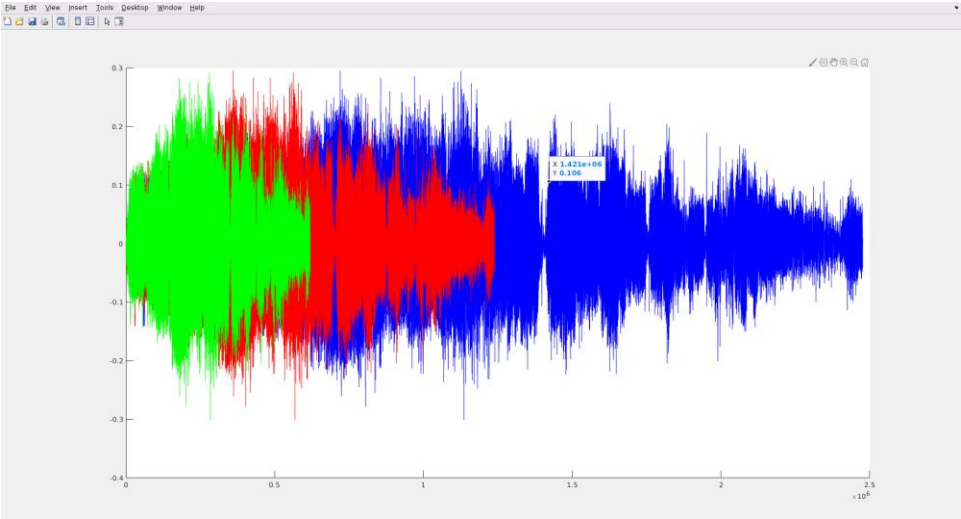
Question 1:



We resampled the audio with a different frequency to increase/decrease the speed of signal. Sampling at twice the original frequency increased speed of signal where as halving the original frequency slowed down the signal speed by a factor of 2.

Plotted in red is the original signal. Plotted in blue is the same signal with a decreased speed. Plotted in green is the signal with speed increased by a factor of 2.

Question 2:

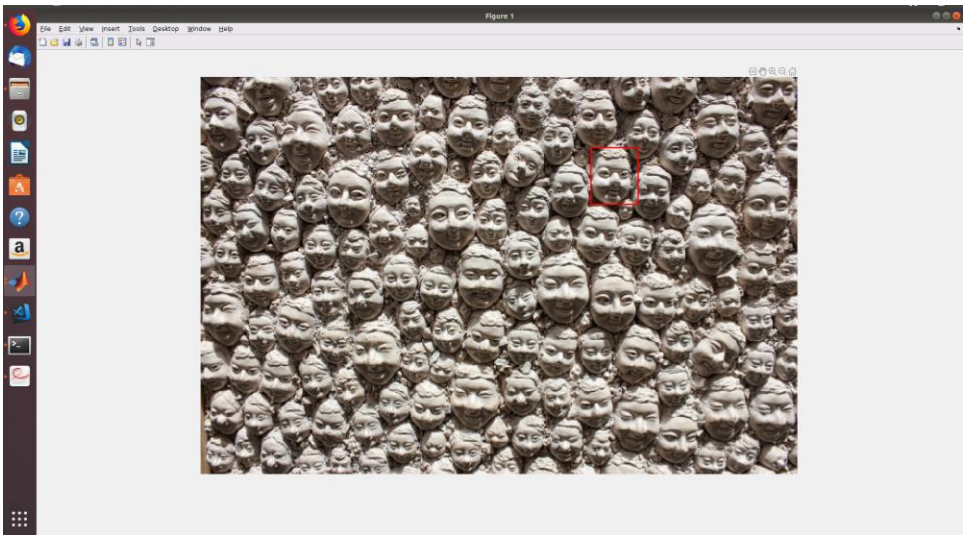
The resample function was used to subsample asked in question 2.

To simulate the voice in three different surroundings, a clip of an impulse response in that surrounding was downloaded and then convolution was applied on the voice signal according to the given formula:

$$y[n] = x[n] ** h[n] = \sum_{k=-\infty}^{+\infty} x[k]h[n-k]$$

Question 3:

For the first part of the we took the small image and checked every other matrix of the same dimensions in the bigger image. The matrix which gave least difference w.r.t the small image is the location of the small face in the picture with many faces.



The noisy image can be dealt with by smoothing the data using smoothdata function in Matlab.

Question 4:

The basic idea is for each of the pixels in the bigger image(we know the dimensions of the bigger image), scale that pixel to the smaller image. Now this pixel value is some decimal value and it will be in between four other integral pixel values.

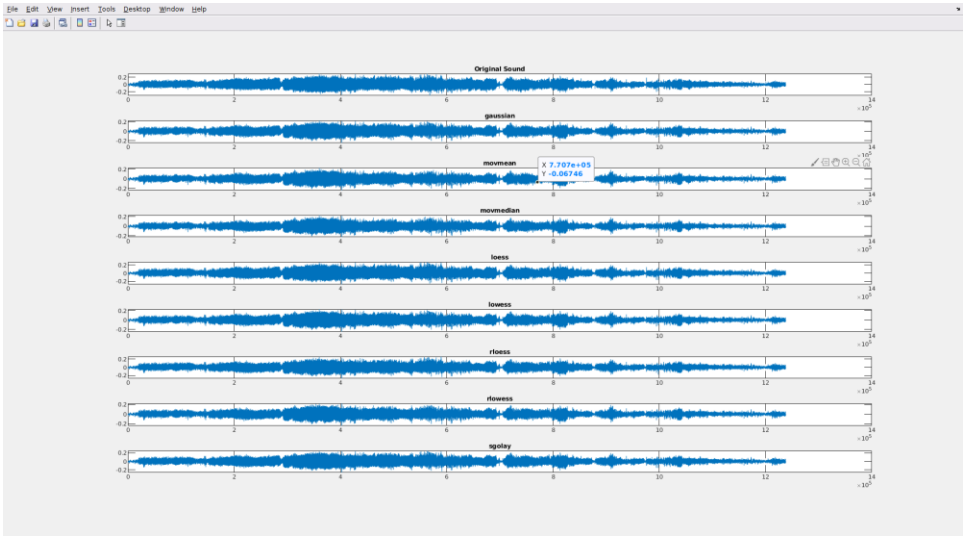
If the algorithm is nearest neighbor interpolation, we take the integral pixel closest to the scaled down pixel.

The above images are magnified by factor two using nearest neighbor interpolation.

If the algorithm is bilinear interpolation, we take weighted average of all the 4 integral pixels.

These images have been magnified by a factor of 10 and 5 respectively using bilinear interpolation.

Question 5:



The best result was given by loess technique.