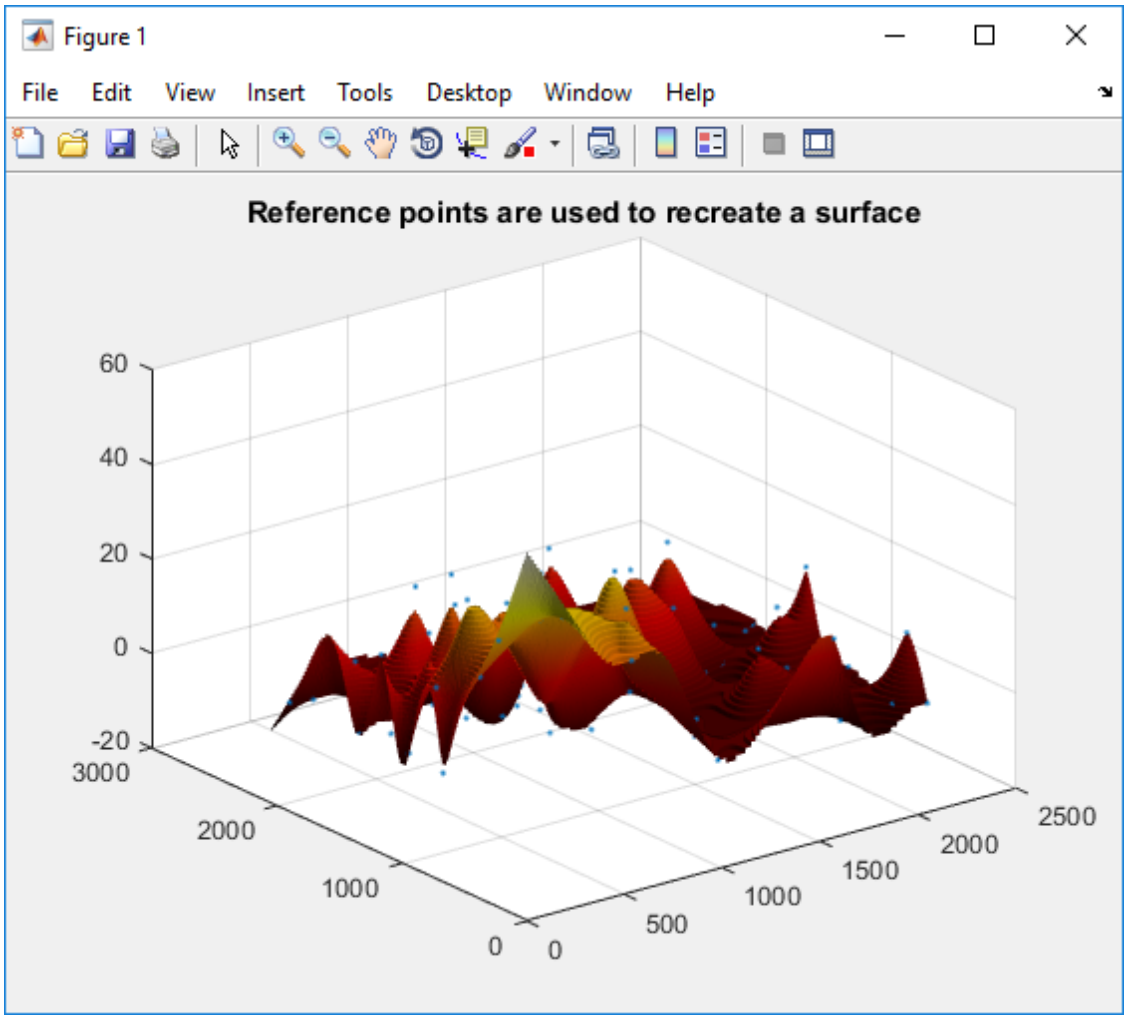
VolumeCut: Cut images along custom surfaces

VolumeCut cuts a three dimensional image stack along an arbitrary surface. The surface is defined by the user that specifies reference point coordinates in a MATLAB matrix. The program then fits a surface passing through all reference points and uses the fitted surface to split the image stack in two halves.

