



# TOLOMEO

TOoLs for Open Multi-risk  
assessment using Earth Observation data

TOLOMEO – WP2 – Urban Focus Batch

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## 1. Introduction

This report describes an usage example of the batch mode available in the InterIMAGE software applied to the Human Exposure (HUEX) tool of the TOLOMEO project. The batch mode permits to run an InterIMAGE project without using the software's GUI. The batch mode has different advantages:

- it is ready to use: the final user can download a batch project from internet and, after a fast setup, just run the processing;
- it is easy to use: the final user could tune all the parameters of the project just using a text file;
- it does not need any knowledge of InterIMAGE. The final user could use the batch mode without reading any documentation of the entire software;
- It could process a stack of layers. The final user could set-up multiple processing just once.

More info about the batch mode are available on the InterIMAGE wiki website [1].

In the next sections, the batch project named UF\_Batch is setup to work in batch mode. It has the aim to detect human settlements based on two parameters: minimum area and minimum number of buildings.

A more accurate explanation on how the project is developed, and how it works, can be found in the 'Video Demo' section on the TOLOMEO website [2]. Obviously, the project described in the video and its batch version produce the same results.

## 2. Batch Mode set-up

The final user has to download the batch project. Once downloaded, the folder includes these files/folders:

- 3 folders named 'decisiontree', 'shapes' and 'tmp'. These folders couldn't be modified;
- The project's files:
  - .gap;
  - .lyr;
  - .net;

- .simg;
- .dt.
- execute\_interimage.bat: this file must be adapted to the environment in use. This is the only file that the final user can change. Furthermore, in this file there are all the tunable parameters (e.g. inputs, and thresholds) of the project.

The file named 'execute\_interimage.bat' can be opened with any text editor and, once opened, it shows the following text lines:

```
1  :: Batch processing example
2  :: by Rodrigo Ferreira
3
4  :: This file should be copied to the InterIMAGE project folder that you want to run in batch
5
6  :: This option hides the commands during batch execution
7  :: Comment the next line putting :: before it in order to debug the program
8  @echo off
9
10 :: This command changes the current directory to the InterIMAGE binaries directory
11 pushd C:\InterIMAGE1.41
12
13 :: The following commands set the parameters used during InterIMAGE execution
14 set prj_path=C:\Temp\UF_Batch
15 set threshold_area=10000
16 set threshold_buildings=100
17 set threshold_mean=75
18 set lowpass_UF=77
19 set threshold_UF=3
20 set compactness_S=0.6
```

```

21 set color_S=0.8
22 set scale_S=10
23
24 :: This command executes InterIMAGE with the defined parameters
25 :: IMPORTANT: The ^ must appear at the end of every line BUT the last one. The lines right
    after a ^ MUST start with a space
26 interimage "projectFile=%prj_path%\UF_Batch.gap"^
27 "outputDecisionRule=%prj_path%\BatchUF_DecisionRule.dt"^
28 "outputShapeFile=%prj_path%\shapefile_%lowpass_UF%_%threshold_UF%_
    %threshold_area%_%threshold_buildings%.shp"^
29 "semanticNetwork=%prj_path%\UF_Batch.net"^
30 "resourceImage=image#%prj_path%\image.tif"^
31 "parameterOperator=@lowpass_UF@#%lowpass_UF%"^
32 "parameterOperator=@threshold_UF@#%threshold_UF%"^
33 "parameterOperator=@compactness_S@#%compactness_S%"^
34 "parameterOperator=@color_S@#%color_S%"^
35 "parameterOperator=@scale_S@#%scale_S%"^
36 "parameterDecisionRule=00001#%threshold_area%"^
37 "parameterDecisionRule=00002#%threshold_buildings%"^
38 "parameterDecisionRule=00003#%threshold_mean%"
39
40 :: This command changes the current directory back to the original one
41 popd

```

The file has 41 lines but just three must be changed:

- Line 11: path of the InterIMAGE binaries directory;
- Line 14: path of the folder of the project (i.e. UF\_Batch folder);
- Line 30: path of the image to be processed. It is suggested to put the image within the project's folder.

Once this is done, the final user can to double-click the batch file to run the project.

The parameters of the project are optimized to process CBERS-2B HRC images [3]. In this case, the human settlements detected have the following definition:

*“ Human settlements with a minimum area of 10000 square meters AND a minimum number of 100 buildings”*

The minimum area and the minimum number of buildings could be modified changing the lines 15 and 16 of the batch file. Tuning these two parameters, the final user is able to detect a large variety of human settlements.

Line 28 defines the name of the output file (in ESRI Shapefile format), that represents the detected [urban area](#). The output will be available in the project folder.

The parameters of the project could be tuned changing the lines described below:

- From line 18 to line 19: the parameters of the Urban Focus operator. These are the size of the low-pass filter window (in meters) and the minimum value of the Urban Focus index to be considered. The default values of these parameters are optimized for images with a spatial resolution of 2.5 meters;
- From line 20 to line 22: the parameters of the Baatz- Schäpe segmentation tool [4]. These parameters are compactness, color and scale. It is suggested to fine tune these parameters by trial and error if the spatial resolution is not 2.5 meters;
- Line 17: the parameter defining the minimum accepted brightness of the image-objects detected by the segmentation tool. Per each segment, if the brightness is greater than or equal to the parameter, then the segment is considered as [urban area](#), otherwise it is discarded. It is suggested to tune this parameter in case of sensors different from CBERS-2B HRC.

### 3. Conclusions

The batch mode of the HUEX tool is easy to use. The final user needs to change just three lines of text to start the processing. Moreover, no a priori knowledge of the InterIMAGE software is required. Anyways, experienced users can optimize the parameters of the project using a text editor. Furthermore, the final user can set-up multiple processing just once, and process wide area data sets with the same parameters.

By using the UF\_Batch project, anyone can extract a variety of human settlements just tuning two parameters, easy to understand also by people without any knowledge of remote sensing.

## 4. References

- [1] InterIMAGE wiki: <http://wiki.dpi.inpe.br/doku.php?id=interimage>
- [2] TOLOMEO videodemo webpage: <http://tolomeofp7.unipv.it/VideoDemos>
- [3] CBERS website: <http://www.cbbers.inpe.br>
- [4] M. Baatz, A. Schäpe, "Multiresolution segmentation: an optimization approach for high quality multi-scale image segmentation", In: XII Angewandte Geographische Informationsverarbeitung, Wichmann Verlag, Heidelberg, 2000.