REPORT

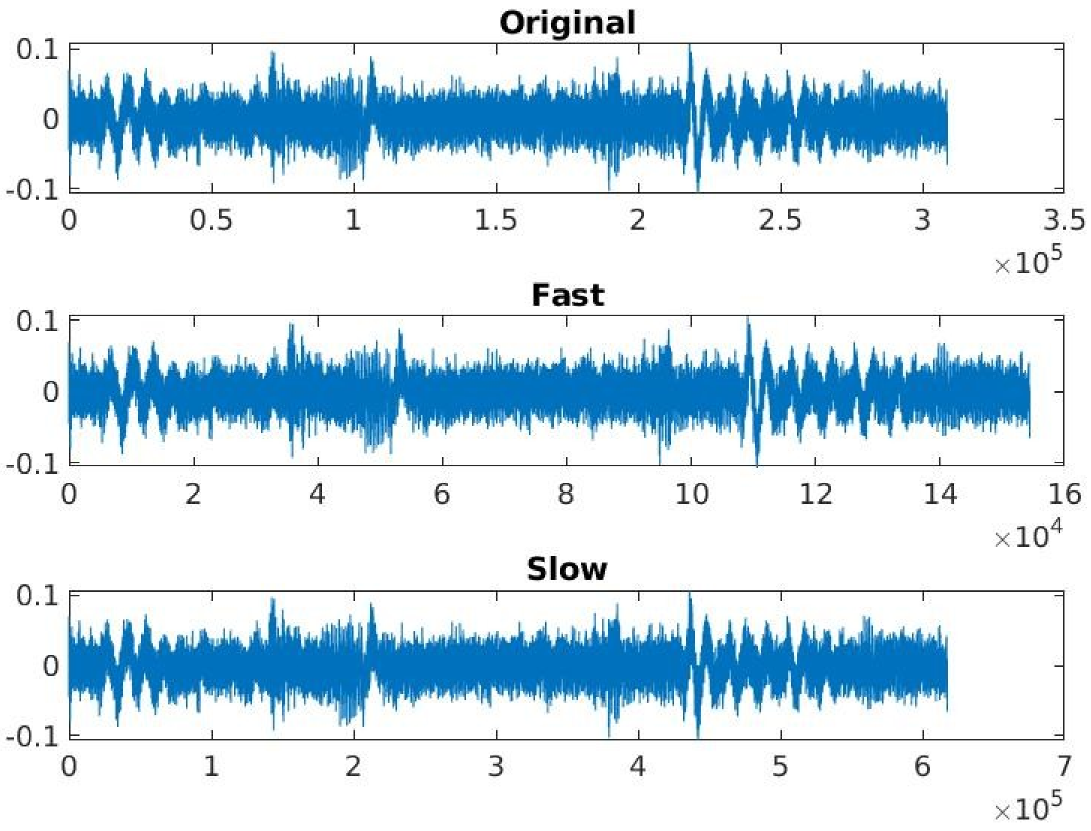
Q1.m

Firstly, we record our own voice as an audio sample required for various operations using audiorecorder.

# Increase Speed
To double the speed of the audio signal downsample has been used with factor = 2 which picks every alternate sample and we play with the same sample frequency which increases the speed of the sample by 2.

#Decrease Speed
To half the speed of the audio signal upsample has been used with factor = 2 which adds an extra sample between every two samples and we play with the same sample frequency which decreases the speed of the sample by 2.

The original ,fast and slow signals are then plotted and we find slow has the largest no. of samples and fast the least.



Q2.m

Firstly, we record our own voice as an audio sample required for various operations using audiorecorder at 44.1kHz and digitized at 24 bits and save it ,then we read the file to operate it for various other functions.

