Packet Reception Data for Single-hop Wireless Multicasting

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***ABSTRACT***

**The purpose of this article is to provide documentation of the data [1] provided for the experiments of applying machine learning clustering algorithms for single-hop wireless multicasting. The technical overview and description of our work will be made available through a research paper.**

**INTRODUCTION**

A total of 6 experiments were performed using TelosB wireless sensor motes, in which 3000 packets were broadcast from a single transmitter to multiple receivers. For each set of parameter, three experiments were conducted. All experiments were conducted in the rural farmland area adjacent to Namal College hostel in Ban Hafiz Jee, Mianwali, to avoid any interference in the 2.4 GHz band which the TelosB motes used for communication.

While the packet transmission from the transmitter was transmitted at sufficiently large distances, NACK frames were collected by physically bringing the receiving motes adjacent to the transmitting mote, after the transmission of 3000 packets, to virtually avoid any NACK losses due to signal attenuation.

Machine learning clustering algorithms were applied on the packet reception data of the first experiment, and then in the second and third experiments evaluation of the efficiency of these algorithms were evaluated. Description of machine learning clustering algorithms can be found from the book [2].

* Grid Topology

15 motes were used as receivers in grid topology.

Three experiments in grid topology were performed at distances of 20m and 25m:

* 20m  
  The clustering results of ‘model-20G’ were applied on ‘exp1’, and ‘exp2’.
* 25m  
  The clustering results of ‘model-25G’ were applied on ‘exp3’, and ‘exp4’.

The .nesc programming code used to program the TelosB motes can be found in the folder “TelosB codes”.

**NOTATIONS AND LEGENDS USED:**

**K** – Number of clusters.

**Lost Packets** – Of the 3,000 transmitted packets, the number of packets not received (erased) by a given mote.

**Total lost packets** – The total packets lost by all receivers. This is given by the summation of the “Lost packets” for all motes.

**Correct RTx** – Of the lost packets, the number of packets which the machine learning algorithm correctly estimated to be lost for the given mote based on the union of NACK of all cluster-heads.

**Total correct RTx** – Of the total lost packets, the total number of packets which the machine learning algorithm correctly identified based on the NACK of the cluster-head. This is given by the summation of the “Correct RTx” for all motes.

**Overhead** – The number of lost packets which the machine learning algorithm could not identify correctly for a given mote.

**Total Overhead** – The number of packets from the total lost packets which the machine learning algorithm could not correctly identify. This is given by the summation of the “Overhead” for all the motes.

**Mote highlighted in Orange** – Cluster-head.

**Total NACK Sent** – The total number of NACKs which were transmitted by all the cluster-head.

**Total NACK Saved** – The total number of NACKs whose transmission was saved due to correct estimation by the machine learning algorithm.

**Cj** – In the file Clustering.xlsx, j represents the cluster id, where 1≤j≤5.

**VISUALIZATION OF RAW DATA**

The images in the folder with cleaned raw data are meant to provide visual of the raw data. A solid dot for a given packet number (as shown in the x-axis) represents that the packet has been successfully received by the corresponding mote (as shown in the y-axis), while an empty space should be interpreted as packet loss.

**REFERENCES:**

[1] I. Tanveer, J. Qureshi, "Packet Reception Data for Single-hop Wireless Multicasting," *Mendeley Data*, v2, July 2018.

[2] K. J. Cios, W. Pedrycz, R. W. Swiniarski, and L. A. Kurgan, Data Mining: A Knowledge Discovery Approach. Springer, 2007.