Chapter 7

The User Manual

The programs mrag and frag are used for identification of Ragas and computation of SCC and RCC, while Sruti is developed for other applications.
This chapter gives an account of the steps involved in the analysis of musical performances, using the software \texttt{mrag}, \texttt{frag} and \texttt{Sruti}. The programs \texttt{mrag} and \texttt{frag} are used for identification of Ragas and computation of SCC and RCC, while \texttt{Sruti} is developed for other applications. These programs will run in Matlab.

7.1 Hardware requirements

Use any multimedia desktop PC or laptop, with provision for external microphone and speaker. Memory requirements are standard.

7.2 Software requirements

Software required are, Microsoft windows operating system and Matlab, which are installed in a PC or a laptop. The programs \texttt{mrag.m}, \texttt{frag.m} are used for identification of Raga and \texttt{Sruti.m} is used to determine the frequency generated by musical instruments. These programs will work in Matlab environment.

7.3 Features of the software

For Raga identification and analysis, we have developed two programs, \texttt{mrag} and \texttt{frag}. For other applications, such as finding the frequency of turning fork etc., we have developed the program \texttt{Sruti}. These programs were developed in Matlab and runs in the Matlab environment. However, the software can also be developed as an independent C program with some more efforts.
7.3.1 Potential of the software

The software developed can be used for the following applications:

1. Real time Raga detection with input from microphone.
2. Detection of Raga with input from secondary memory.
3. Computation of the details of the Swaras, such as frequency and amplitude.
5. Computation of Raga Consistency Coefficient.
7. Calibration of musical instruments.

The software developed can be used for the identification and analysis of the 72 Melakartha Ragas. A live program can be input to the software with the help of a microphone attached to the computer. If it is a recorded performance in any of the sound file formats, such as wav, mp3 etc., compatible software players can be used as an interface to input the file to the software for the analysis. The result of the analysis is made available in two forms, as a listing and as a graph.

7.4 Procedure of analysis using mrag and frag

Step 1.

Choose the mode of input of sound from the Microsoft windows control panel. Choose a microphone, wave out mix or line in as the input source. Set the input level to 40% of the maximum, so that we can here the sound at a medium level volume. Mute all other inputs.

Step 2.

Choose any one of the programs mrag, or frag depending on the requirement. For identification of the Raga, mrag or frag has to be used. If the
singer is a male or the playing instrument is a male instrument, for instance Veena, choose `mrag` as the program. If the singer is female or the instrument used is female, for example Violin, Flute or Mandolin, choose `frag` as the program.

**Step 3.**

For `mrag` and `frag`, give the base Sruti of the singer or the instrument as one of the inputs. Sruti will be entered as any of the alphabets a, A, b, c, C, d, D, e, f, F, g, G. The details are given in table 3.1 in chapter 3.

**Step 4.**

Give the number of scans equal to 300 as the second input. The no of scans depends on the performer. The no of scans can be 200 if he or she covers all the notes of the middle octave in 100 seconds. Usually, in Raga aalapana, the no of scans may be 300. Better result is obtained while number of scan is 500. Any form of Raga, like Varna, Keerthana, Raga aalapana can be used for Raga identification. While a Raga is rendered by a singer, analysis would be better if no other instrument is used as an accompaniment. Satisfactory results can also obtained while accompaniments are used, but at a subdued level. Only solo singing is recommended.

Prominent frequencies and the corresponding Swaras are determined based on the initial base frequency (of `sa`). Then the sequence of Swaras is matched with the Swara sequence of the 72 Melakartha Ragas, to identify the Raga. The following details of the analysis are displayed as default: 1) The Melakartha number of the Raga. 2) The name of the Raga detected. 3) The Swara sequence of the identified Raga. There is a provision for displaying more details of the Raga. The following details can be had as per requirements. 1) The average frequency of all the Swaras identified. 2) The average amplitude of the corresponding Swaras. 3) The number of times each Swara has been detected. 4) The graphical display of the
observed frequency against amplitude. The graphical display of the Swara positions of the Raga are marked with green dots and those Swaras which are outside the Raga are marked with red dots. In the black and white printout the dots will be gray and black respectively. 5) The Sruti Consistency Coefficient of the artiste. 6) The Raga Consistency Coefficient of the artiste.

7.5 Procedure of analysis using Sruti

The program Sruti is used for the calibration of the tuning fork and other musical instruments. The frequency generated by these acoustic instruments can be measured using Sruti. The steps followed for the analysis are:

Step 1

Same as the step 1 of 7.4 above

Step 2

Run the program and sound the instrument, keeping the microphone near the instrument. It will detect the sound and measure the frequency and the result will be displayed. Here the time duration may be taken to be 1 sec. for a resolution of 1 Hz.

7.6 Remark

The software can easily be modified to suit any other application in this area.