TONE IDENTIFICATION USING CROSS CORRELATION IN MATLAB

TEAM MEMBERS-

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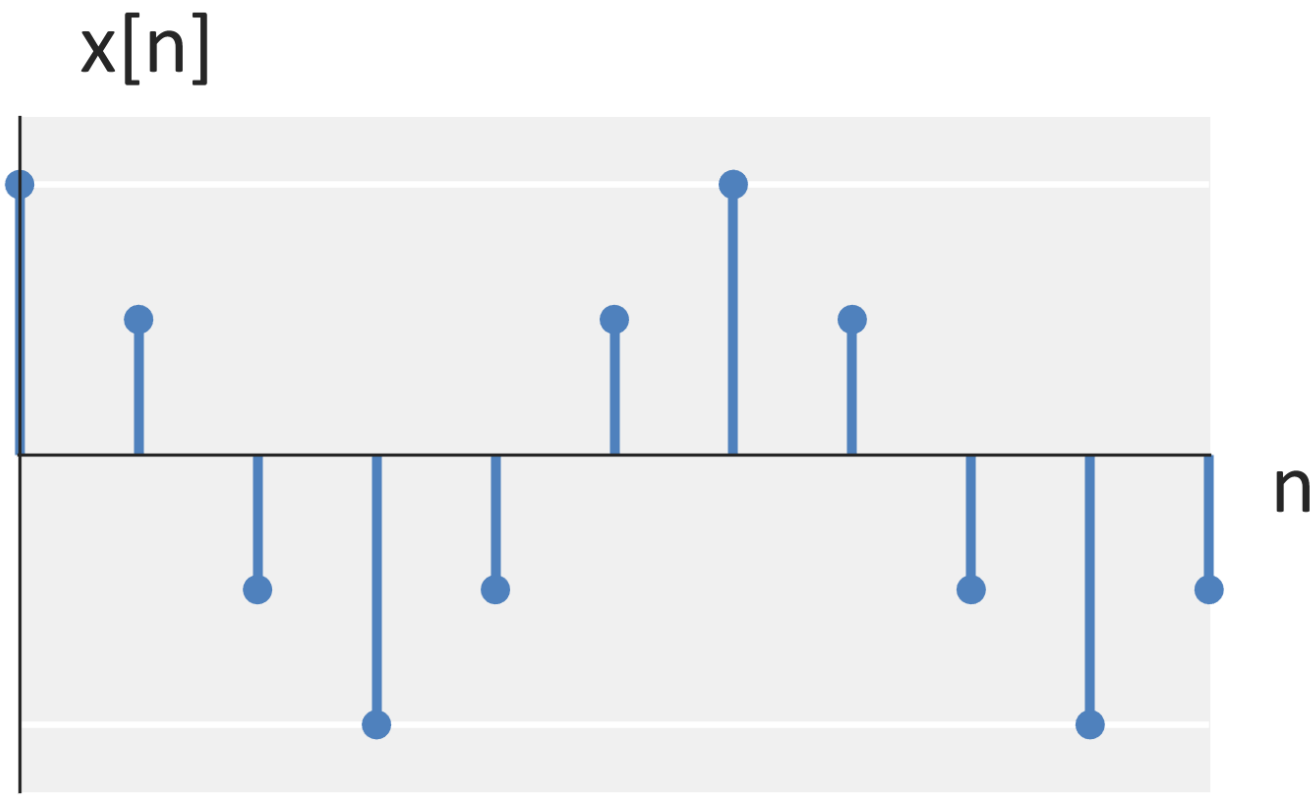


