# LAB 1 - OBJECTIVES

The goal of this lab is to understand the benefit of using source coding in reducing the data traffic by understanding and exploiting the statistical properties of the source data. The type of data we will be looking at are black and white images. We will learn about two types of coding: run-length coding and Huffman coding.

To achieve the above goals you will complete four tasks:

In task 1, you will compare the lengths of the bit streams for four source coding algorithms applied to a black and white image: "raw" image encoding, run length encoding with lengths encoded as 8 bit binary numbers, and run length encoding with lengths encoded with Huffman coding with one or two dictionaries.

In task 2, you will work on code that extracts run-lengths from a black and white image. If we scan across rows of a black and white image, we typically encounter alternating runs of contiguous white and black pixels. These runs have different lengths, depending upon the image. Rather than encoding an image as a sequence of pixel values, the run-length code encodes the image as a sequence of numbers indicating the lengths of the runs of white and black pixels.

In task 3, you will generate the Huffman code for a set of run-lengths, and use it to encode the run-lengths of black or white pixels. You will find that Huffman coding enables us to encode the sequence of run lengths using fewer bits than the standard 8 bit encoding.

In task 4, you will see that the distributions of run-lengths for white pixels and black pixels are different. You will use different Huffman dictionaries to encode the black and white runs, and observe the change in the number of bits required to encode the runs.

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