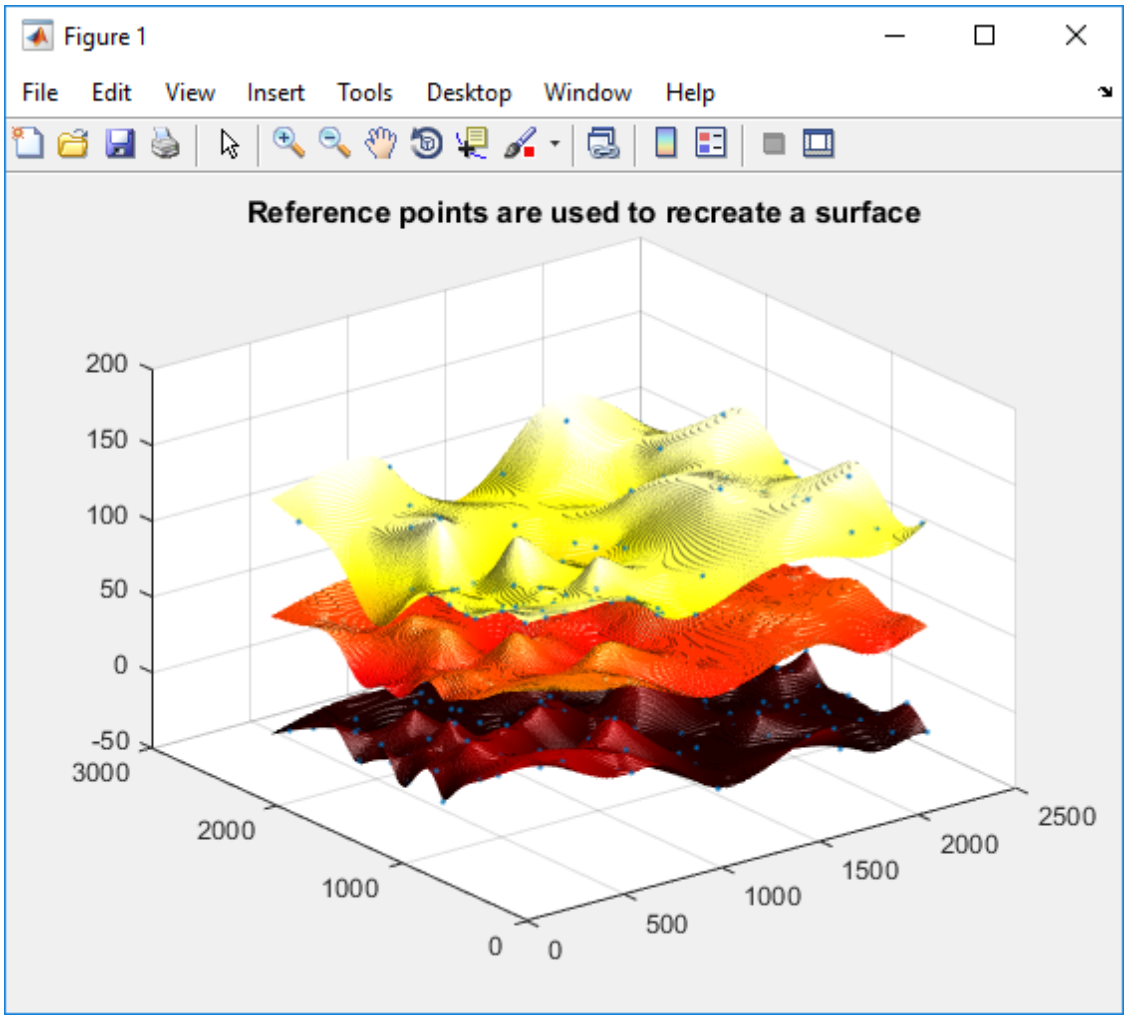
Each row of the reference points' matrix is the [X,Y,Z] coordinates of each point on the cutting surface. VolumeCut will fit the missing points.

The program performs the following main operations:

1. Ask user to load the TIF image stack file from disk
2. Ask user to load matrix containing coordinates of reference cut points
3. A surface if fitted across all reference points
4. If there are two reference matrixes, the average surface is computed
5. The image volume is cut in hald along the plane
6. Image halves are saved with suffixes "-Part1.tif" and "-Part2.tif"



If one matrix of reference points is provided, the program cuts the image stack along that surface. Pixels from Surface#1 to half-way surface are saved in "-part1.tif" Pixels from half-way surface to Surface#2 are saved in "-part2.tif"



If two matrixes of reference points are provided, the user is asked to select the mode of cutting:'

1. **Inside to halfway between planes:** Pixels from Surface#1 to half-way surface are saved in "-part1.tif" Pixels from half-way surface to Surface#2 are saved in "-part2.tif"

2. **Beginning to halfway between planes:** Pixels from beginning of stack to half-way surface are saved in "-part1.tif" Pixels from half-way surface to end of stack are saved in "-part2.tif"

3. **Inside/outside planes:** Pixels inside surfaces are saved in "-part1.tif" Pixels outside surfaces are saved in "-part2.tif"

Input:

- Image file: a 3D TIF image stack of the volume to cut

- Reference points: one or two matrixes containing reference points

Output:

- "imageFileName-part1.tif" containing pixels above the final cut surface

- "imageFileName-part2.tif" containing pixels below the final cut surface

Dependencies:

- gridfit.m (surface fitting from reference points)
- saveastiff.m (TIFF image writer more robust than imwrite)
- txtBar.m (display progress a text progress bar in the command window)

Changelog

Version 1.4 *created on 2017-11-0 by Luca Della Santina*

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+ Allows to cut at a custom distance from references planes when mode=1
+ Added progress bars and verbose output for all the processing steps
+ Added copyright statement
% Exmplained the three cutting modes more clearly
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Version 1.3 *created on 2017-10-01 by Luca Della Santina*

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% Fixed double extension inserted into filenames, i.e. ".tif-part1.tif"
+ Added new modes of slicing when using 2 set of coordinates

  Plane #1<->middle<->#2
  Part1: From beginning of plane #1 to halfway between planes
  Part2: From halfway between planes to plane #2

  Stack Start<->middle<->End mode:
  Part1: From beginning of volume to halfway between planes
  Part2: From halfway between planes to end of volume

  Inside/Outside planes mode:
  Part1: volume outside the planes delimited by the coordinate sets
  Part2: volume inside the planes delimited by the coordinate sets
```

Version 1.2.1 *created on 2017-09-07 by Luca Della Santina*

```
+ Reformatted documentation using proper MATLAB markup format
```

Version 1.2 *created on 2017-09-07 by Luca Della Santina*

```
+ When cutting with 2 set of reference points output stacks are:
  "-part1.tif" voxels between top and middle surfaces (g1<->g3)
  "-part2.tif" voxels between middle and bottom surfaces (g3<->g2)
+ Allow Surface 1 and Surface 2 to be loaded opposite than expected
```

Version 1.1 *created on 2017-09-01 by Luca Della Santina*

```
% bug fixed the file selector for reference points
```

Version 1.0 *created on 2017-09-01 by Luca Della Santina*

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