Exercise Sensor Networks (due till December 8, 2008)

Lecture 6: Compression

Exercise 6.1: Huffman codes

(a) Encode (compress) the string MISSISSIPPI using Huffman-encoding.

(b) Produce the table for fast decoding of the Huffman code.

Exercise 6.2: Arithmetic encoding

Using the relative occurrences from the last exercise, encode the string MISP using arithmetic encoding. P is considered to be the terminal symbol which means that the decoder knows that it can stop, once a P is encountered. Use 8 bit wide registers. In order to encode the entire message, you will have to pick a (binary) number from the interval for P in the end. Try to go for the shortest number you can within this interval to use as few bits as possible.

Exercise 6.3: Comparison

The arithmetic coding is known to be a generalization of Huffman. Explain why arithmetic coding can be at least as efficient as Huffman but not vice versa. In particular, which advantage does arithmetic encoding have as compared to Huffman?