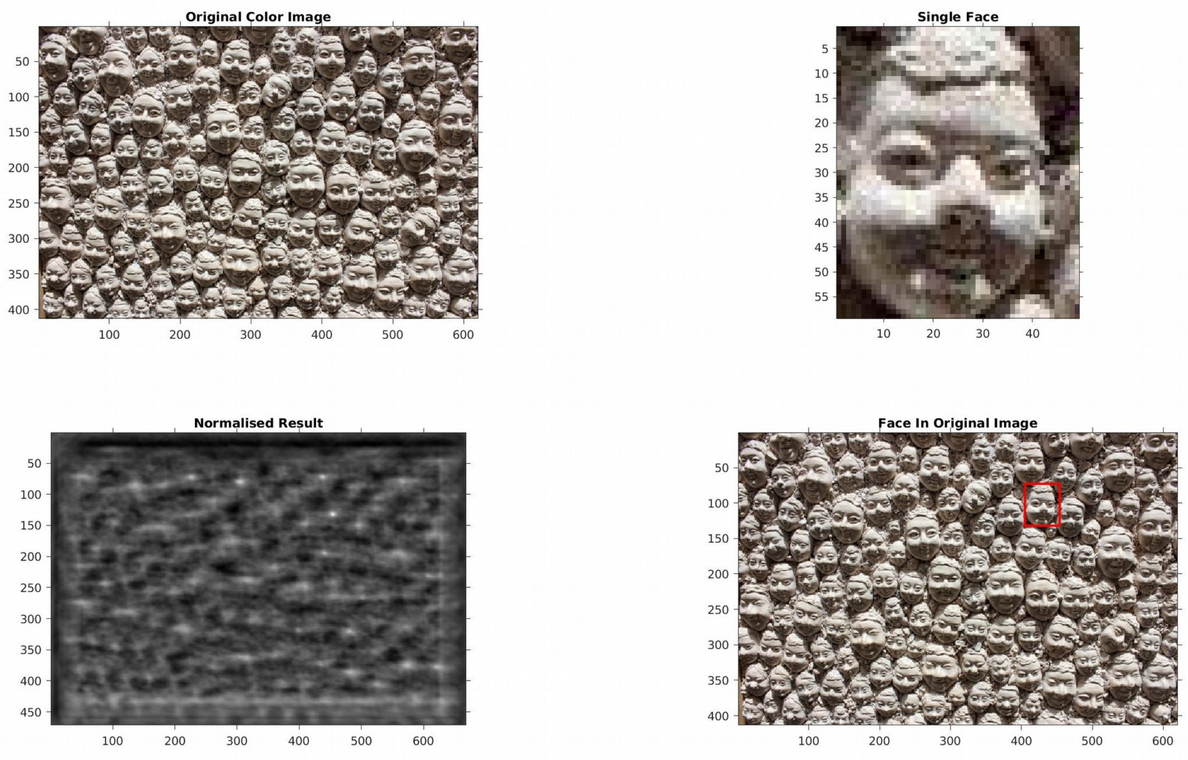
The recorded voice is played at different sampling frequencies like 24KHz, 16KHz, 8KHz and 4KHz and the original one i.e. 44.1KHz.

Then , we read audio signals recorded in different environments like church , strange box and wide hall and perform convolution with the original signal to know the look and feel of the audio in various environments and played for all three environments.

Q3.m

The problem 3 requires face detection of the face in the smaller image in the larger image.
We firstly read the larger image and the smaller face image and plot them in the result for a better comparison. We detect the face using the normalisation approach and we find the maximum similarity in the part of the original image and the face using channel 1 in this case. Channal number specifies the parameter of comparion between rgb (1 for r , 2 for g , 3 for b).

