K-RLE IS LOW POWER CONSUMPTION ALOGORITM IN WSN

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Abstract— **Data Communication is important in wireless sensor network. Transmitting data between two distinct places is important. In wireless sensor network data transmission and acquisition are two important tasks. We proposed new algorithm namely K-RLE which is modified version RLE .By using this algorithm increase compression ratio compared to RLE. Data compression is a process that reduces the amount of data transmitted and decreases transfer time because the size of data is reduced. Along with it the power consumption for the transmission is also reduces. By using GUI model of matlab we compare result of RLE and K-RLE such as compression ratio, complexity, performance and its design module.**

Keywords— **Wireless Sensor Network, Data Compression, RLE, K-RLE.**
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I. INTRODUCTION

In wireless sensor network saving of energy is one of the big problem. For this we can use sleep mode. Sleep mode reduces data transmission and reception rate. For saving energy we can keep receiver in switch off mode. The power saving is generally achieved by reducing the radio communication. By using data compression algorithm we can reduce the size and time of the transmitted data. There are two types of data compression algorithm such as lossy and lossless. The Lossless compression algorithm is that in which data cannot be change that it is decompressed, it is identical to the original data .This make the lossless algorithm best suited for documents ,programs and other types of data that makes to be in its original form. In this paper we studied the basic compression algorithm RLE which is lossless and its modified version namely K-RLE.

II. LITERATURE SURVEY

The concept of data compression for wireless sensor network is first given in [1]. Eug`ene Pamba Capo-Chichi, Herv´e Guyennet, Jean-Michel Friedt, evaluated several data compression algorithms on an ultra-low power microcontroller from Texas Instrument known as MSP430. They have compared a famous dictionary-based data compression algorithm for WSN named S-LZW with RLE using real temperature datasets. Because of the difficulty in using S-LZW on a sensor platform with a limited RAM, we have introduced a new algorithm inspired from RLE named K-RLE which increases the ratio of compression compared to RLE and S-LZW [1]. A new simple and effective lossless data compression which suited to latency tolerant transmission in environmental monitoring WSNs is described in [2]. The algorithm realizes data transformation and rearrange of bits at first, and then RLE is used to compress the rearranged bit stream. Fransisco Marcelloni, Massimo Vecchio, Member, IEEE, describe a simple lossless algorithm particularly suited to the reduced storage and computational resources of a WSN node. They have evaluated the algorithm by compressing temperature and relative humidity data collected by a real WSN [3]. However K-RLE data compression algorithm is a low power Compression algorithm presented in [4]. K-RLE is a lossy compression algorithm. It is lossless at the user level, because it chooses K considering that there is no difference between the data item d, d+k, d-k. The basic and proposed system architecture, design, complexity, and performance analysis is given in [5] for RLE and K-RLE.

III. THE COMPRESSION ALGORITHM

Compression techniques are predominately used to increase the energy efficiency and the life time of sensors. It also helps to cut communication cost and computation cost. A few of the compression techniques for wireless sensor networks are,

1) Run length Encoding.
2) K-Run length Encoding.

RLE: This is a basic algorithm, the idea behind this algorithm is, If a data item d occurs n consecutive times in the input data we replace the n occurrences with the single pair nd. It is very useful for slowly varying and repetitive data. This algorithm is useful for data that contain many runs. For example, relatively simple graphic images such as icons, line drawings, and grayscale images. Which is a lossless data compression algorithm used for slowly varying sensor and image data. It is not useful with files that don't have many runs as it could double the file size [3] [4].

K-RLE: The concept of this algorithm is, let K be a number, a data item d or data between d+K and d-K occur n consecutive times in the input stream, replace the n occurrences with the single pair nd. We introduce a parameter K which is a precision [5]. If the value of k is 0 then it works as a RLE. This is lossy algorithm which losses the data during transmission. By using this algorithm we can improve the compression ratio. Also we can reduce time for transmission and complexity.

