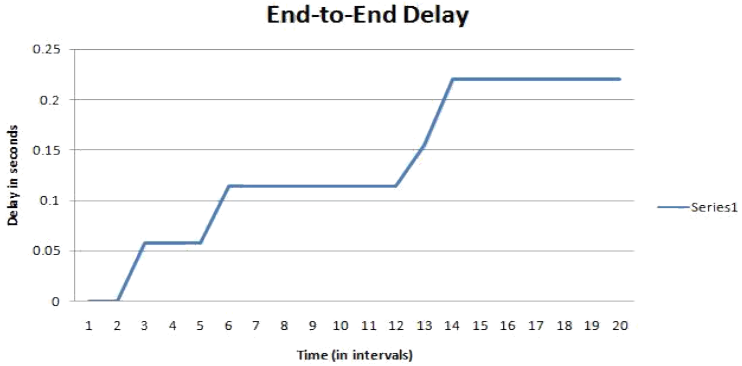

Figure 2. End-to-end latency.

CONCLUSION

The proposed model has been designed for the prioritization of the healthcare data over the network links in order to propagate the data with the best effort delivery. The proposed model has been designed for the evaluation of the healthcare update data along with the quality of service (QoS) based application for the healthcare networks. The proposed model performance has been evaluated on the basis of the packet delivery ratio and end to end delay based parameters. The proposed model has been found efficient on the basis of the evaluated parameters.

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