Help: How to use MATLAB Code of Compression of Motion Capture Data using Discrete Wavelet Transform

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January 31, 2017

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Reference:

Murtaza Ali Khan, "Multiresolution coding of motion capture data for real-time multimedia applications", Multimedia Tools and Applications, Springer journal, First online pp 1-16, Sep. 2016. DOI=http://dx.doi.org/10.1007/s11042-016-3944-7

Reference BibTeX:

@Article{Khan2016,
author="Khan, Murtaza Ali", title="Multiresolution coding of motion capture data for real-time multimedia applications",
journal="Multimedia Tools and Applications",
year="2016",
pages="1–16",
issn="1573-7721",
url="http://dx.doi.org/10.1007/s11042-016-3944-7"
}

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Chapter 1

INTRODUCTION

1. This software performs the lossy coding of motion capture data stored as ASF/AMC file format.

2. Please read the reference paper (http://dx.doi.org/10.1007/s11042-016-3944-7) to get more details about the system.

3. In order read/load the ASF/AMC files, this software uses the Neil D. Lawrence's MATLAB Motion Capture Toolbox (https://github.com/lawrennd/mocap). We provided the Toolbox in the `MOCAP0p_135_136` directory (folder). Though our coding system uses very few of these files but for the sake of completion all the Toolbox files are provided.

4. Sample ASF/AMC files are obtained from Carnegie Mellon University - CMU Graphics Lab - motion capture library. (http://mocap.cs.cmu.edu/).

5. You can play ASF/AMC files in a free program like MotionView (motView.exe) or use some commercial programs like Autodesk MotionBuilder.

Chapter 2

TUTORIAL

2.1 Directions for Installation and Running the Program

1. Unzip the file `DWT-GUI.zip` to create a directory (folder) `DWT-GUI`. The `DWT-GUI` directory has few files and two subfolders, `MOCAP0p_135_136`[1] and `mocap_compress_dwt`. Add `DWT-GUI` folder to MATLAB path using MATLAB Set Path button/menu. When setting path, use the option *Add with Subfolders....*; otherwise subfolders won't be added in the MATLAB path.

2. Run the script `gui_main_dwt.m`. You can write the script name `gui_main_dwt` on MATLAB command prompt `(>>)` to run it. It will show the two windows. This first window (Fig. 2.1) is the help window and it shows the steps for encoding and decoding. The second window (Fig. 2.2) is the main interface of the program.