IV.FLOWCHART AND SAMPLE MATLAB RESULTS

Below figure shows the flowchart for K-RLE, are the graphical representation of algorithm applied on temperature readings. Its results depend on the data source. Here the GUI model for the RLE and K-RLE algorithm is given below. Here we consider one hypothetical example :21,21,21,21,22,22,22,22,23,23,23,23,24,24,24,24,25,25,25,25

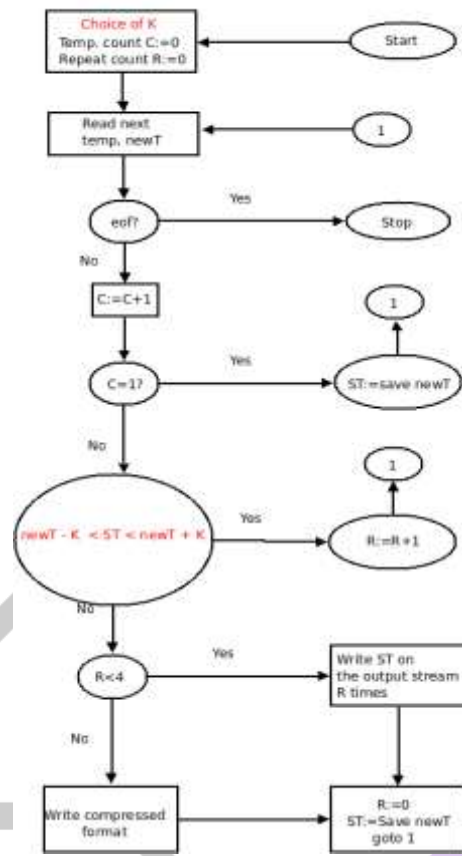By using RLE and K-RLE we can encode and decode data. It shows that how compression ratio of K-RLE is better than RLE.

Fig 1: Flowchart for K-RLE

Matlab simulation:-
GUI model for RLE:

GUI Model for K-RLE when k=1:
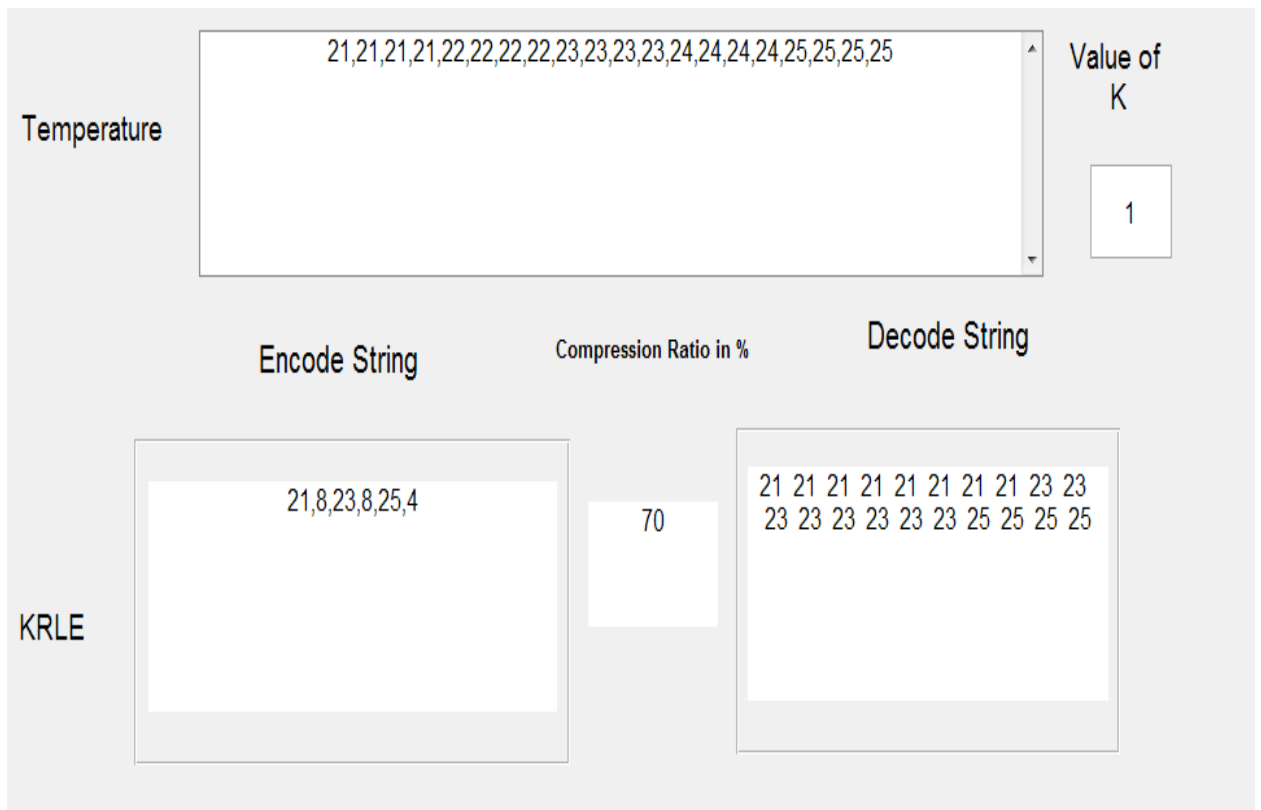
GUI model for RLE and K-RLE:
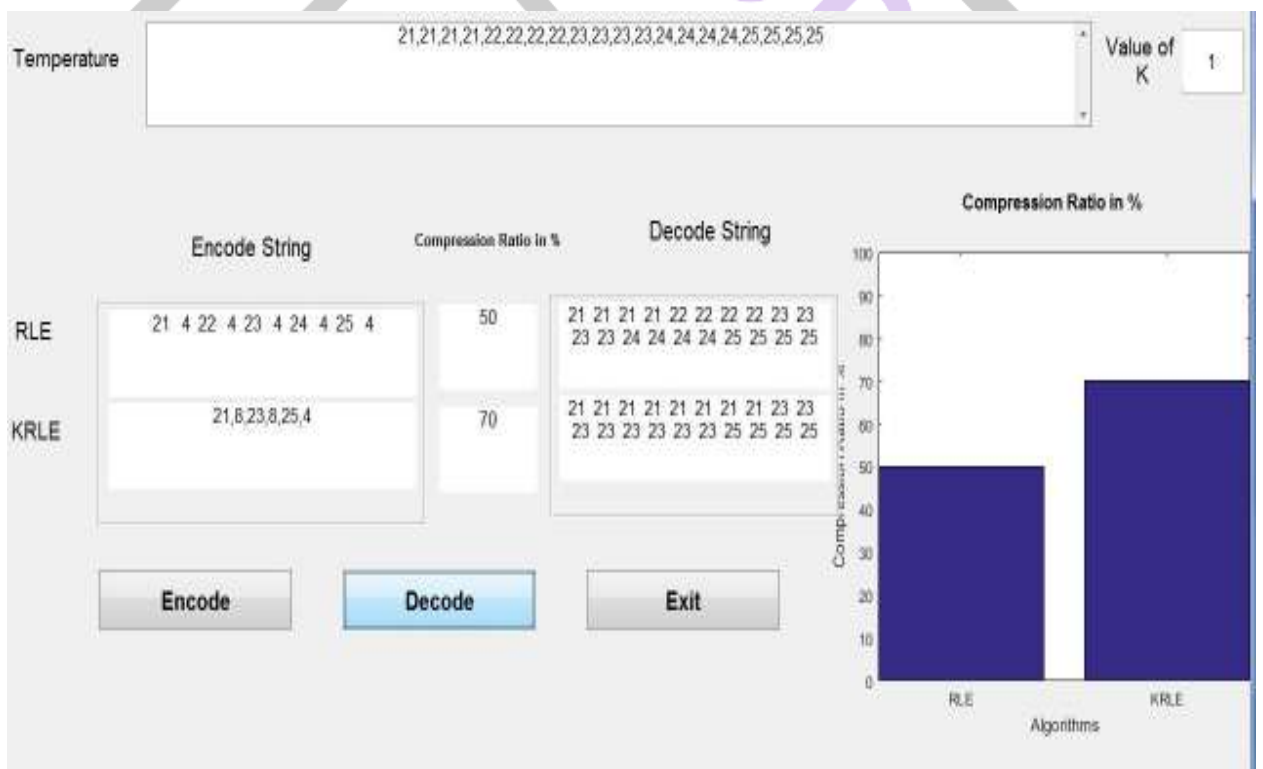
V.APPLICATION

This algorithm is very useful when talking about data transfer between two distant places. Perhaps the best example is the transfer between a web server and a browser.

VI .CONCLUSION

A K-RLE data compression algorithm is low power consumption algorithm. With this approach a fast transmission of data with minimum hardware requirement is possible.

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