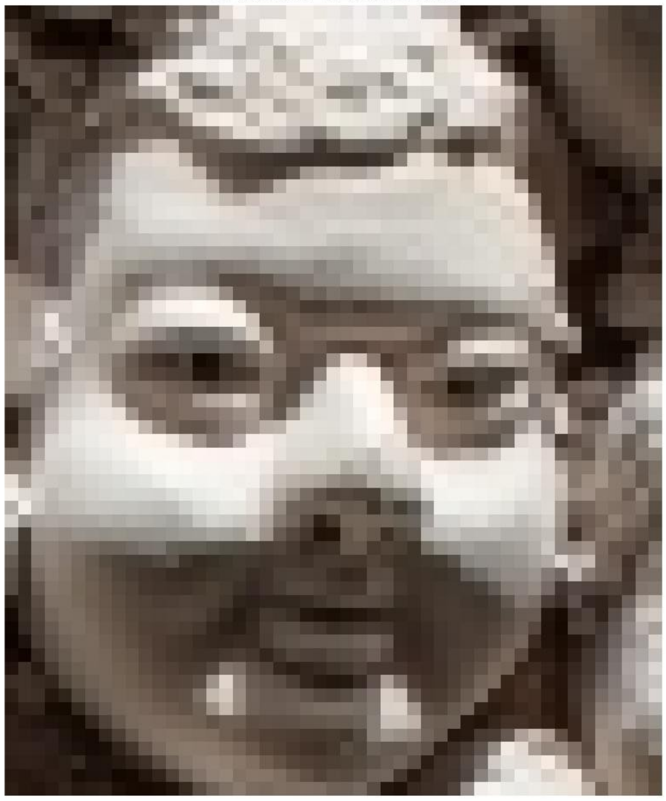
Once we find the location where maximum similarity is reported over the channel , we create a box for the user to display the found location of the face . The normalised image and the image displaying the face detection with the help of the box is then displayed.



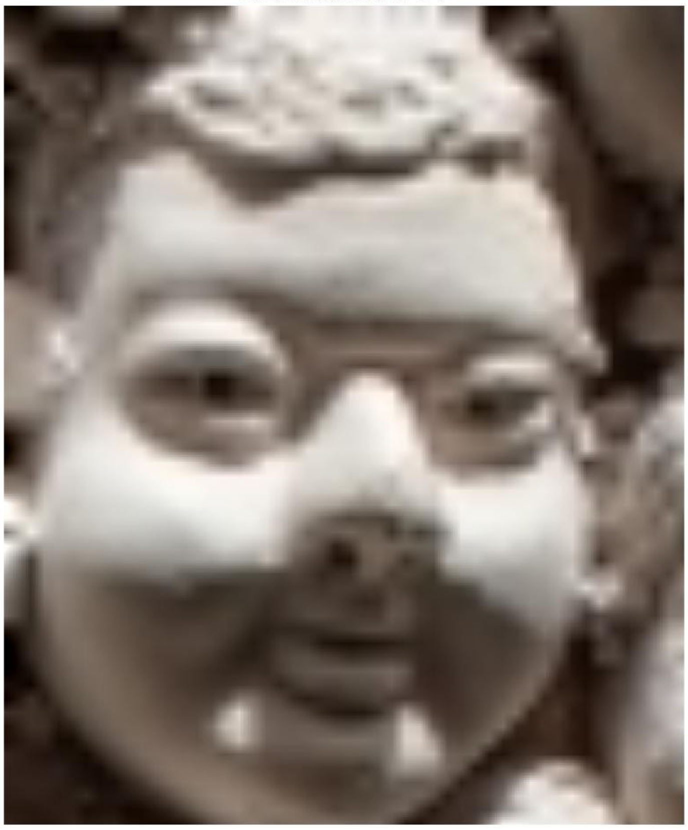
The algorithm detects correctly even for noisy images like F2.jpg as it just compares the face images with all possible choices for a single channel. The match with the correct face will be less for noisy environment compared to the other one but still correct as it’s still the maximum. (For e.g. in our case the match with face of F1.jpg is 99.96% whereas it’s 98.29% incase of F2.jpg over channel 1 , therefore the match reduces with noise but the max match is still with the correct face.) The chances of mistake can increase quite considerably if the noise is pretty high.