[1] https://github.com/lawrennd/mocap

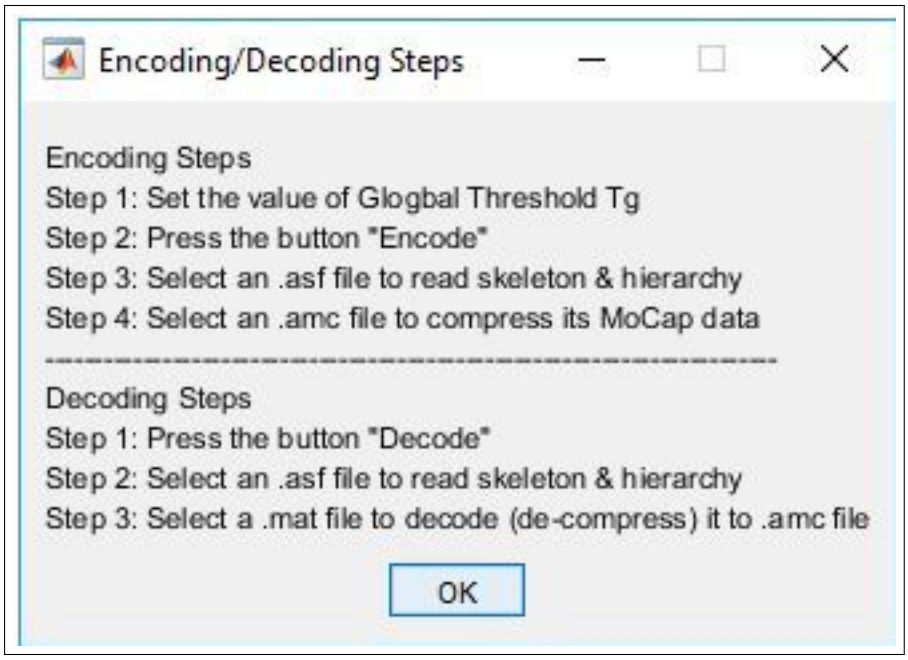

Figure 2.1: Help window

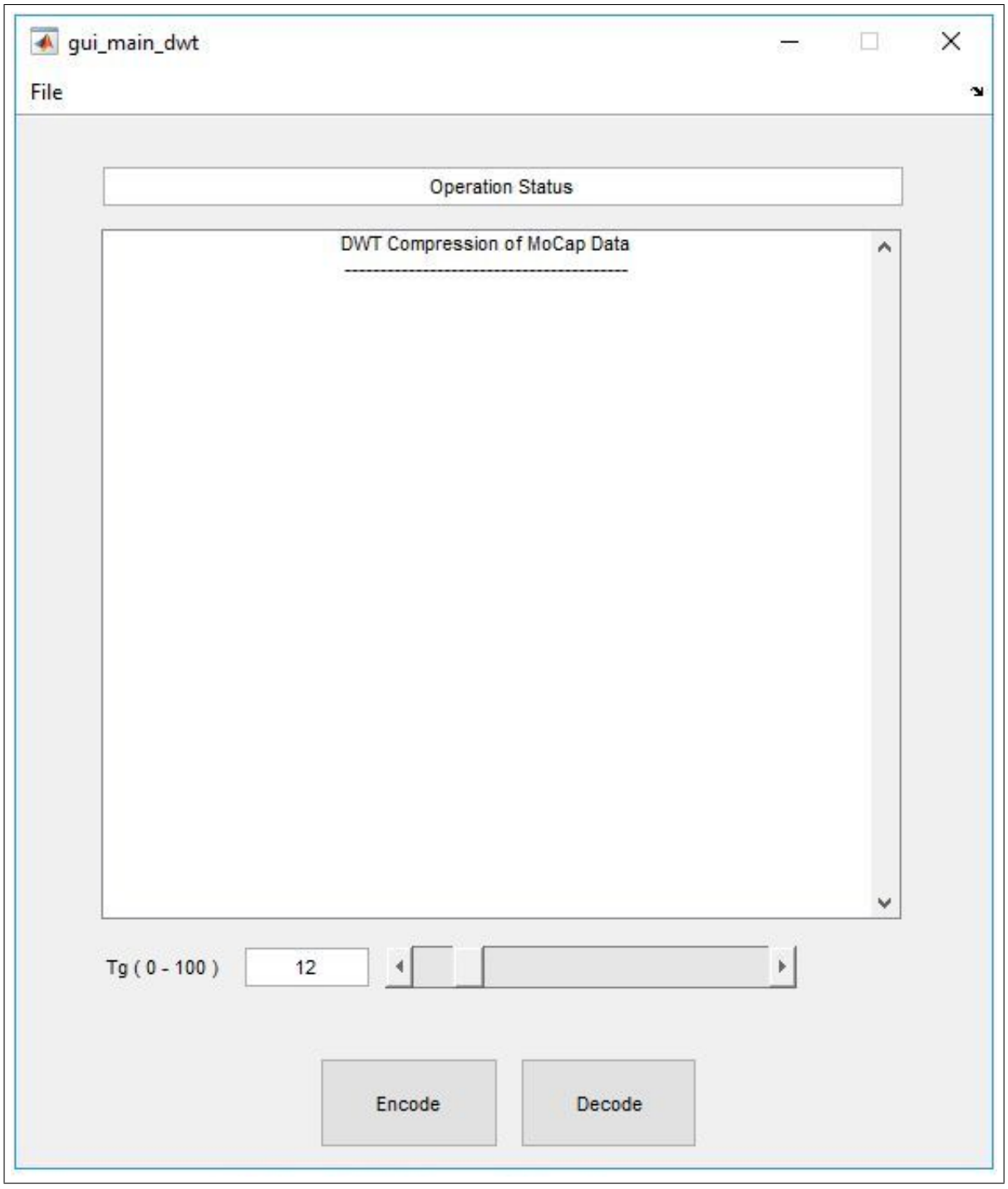

Figure 2.2: Main interface

2.2 Steps for Encoding

1. In the main interface window, optionally input the value of Global Threshold Tg either by typing the value in the text field and pressing the enter key or by moving the slider (Fig. 2.3). Default value of Global Threshold Tg is 12.

