Abstract

A Wireless Sensor Network (WSN) is a collection of spatially separated and specialized sensors that work together to monitor, record, and transmit information about the physical state of the environment to an internet-based location. In order to improve WSN power consumption, this work proposes a classification technique where K nearest neighborhood was applied in those clusters to select the best nodes. The purpose of the classification technique is to divide the network into various node-groupings. We calculated the correlation matrix for one node in each group and cluster, and we also applied the RNN model to get a better prediction within each node in each cluster, so only one node of data will be sent from each cluster to the base station. Furthermore, the experimental results reveal that, based on a suitable choice of nodes, our proposed model performs accurate predictions, with minimum error measured using the Root Mean Squared Error (RMSE) as compared to related work. The radio-energy transmission model used in this work also shows that our proposed model is able to save two times more energy than most of the existing data transmission models.

Evaluation Metrics

Energy in each cluster $C_k$

$$E(C_k) = \min\{E_{n_1}, E_{n_2}, ..., E_{n_{m}}\}$$  \hspace{1cm} (1)

$E_{n_{i}}$ is the energy required by node $i$ for transmission.

Lifetime of cluster $C_k$

$$\text{Lifetime}(C_k) \propto \frac{1}{K}$$  \hspace{1cm} (2)

Network lifetime

$$\sum_{k=1}^{N} \text{Lifetime}(C_k).$$  \hspace{1cm} (3)

Nodes organization

$$S = \{m_i\}_{1 \leq i \leq N} \text{ where } (m_i = \text{node } i)$$  \hspace{1cm} (4)

Results

The graphs and tables below show the results obtained after training the models. K Nearest Neighbor (KNN), Clusters, LSTM with the sample dataset and entire dataset.

References