Assignment 1: Data compression

Wireless Sensor Networks

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1 Introduction

Data compression is a typical method used in WSNs to reduce the sensor data size and transmission cost, however, data compression will cost some processing time and energy itself. Thus, to save energy, the implementation of data compression must be efficient. In this assignment, a basic Discrete Cosine Transform-II(DCT-II) has been used to achieve this. Other implementations of this algorithm exist that are faster, and more complex in implementation.

2 Results

Multiple tests were run in vagrant, where the recovered signal was logged in a text file. This was then later used in a python script to generate plots of the original signal, and the recovered signal. One such plot can be seen in Fig. 1.

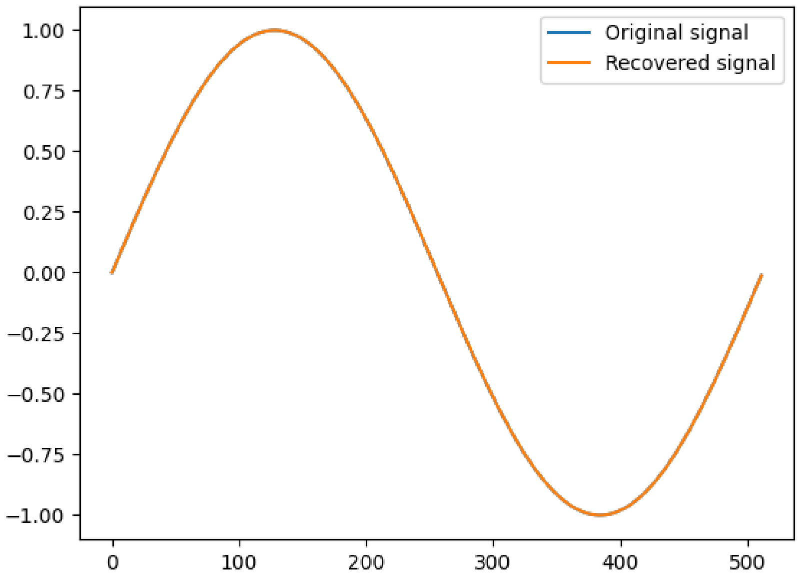

Figure 1: Signals overlapping so well, we can't see the difference

Furthermore, calculating the Signal to Noise Ratio(SNR) in python, I got a SNR of 60,9, meaning we got, as seen on Fig. 1 as well, a very clean signal coming through.

3 Discussion

While Fig. 1 plots a very clean signal, This could be due to using a very basic sine wave as the original signal.
An increase in M, lead to including more coefficients in the transformed signal, which, in theory should lead to a "finer" signal, but in practice, anything above 4 was hard to see with the human eye. However, lowering M, it was possible to see the more "coarse" signal representation.
Inversely, increasing L, leads to a longer DCT, and thus more aggressive data compression, meaning an increase in L, should lower the fidelity of the signal. This was also the case, as setting L above 64 (eg. 128, 256), returned very poor signals.