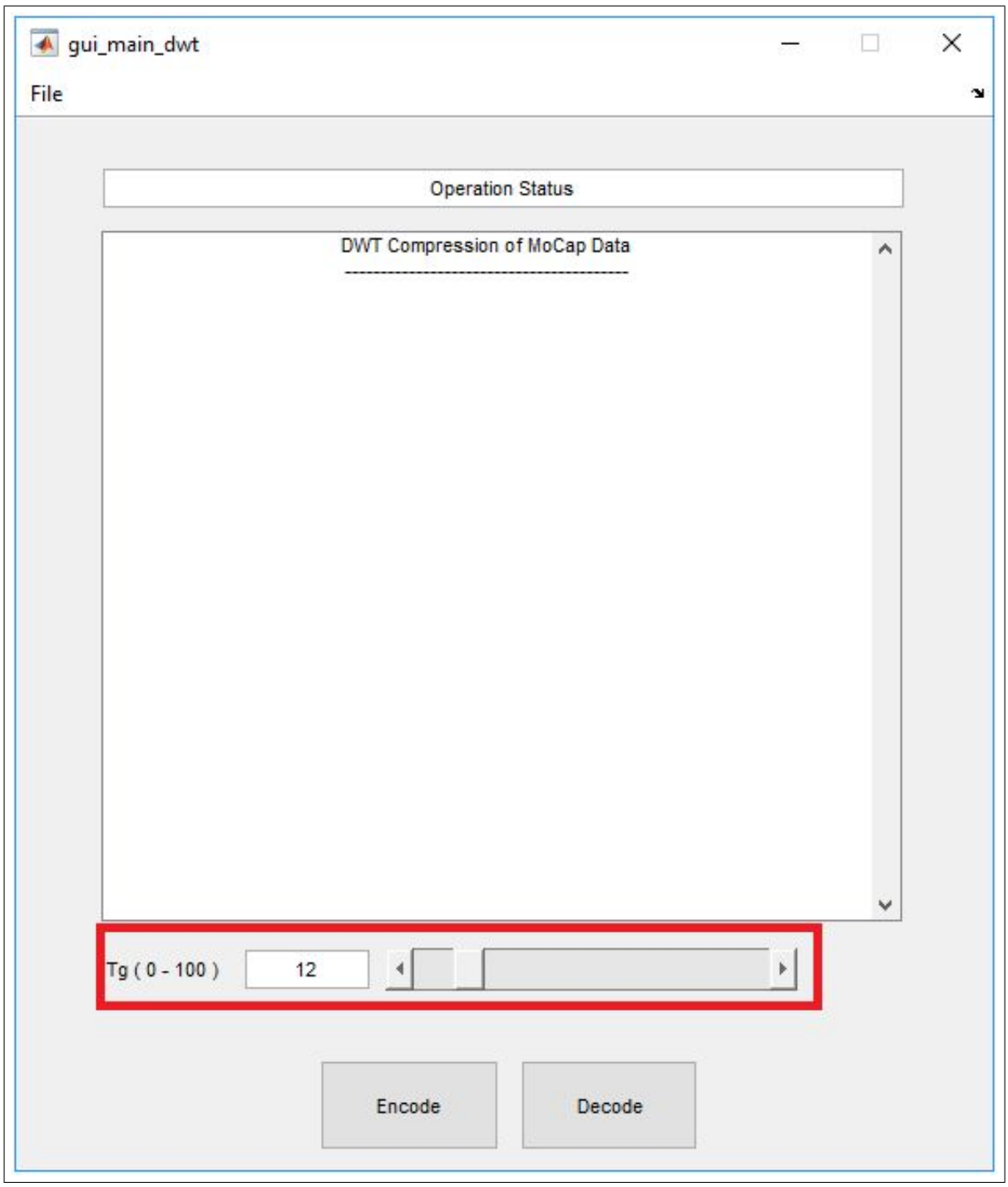

Figure 2.3: Input Global Threshold Tg

2. Press the Encode button (Fig. 2.4). It will show a dialog box to select an ASF file (next step).

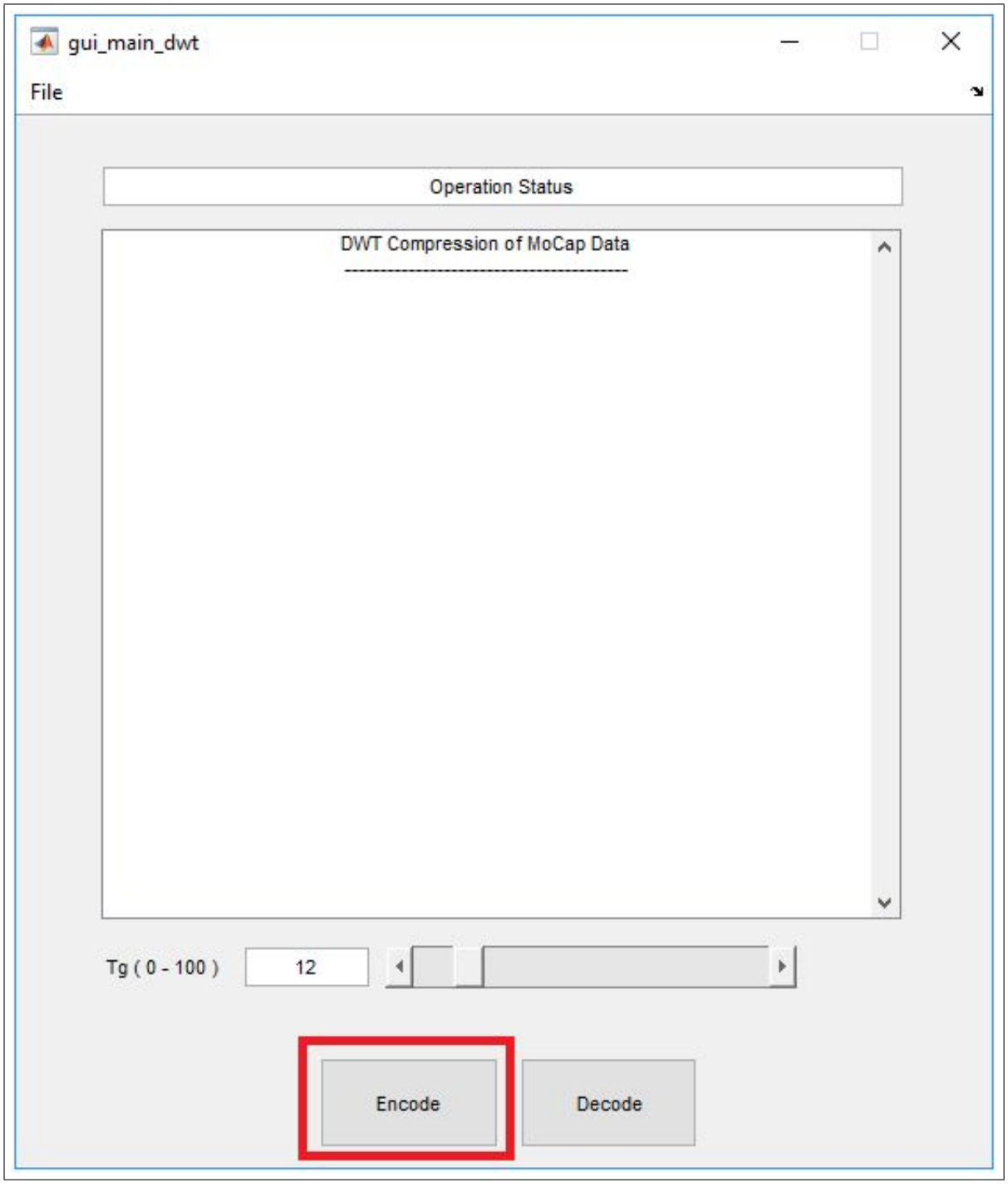

Figure 2.4: Press Encode button to begin encoding process

3. Select an ASF file and press the button Open (Fig. 2.5). Two sample ASF files `09.asf` and `10.asf` are provided in the installation directory (folder) `DWT-GUI`. Note that we are NOT compressing ASF file, the