ESE-3014 Lab 4 - The transmitter of a PCM system

Theory

GNU Octave is a high-level language, primarily intended for numerical computations. It provides a convenient command line interface for solving linear and nonlinear problems numerically, and for performing other numerical experiments using a language that is mostly compatible with Matlab. It may also be used as a batch-oriented language.

Octave has extensive tools for solving common numerical linear algebra problems, finding the roots of nonlinear equations, integrating ordinary functions, manipulating polynomials, and integrating ordinary differential and differential-algebraic equations. It is easily extensible and customizable via user-defined functions written in Octave's own language, or using dynamically loaded modules written in C++, C, Fortran, or other languages.

Task

Simulate all operations performed in the transmitter of a PCM system include steps below. You can choose the techniques we introduced in the course, and please show your code in text form and screenshots of each steps.
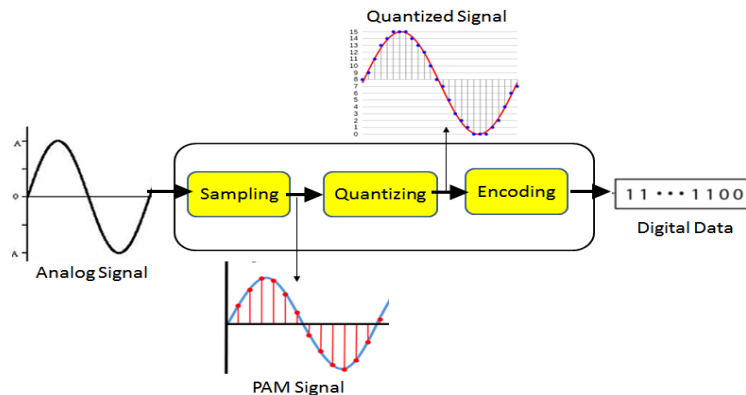

Figure 1: Pulse-code modulation

1. Analog signal: it could be a sin or cos wave.

2. low-pass filter (optional)

3. sampling: Use the result from last step, and sample it with a proper sampling frequency.

4. quantizing: You can apply Uniform quantization or Non-uniform quantization, and you should indicate which type you used.

5. encoding: Please refer the encoding from our slides, choose and indicate the line code can be used for electrical representation of binary symbols "1" and "0". (e.g. on-off signaling, NBZ, RZ, and so on)
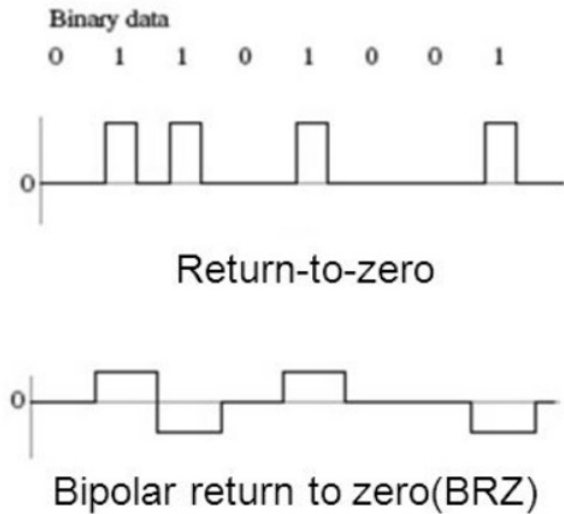
Figure 2: Line code for encoding