Energy efficient data prediction model for the sensor cloud environment

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Abstract:
The sensors are used for many applications in the recent time. The sensors generally connect with each other wirelessly to form a Wireless Sensor Network (WSN). Cloud computing is an emerging technology where the end users pay and access the services without worried about the infrastructure. Sensor cloud combines sensor network with the cloud computing in which the end users can access to the sensor network through the cloud computing. Sensor cloud should be energy efficient as the battery life of the sensor is finite and huge amount of energy is consumed in the cloud computing environment to provide services to the end users. The users request to access the sensor through the cloud system redirects every time to the sensor network, which causes more transmission in the sensor network as a result more energy is consumed. In this paper, we have compared mainly the accuracy and time consumed by various prediction schemes using some activation functions. From our analysis, we found that the Rprop-algorithm using logistic activation function is suitable as it provides nearly 97.2 percentage accuracy within an admissible delay of 13 seconds. Our proposed sensor cloud model integrates Rprop-prediction scheme using the logistic activation function in cloud system which predicts future sensor data, such that users request are replied at cloud level which saves energy as number of transmissions are reduced in the sensor network.

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Contents

WSN is used for many applications in various industries recently. The cloud computing provides processing resources, storage space to the end user on rent. The end users only have to pay and get the service without worried about infrastructure. The sensor Cloud is a combination of wireless sensor network and the cloud computing, where the end users can access the sensors using the cloud computing environment. The owner of the sensor can attach his sensor to the cloud computing environment and gets rent, once the sensors are used by the end users. Sensor node must be energy efficient as the battery life time is finite and it is not possible to replace the battery in some scenarios. In the cloud computing environment, there is the huge amount energy required to run the server. Energy saving in the sensor cloud environment is challenging task. Energy consumption in the wireless sensor network mainly depends on the distance between two nodes and rate of transmission. More transmissions make the batteries of the sensors to dry soon. Using prediction scheme if the number of transmissions is reduced, the network lifetime can be further increased. Authors in [1] proposed a weather forecasting system which provides accurate prediction. A. J. Litta et al. [2] predict thunderstorm in weather using neural network models. The authors in [3] have predicted temperature for 365 days using nonlinear predictive model of artificial neural network. The research carried out by V. M. Krasnopolsky et al. [4] proposed weather and numerical climate prediction using the cloud resolving model. Authors in [5] proposed a neural network based back propagation method to predict temperature using dataset of real time.

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