program reads the ASF file to get information about skeleton, hierarchy of joints, channels, etc. Another file selection dialog box will appear (next step).

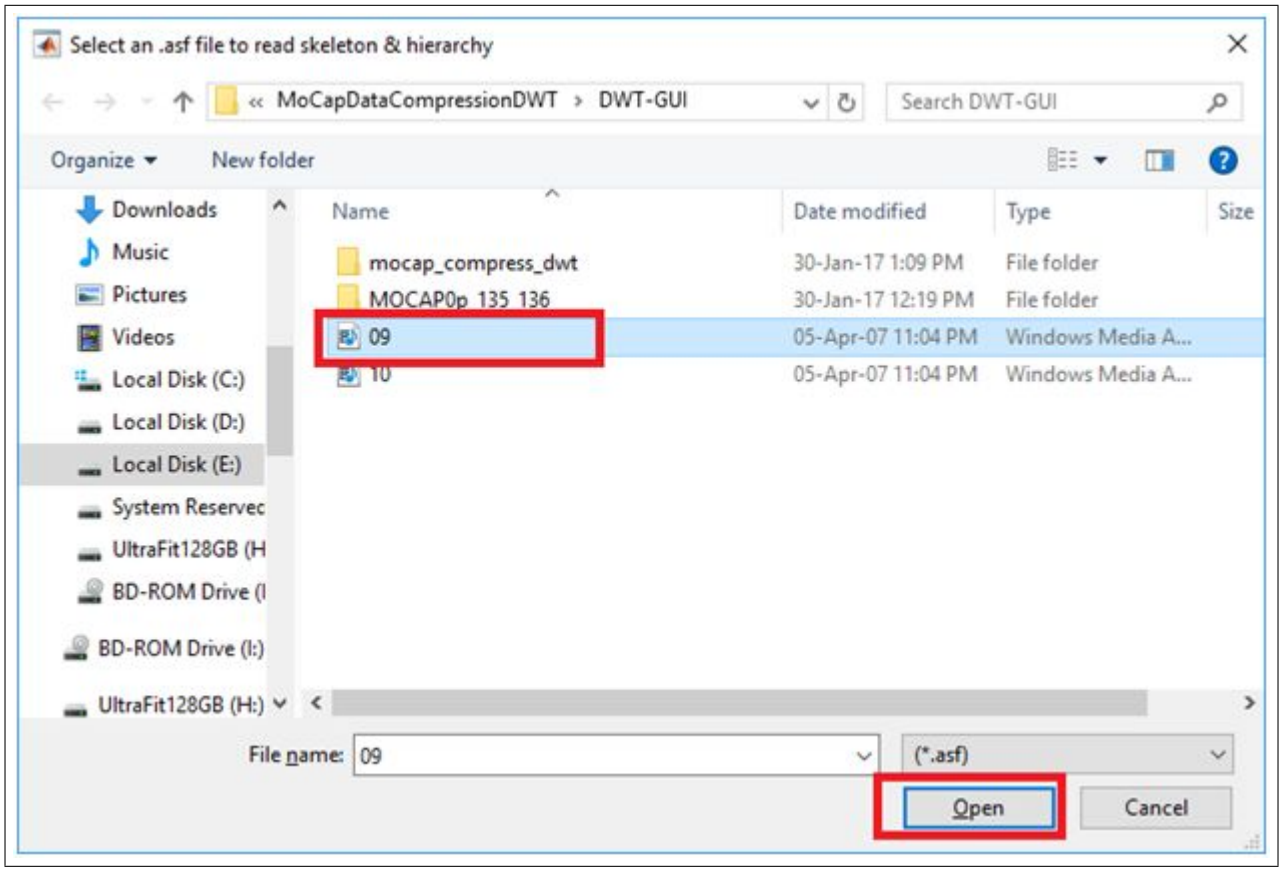

Figure 2.5: Select an ASF file

4. Select an AMC file corresponds to the ASF file selected in the previous step and press the button Open (Fig. 2.6). Two sample AMC files `09_01.amc` and `10_03.amc` are provided. The AMC file contains motion capture (MoCap) data that is to be compress.