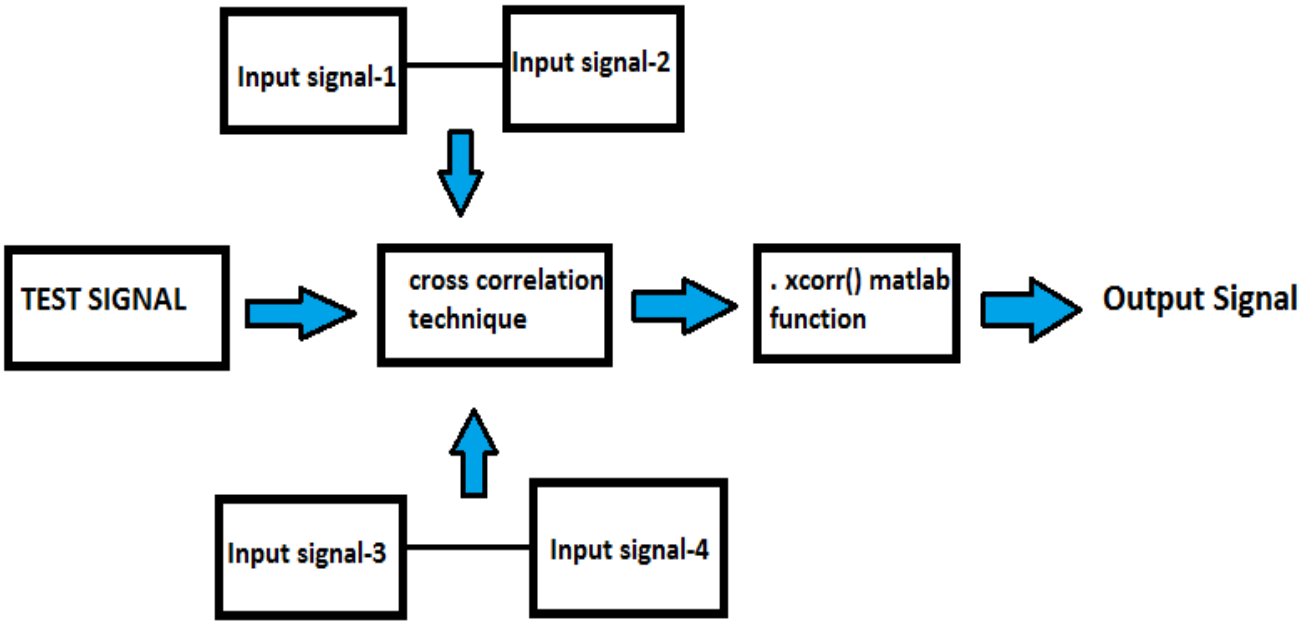
Problem Definition

- Several audio signals are given, our aim is to find out from the given audio signal, which audio matches with our test audio signals.
- Tone stands for musical or vocal sound with reference to its properties.
- Tone identification is a process to identify the tones.

- The cross-correlation is equivalent to convolution of one sequence with a folded version of another sequence.

