**CMPSC 176B HW2**

Introduction

In this assignment, I attempted to simulate the transmission of an audio file through a lossy channel. This simulation contained three significant parameters: packet size, packet loss, and packet replacement policy. Packet size can be varied from very small packets, to large packets up to a size of 1500 or more. Packet loss rate determines the chance that any given packet is lost in transmission. Packet replacement policy chooses how to replace packets that are lost. For this assignment, I worked on three replacement policies: replacing a lost packet with all 0s, replacing a lost packet with the most recent sample taken, and replacing a packet with the most recent packet received.

Generating the simulated files:

When generating the simulated files, I had two settings. First, I generated files individually, allowing inputs to determine the three parameters listed above. After doing some basic testing to verify that the program was working correctly, I wrote a second part to the program to generate all song outputs for a given array of each of the parameters. At the current time, my program tests for the packet sizes [100, 200, 400, 600, 800, 1000, 1200, 1500], for the loss rates [0.005, 0.01, 0.02, 0.04, 0.08, 0.12, 0.16, 0.25, 0.36, 0.49, 0.64, 0.80], and for all three packet replacement policies.

Effects of Packet Size:

As shown above, I tested for 8 different packet sizes, 100, 200, 400, 600, 800, 1000, 1200, and 1500 bytes. For this test, I was primarily writing 0s when packets were dropped. At relatively low loss rates (below 10 percent), smaller packets disguise the loss making it almost unnoticeable while the larger packet sizes, especially 1500 cause large disruptions in the audio when they come up, greatly reducing the quality. At a more medium loss rate (0.12, 0.16, 0.25, 0.36) low packet sizes make the music appear scratchy while large packet sizes make the music sound like it’s starting and stopping. Interestingly, medium packet sizes (400, 600, 800) at medium in this range of loss rates tend to sound the best, striking a decent balance between a scratchy sounds and missing sound. At the highest loss rates I tested (0.49, 0.64, 0.80), the smaller packets sound incredibly scratchy, nearing the point of being inaudible. The larger packets are less scratchy, but sometimes the sound stops for more than a second at a time, making it almost impossible to listen to. Middling packet sizes at these higher loss rates sound similar to the higher packet sizes at medium loss rates, with the sound constantly stopping and starting.

Effects of Loss rate:

As noted above, I tested for 12 different loss rates: [0.005, 0.01, 0.02, 0.04, 0.08, 0.12, 0.16, 0.25, 0.36, 0.49, 0.64, 0.80] in my main tests. At low packet loss rates (0.005, 0.01, 0.02), the packet losses are almost completely unnoticeable, especially at lower packet sizes. At around 4% loss, the loss is really only noticeable when paying strict attention to the music, but does not pop out. Loss is definitely noticeable at 8% loss rate, at which point there is a distinct difference between small packets, which only make the music scratchy, and large packets which greatly interrupt the sound.