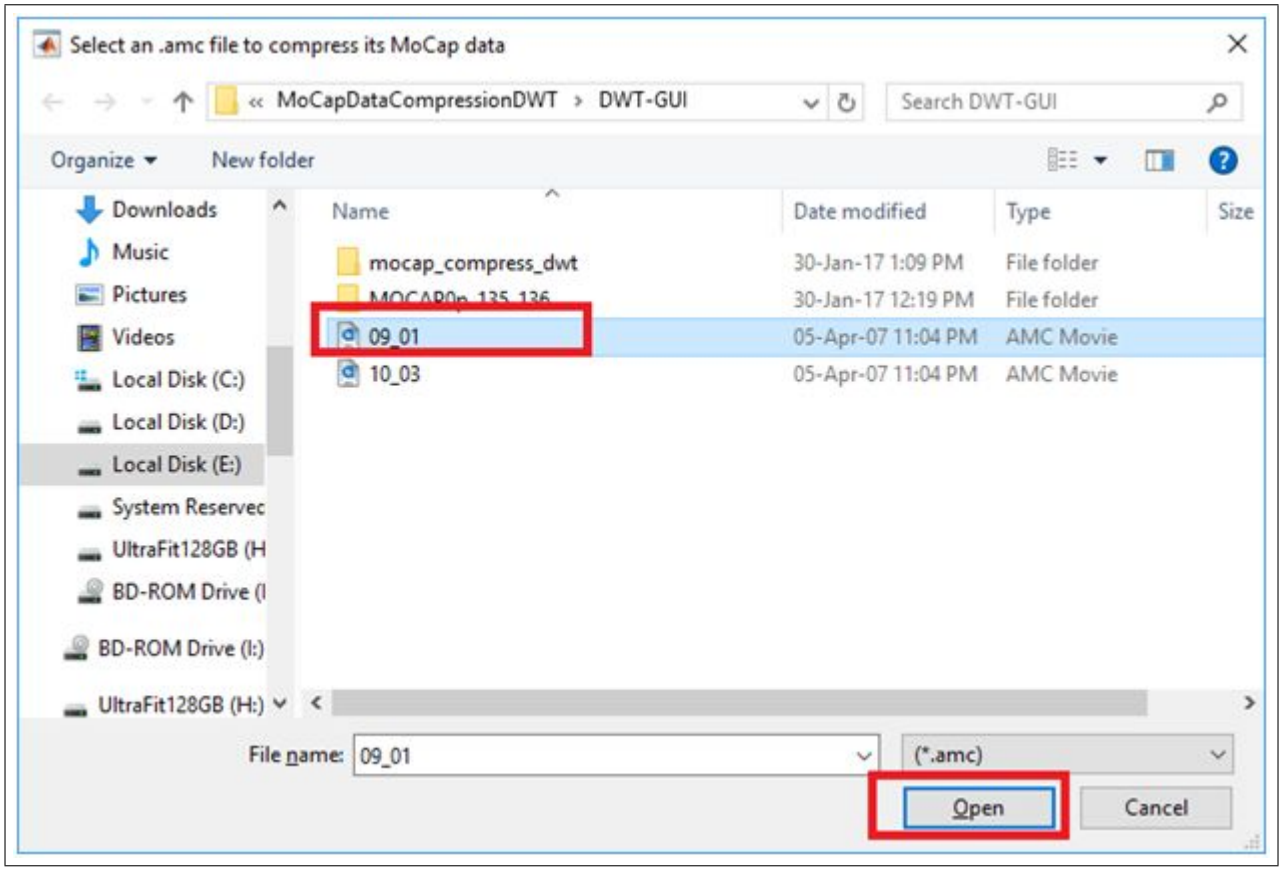

Figure 2.6: Select an AMC file

5. The program will compress the AMC file (e.g., `09_01.amc`). Operation messages and the statistics will appear in the main interface window (Fig. 2.7). A compress MAT (MATLAB format) file will be created in the directory (folder) where the AMC file is located. The name of compress MAT file is automatically generated and it is be based on input AMC file name, Tg, name of wavelet and level of wavelet decomposition, e.g., `09_01_Tg12_db3_lev4.mat`. Note that if a compress MAT file with the same name already exists then new file will overwrite it.