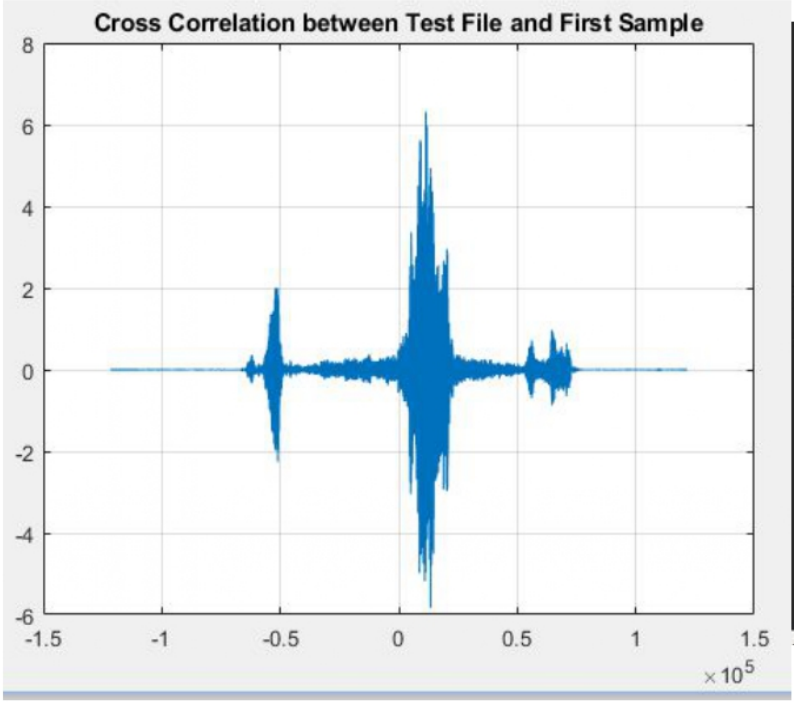
$$rxy(l) = x(l) * y(-l).$$

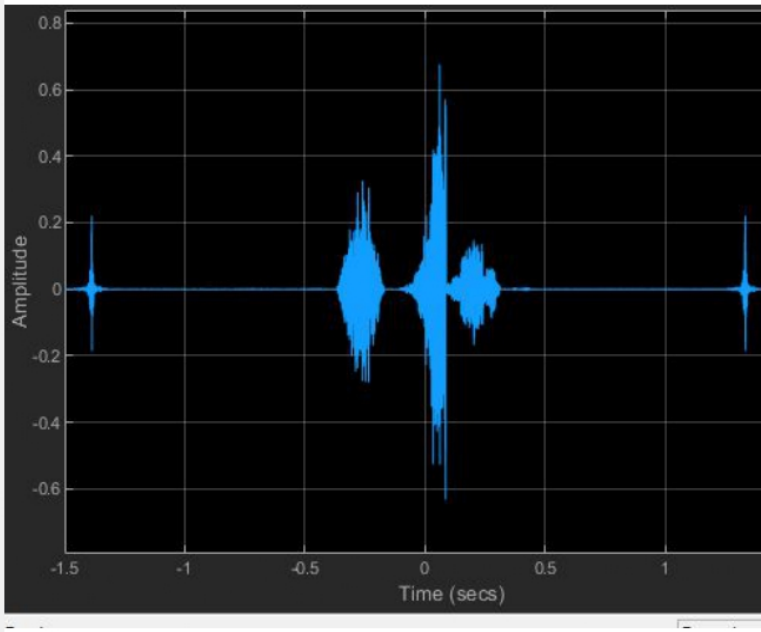
Input, Output and the complete Flowchart



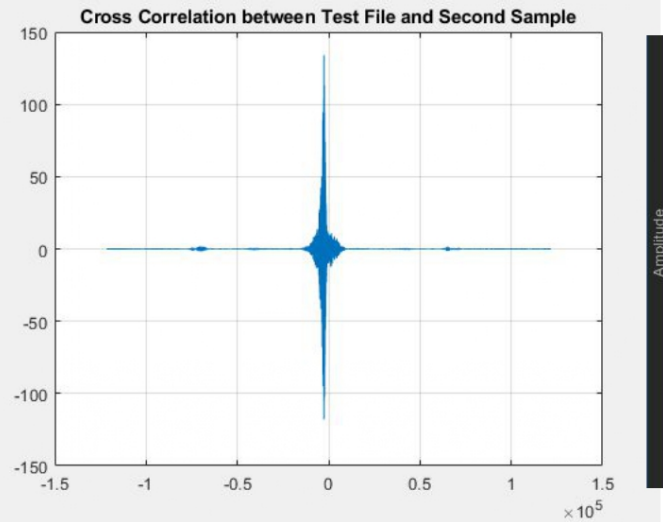
Complete flow chart

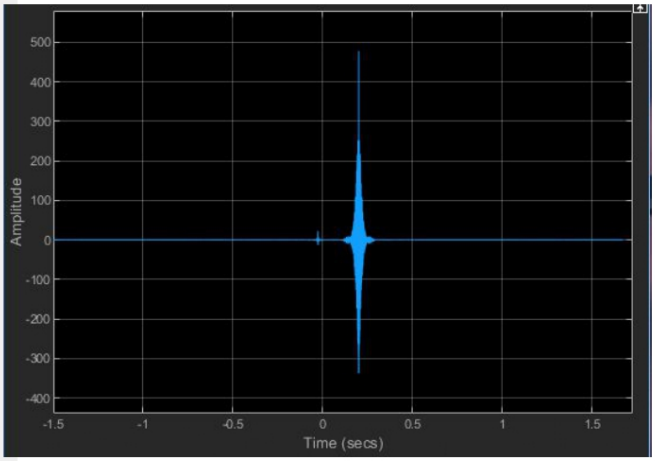
Simulation and Results:



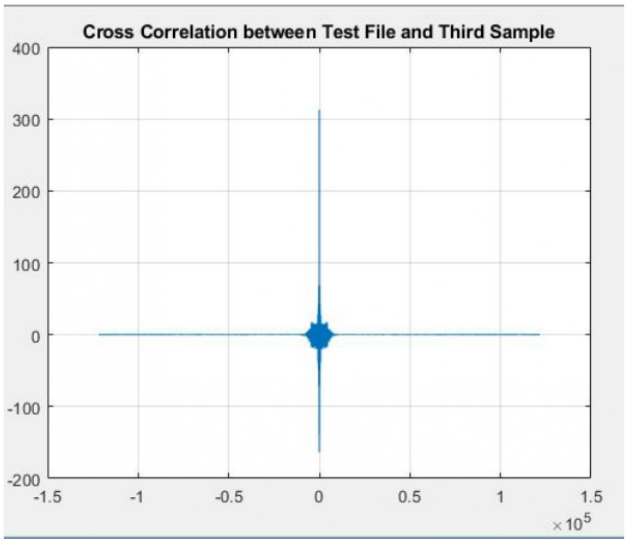


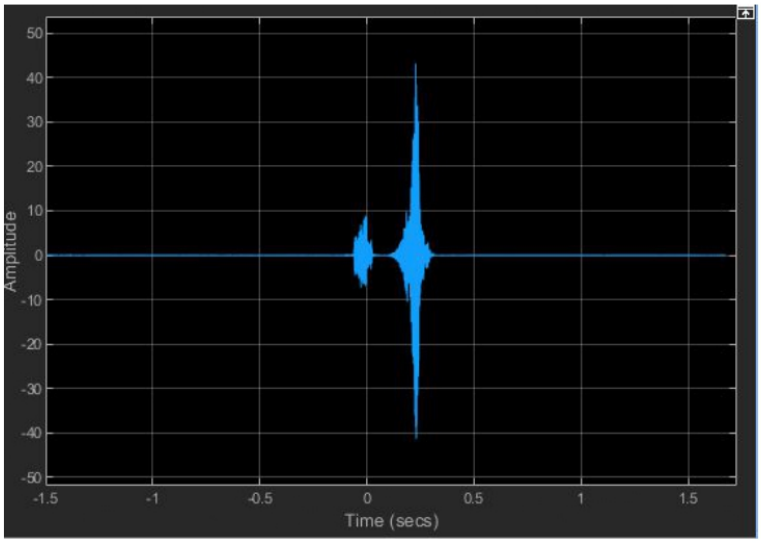
Simulation and Results:



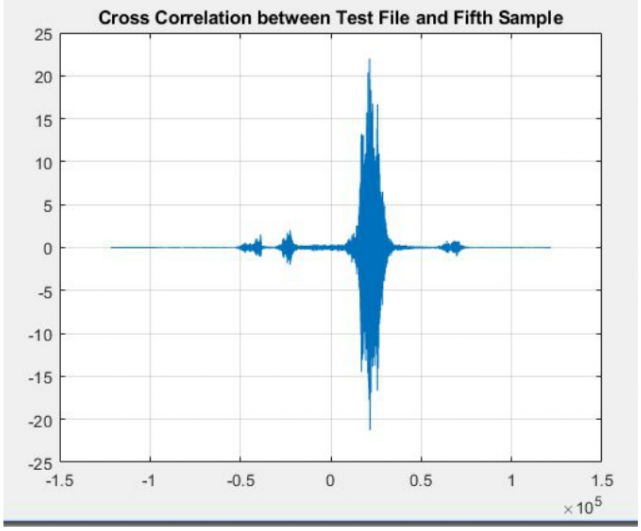


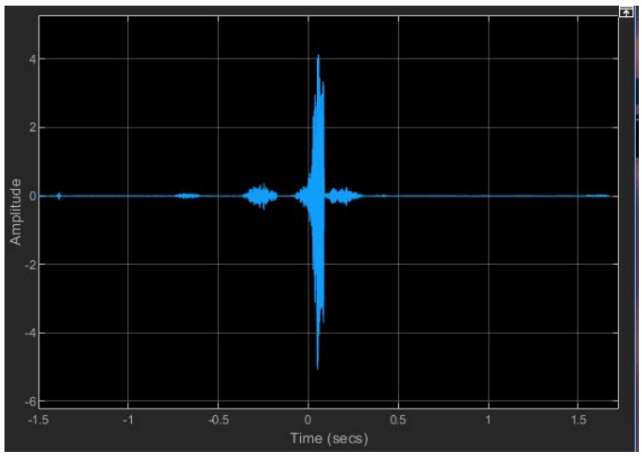
Simulation and Results:





Simulation and Results:





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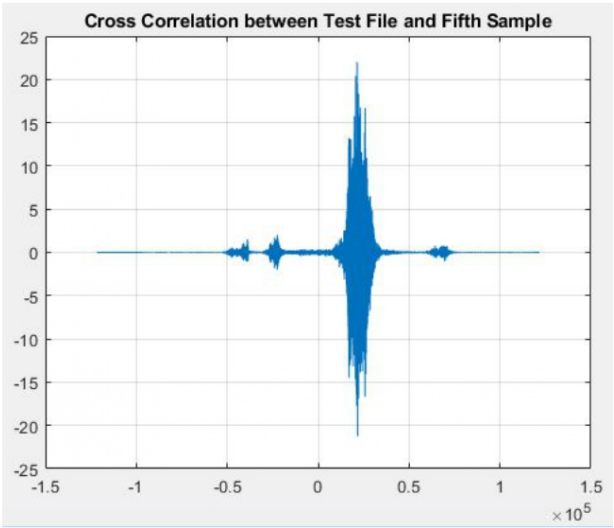

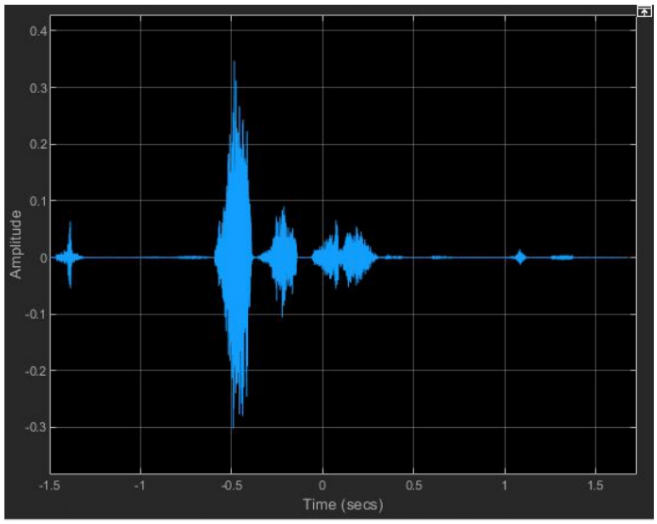

REQUIREMENT FOR EACH STEP

- We are required to input a test signal first.
- NEXT It is required to input the input audio signal-1,input audio signal-2,input audio signal-3,input audio signal-4 which needs to be identified.
- If several audio signals are given, our aim is to find out from the given audio signal, which audio matches with our test audio signals.
- From a given set of digit audio clips (1-5), we've to verify the matching tone by providing a digit audio clip. (any)
- Using Cross Correlation technique approach to detect specific frequencies in audio file.
- Cross-correlation functions gives the similarity between two signals i.e input audio signal and test audio signal.
- We will be able to find the solution to our problem using MATLAB script as coded.
- Its mainly used in applications such as security related applications for verification purpose and in pattern recognition systems.

ALGORITHM :-

Cross Correlation Technique

1.We have used a cross-correlation function to complete our task.
2. Cross-correlation functions gives the similarity between two signals i.e input audio signal and test audio signal.
3. Formulae of cross correlation:

$$r_{xx}(l) = \sum_{n=-\infty}^{\infty} x(n)\ x(n-l)$$

OR

$$r_{xx}(l) = \sum_{n=-\infty}^{\infty} x(n+l)\ x(n)$$

4. xcorr() is the in-built MATLAB function used for finding cross correlation between two signals.