Q4.m

NEAREST NEIGHBOUR



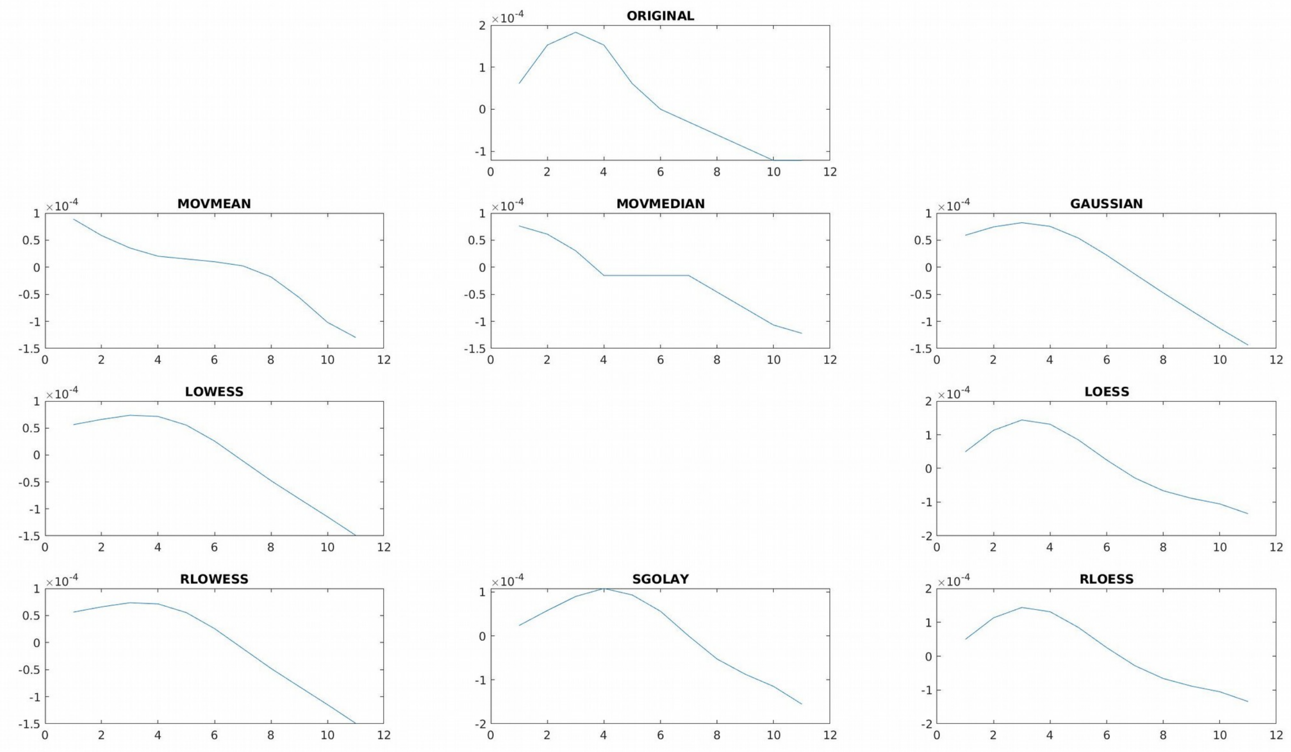
BILINEAR OUTPUT



We implement the resize function in two ways using nearest neighbour and bilinear interpolation algorithms. The nearest neighbour checks for the nearest neighbour for each pixel and gives it the same value. Bilinear interpolation takes into account the 4 near adjoining known pixels depending upon the distance from each and ratio correspondingly. Increasing size using both techniques and analyzing results , we find increasing size using bilinear interpolation provides a better enlarged image. Both techniques are applied for various different images like coloured, black-white , involving faces and shapes etc..

Q5.m

We read the audio file sa_re_ga_ma.mp3 using audioread and smooth the data using various filters in the smoothdata function. The plots for all the filters is plotted and compared for a shorter range (2200:2210) for a better analysis.
Analysing smoothdata over various params , we find that “sgolay” gives the best result as “sgolay” performs most of the filtering by convolving the signal with the center row and the output of sgolay is a steady-state portion of the filtered signal. The sgolay performs filtering using differentiation and least squares. All these parameters make it the better filter among others and provide the best smoothing effect.


ORIGINAL
MOVMEAN
MOVMEDIAN
GAUSSIAN
LOWESS
LOESS
RLOWESS
SGOLAY
RLOESS
×10^-4