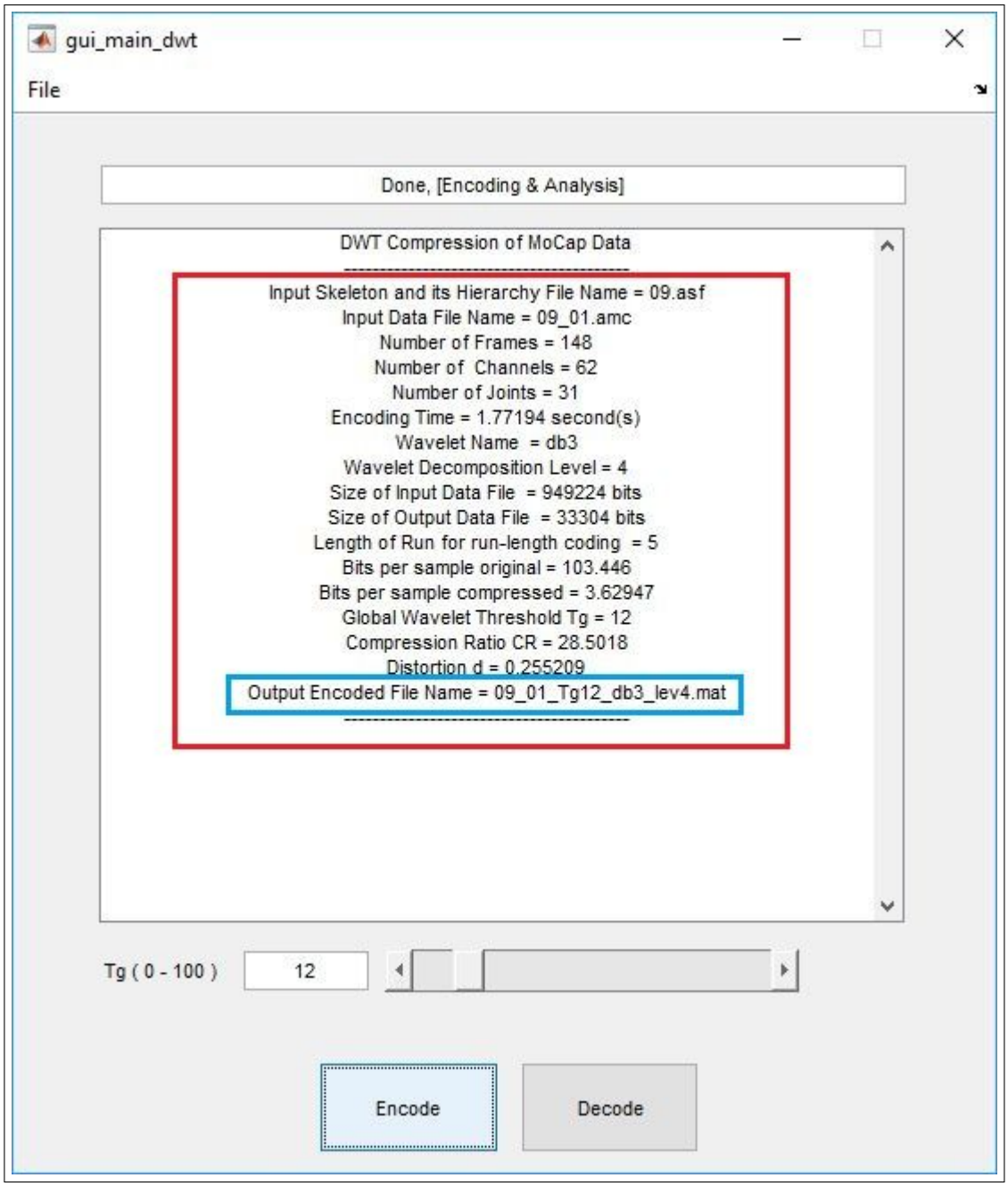

Figure 2.7: After Encoding

6. Optionally repeat the same process to encode (compress) more mocap files one by one.

2.3 Steps for Decoding

Note that an encoded file, either obtained in the current session or an earlier session of the program run, is needed in order to apply decoding process.

1. Press the Decode button (Fig. 2.8). It will show a dialog box to select an ASF file (next step).

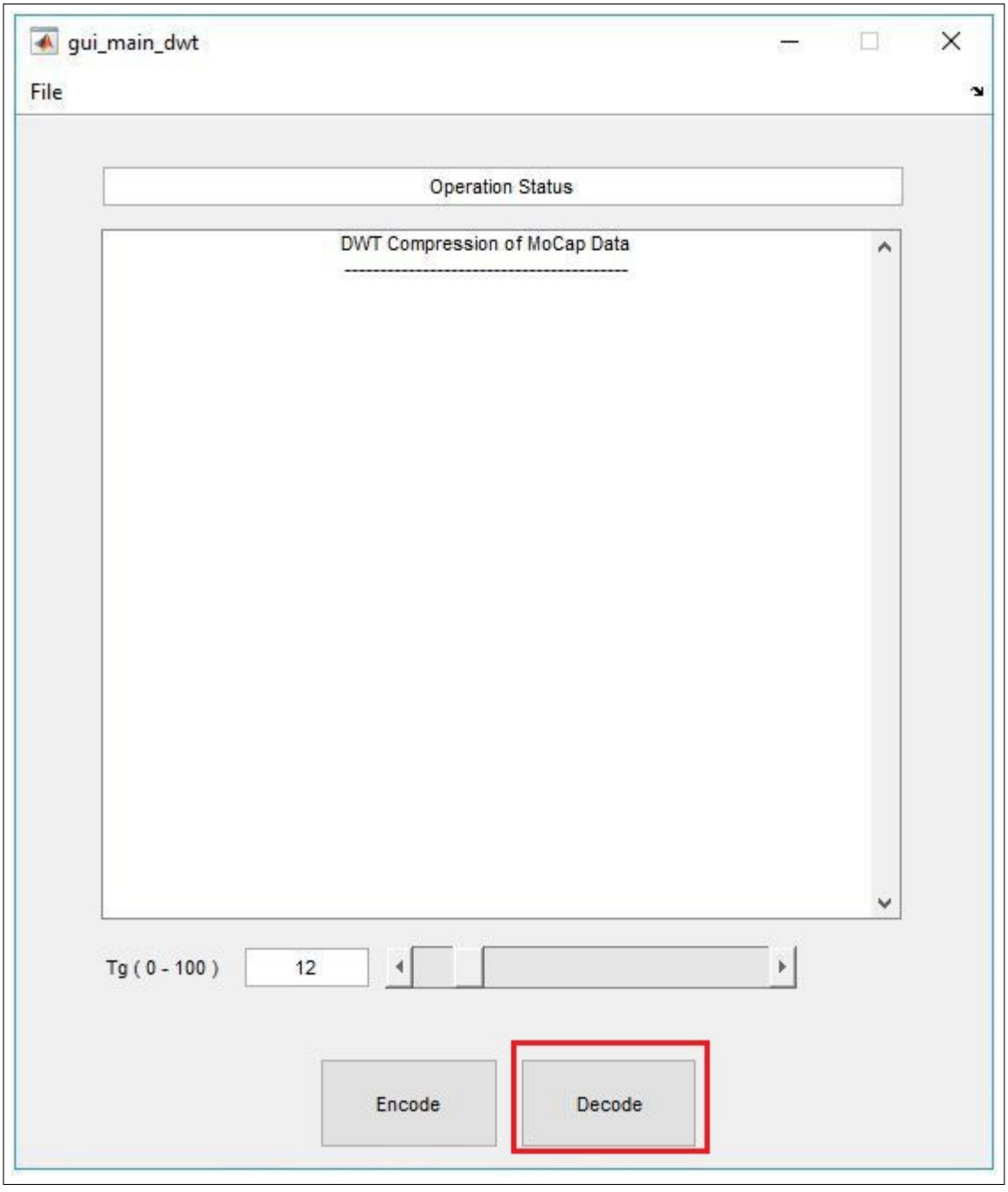

Figure 2.8: Press Decode button to begin decoding process

2. Select an ASF file and press the button Open (Fig. 2.9). Two sample ASF files `09.asf` and `10.asf` are provided in the installation directory (folder) `DWT-GUI`. Note that we are NOT decoding ASF file, the program reads the ASF file to get information about skeleton, hierarchy of joints, channels, etc. Another file selection dialog box will appear (next step).

