Guide of Using the MATLAB Code

1. Installing the required softwares :
   - MATLAB 2017a with all Toolbox
   - MATLAB Support for MinGW-w64 C/C++ Compiler
   - Geometry Processing Toolbox by Alec Jacobson (included in the file package)
   - nonrigidICP MATLAB code by Manu (included in the file package)
   - Shape Model Builder by Manu (included in the file package)
   - Exact geodesic for triangular meshes by Danil Kirsanov (included in the file package)
   - Surface Reconstruction from scattered points cloud by Luigi Giaccari (included in the file package)
   - ACVD from CREATIS
   - Meshlab 2016.12

2. Using the code (Pre-MATLAB)
   - Prepare surfaces from STL or PLY files.
   - Remesh the surfaces by using ACVD Software. Put the files in the acvd folder. Individually, the command for using is by using command prompt in the ACVD folder "ACVD.exe filename.ply 3750 no". The 3750 specify the number of vertices that is desired. Change number if desired. The result is output_1.ply. Use acvdauto.m for batch files. Modify the code as desired.
   - Put the remeshed surface files in the main folder as the file package

3. Using the SSM Builder (MATLAB)
   - Specify the type of file for STL or PLY files are used. (PLY if files are remeshed with ACVD)
   - Run the code for building the SSM. Specify the source surface from the files by changing the N variable. Use runmode = 1 for fastest registration. Use runmode = 0 to see each surface registration in figure, although slower.
   - Specify tempfiles for the total number of files that is going to be registered.
   - To see the principal components, specify k number for the shape mode that wanted to be shown.
   - After the Shape model is completed, annotate the landmark points. Specify the landmark numbers by changing the variable.
   - For now, the vertex_number(1) and (2) are landmark points, vertex_number(3), (4), and(5) are belt vertices for circumference measurement.
   - OPTIONAL: Insert pause commands to see the result of each step.

4. Using the SSM Fitter (MATLAB)
   - Run a mat file to specify a SSM that is going to be used.
   - Put the target files on the main folder. It is desirable to have the target remeshed with ACVD before.
   - The naming should be specified that variable 'var' is specifying the file number. The input file naming detection is specified with 'input' variable.
   - Specify using local deformation or not (1 if yes, 0 if not).
   - Specify the number of shape modes that is going to be used by changing the 'endmode' variable

- Specify var = 1:numberoffiles depending on the total number of files to run, or specify var = filenumber if only specific surface is desired.
- IMPORTANT! Check the directory path. Change `cd` `'C:\Users\Gale Dewo\OneDrive\thesis\thesis\charlienash\MANU test'` and `cd 'C:\Users\Gale Dewo\OneDrive\thesis\thesis\charlienash\MANU test\geodesic'` if necessary. Also change all 'oldFolder' variables to avoid directory problems.
- The result numbers are shown in variable 'circumferences', 'depthver1', and 'depthver2'
- The result figures are shown in main folder as 'circumference_xx.png' and in the 'geodesic' folder as 'geodesic1_xx.png' with xx as the surface number.
- OPTIONAL: Uncomment the Pause lines to see the result of each step.