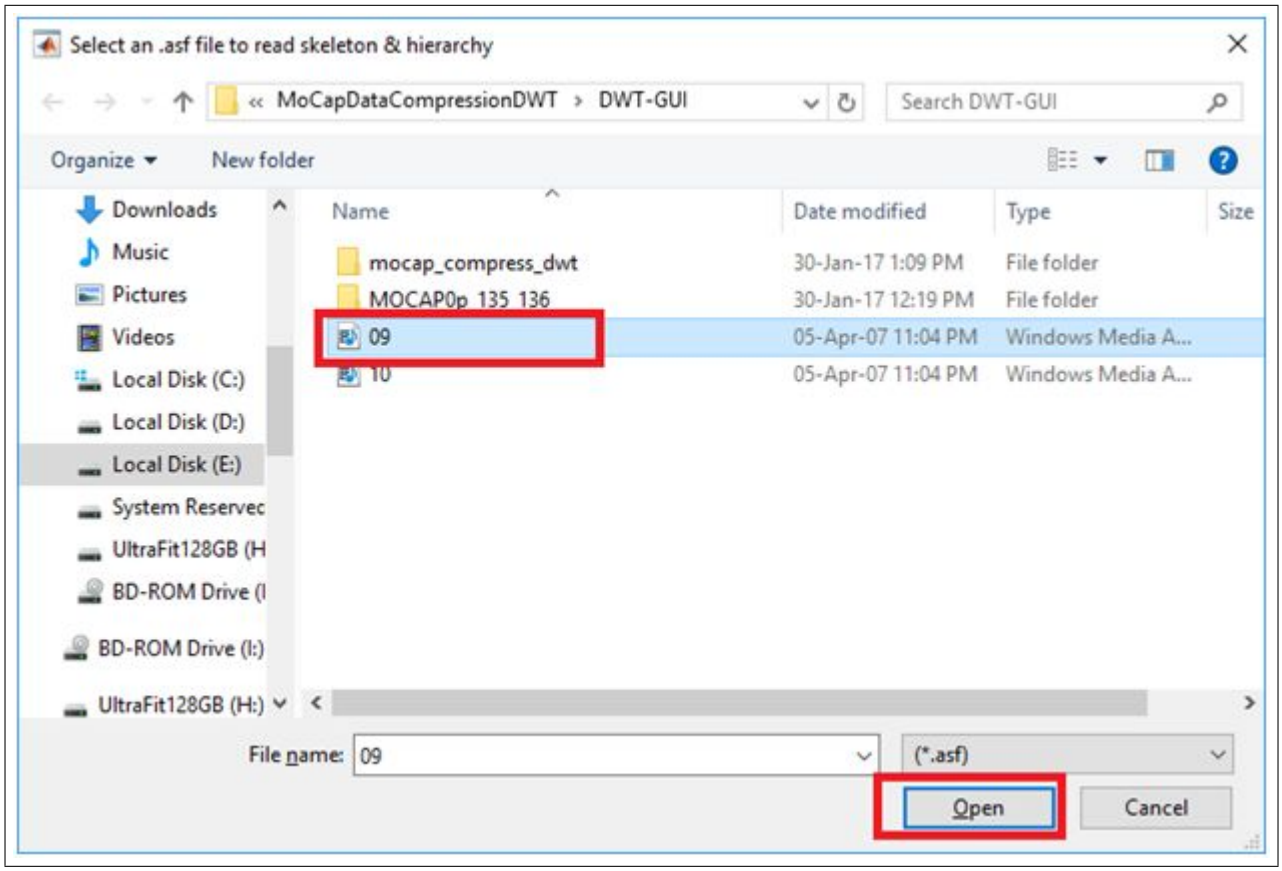

Figure 2.9: Select an ASF file

3. Select a MAT file, (e.g., `09_01_Tg12_db3_lev4.mat`) (Fig. 2.10) encoded earlier to decode (de-compress) it.

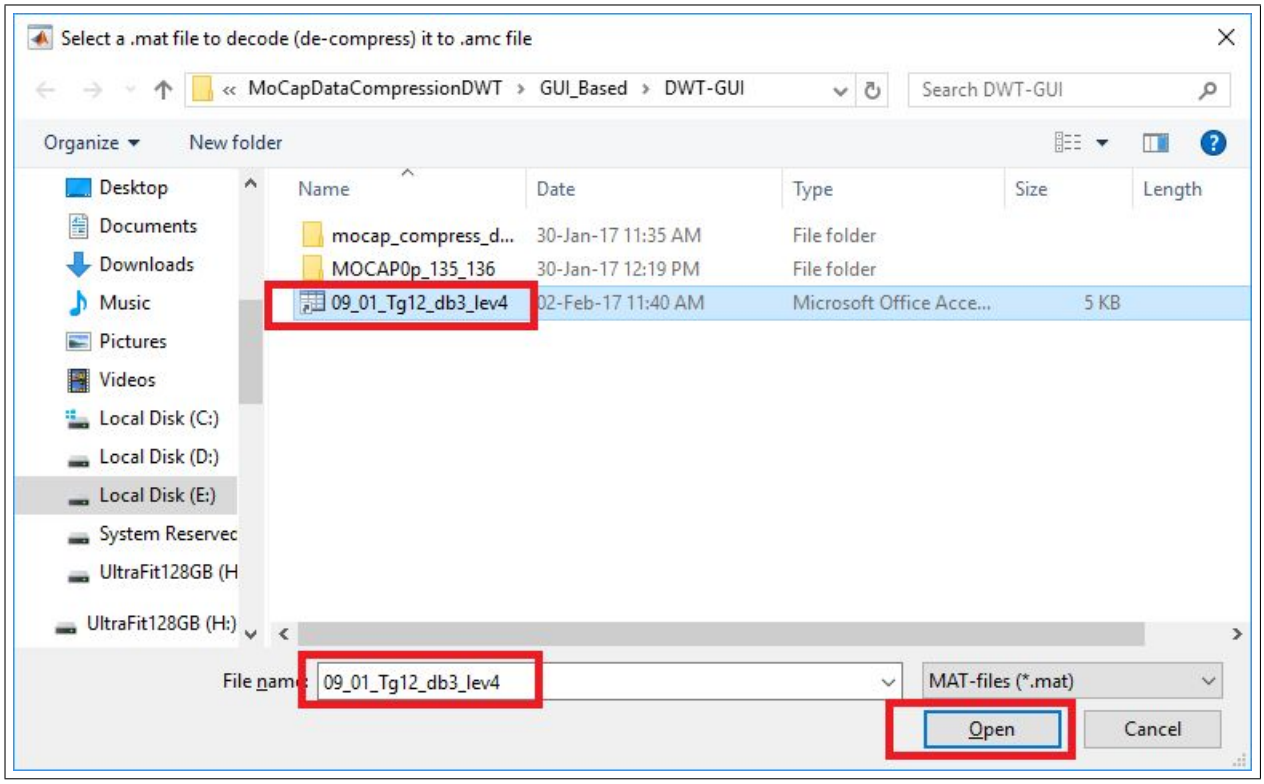

Figure 2.10: Select a MAT file

4. The program will decode (de-compress) the MAT file (e.g., `09_01_Tg12_db3_lev4.mat`). A decoded AMC file will be created in the directory (folder) where the MAT file is located. Operation messages and the statistics will appear in the main interface window (Fig. 2.11). The name of newly created AMC file is same as the input MAT file but its extension is .mat.

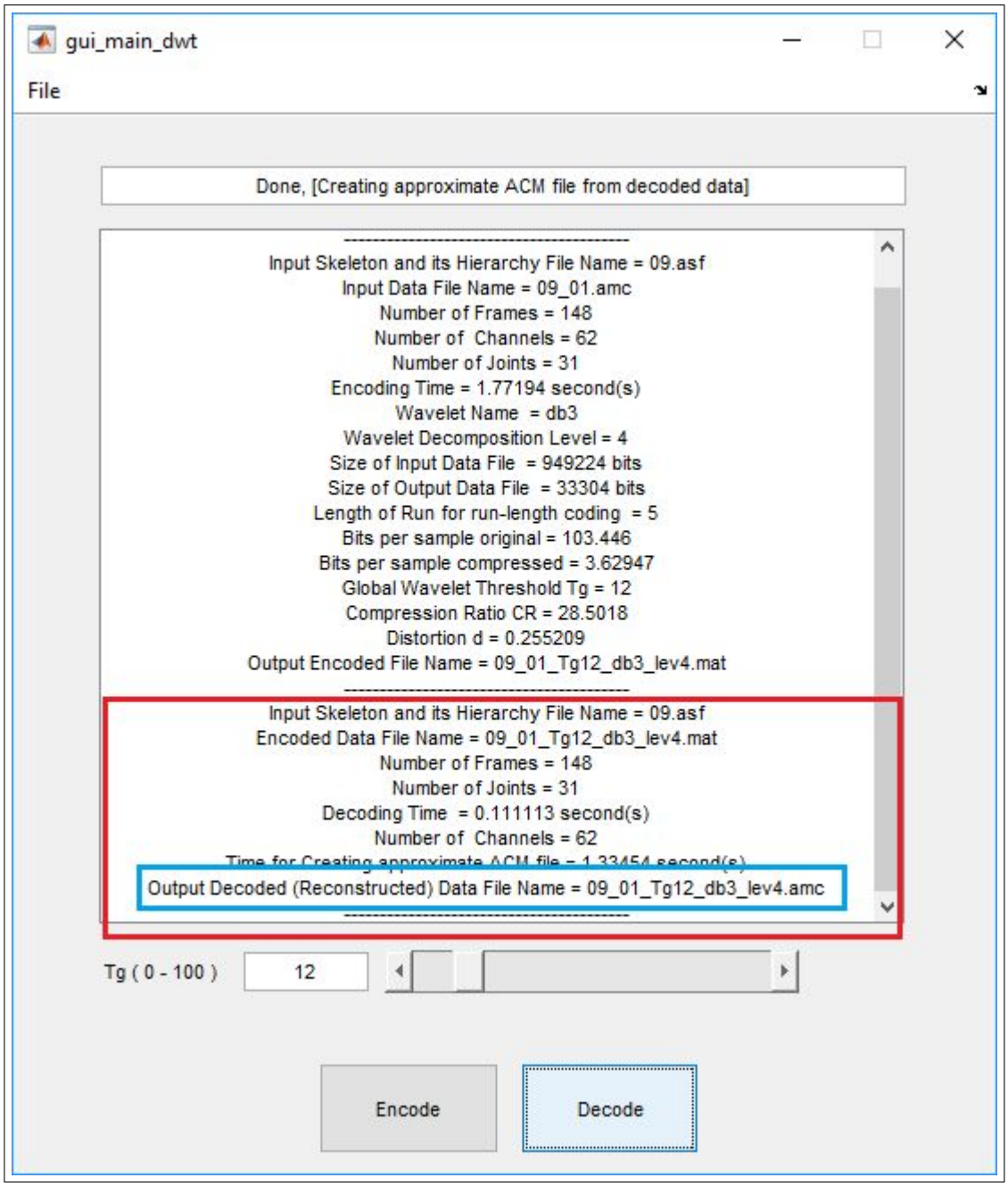

Figure 2.11: After Decoding

5. Optionally repeat the same process to decode (de-compress) more encoded files (MAT files) one by one.

2.4 Saving the Statistics

1. Optionally, you can save the statistics of encoding/decoding messages, as shown in main interface window, in a text file by press the `File` menu then selecting `Save Statistics & Analysis Ctrl+S` menu item (Fig. 2.12).

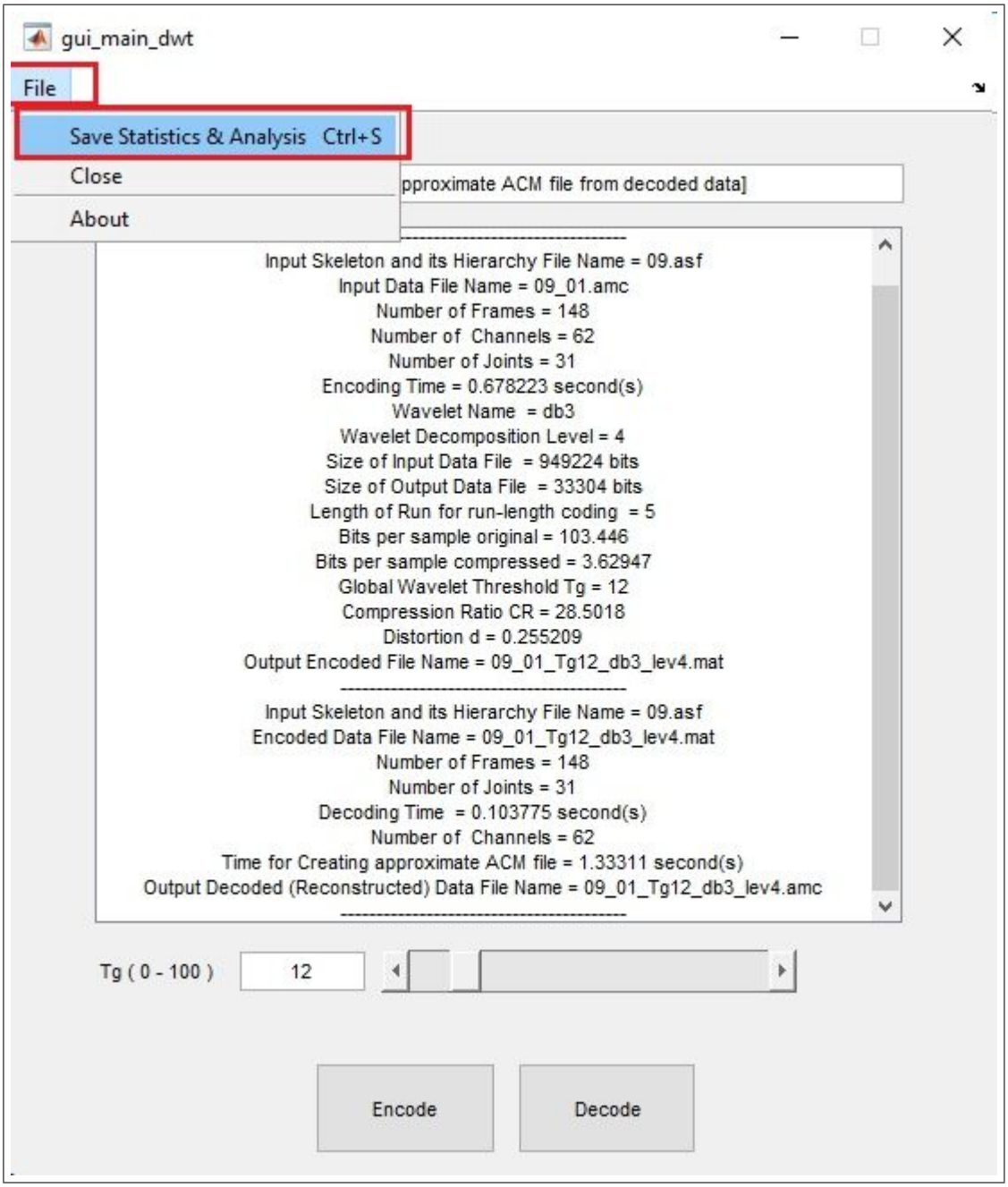

Figure 2.12: Save Statistics

2. Type the name of statistic file (e.g., `Statistics-09_01_Tg12_db3_lev4`) and press the button Save (Fig. 2.13). A text file of statistic will be created.

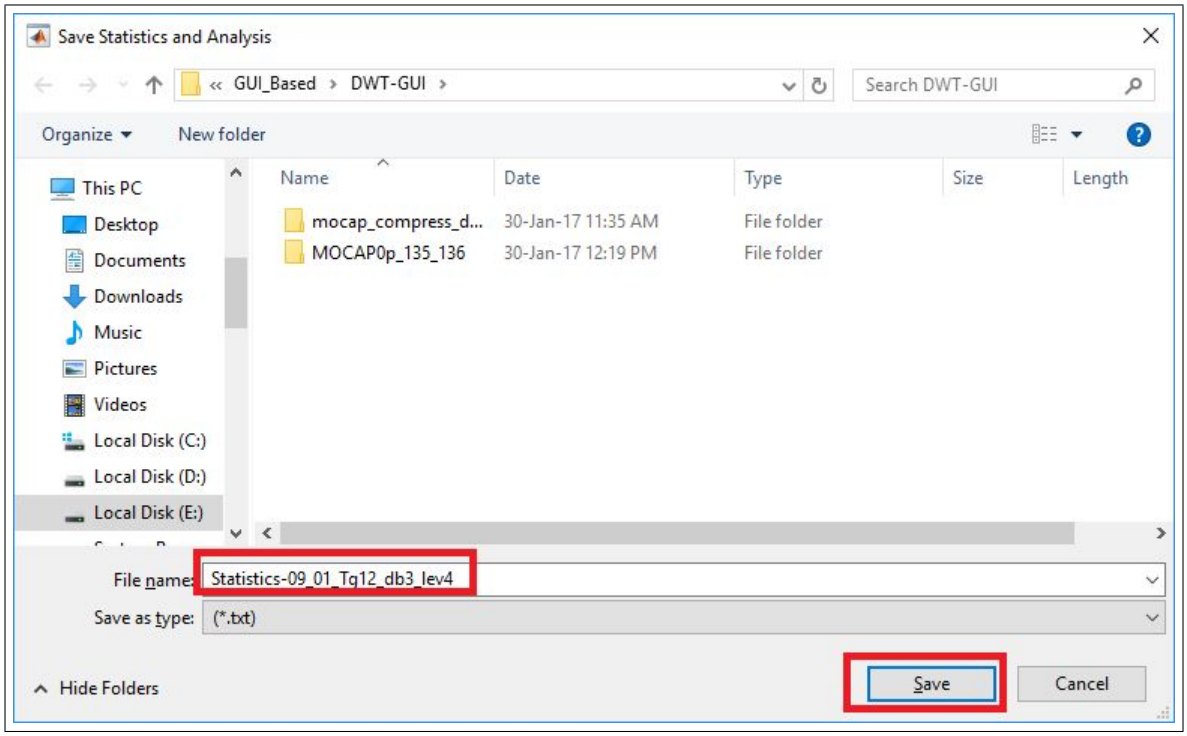

Figure 2.13: Enter Statistics File Name

Chapter 3

FUTURE ENHANCEMENTS

The author intents to add more functionality in the software, e.g,

1. Encode other types of motion capture file formats, e.g., BVH, c3d, etc.
2. Batch processing to select and code multiple files.
3. Add viewer to visualize hierarchy of joints.
4. Plot statistical curves, e.g., MSE, PSNR, etc.
5. Add options to change parameters of coding, e.g., types of wavelet, level of Wavelet decomposition, etc.

Chapter 4

SEEKING COLLABORATION

There are various standardize methods and file formats for coding and storing compressed image and video data e.g., jpeg, png, mpeg, etc. But there is no standard file format exists to code and store *compressed* motion capture data. The author seeking collaboration in research and development to develop a robust coding method of motion capture data and to define a unified standard file format to store the compressed motion capture data.

Thanking you.

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