Generation of Attribute Profiles

This manual describes about the installation and usage of AP tool for generating attribute profiles. For details about the attribute profiles please refer to the course materials.

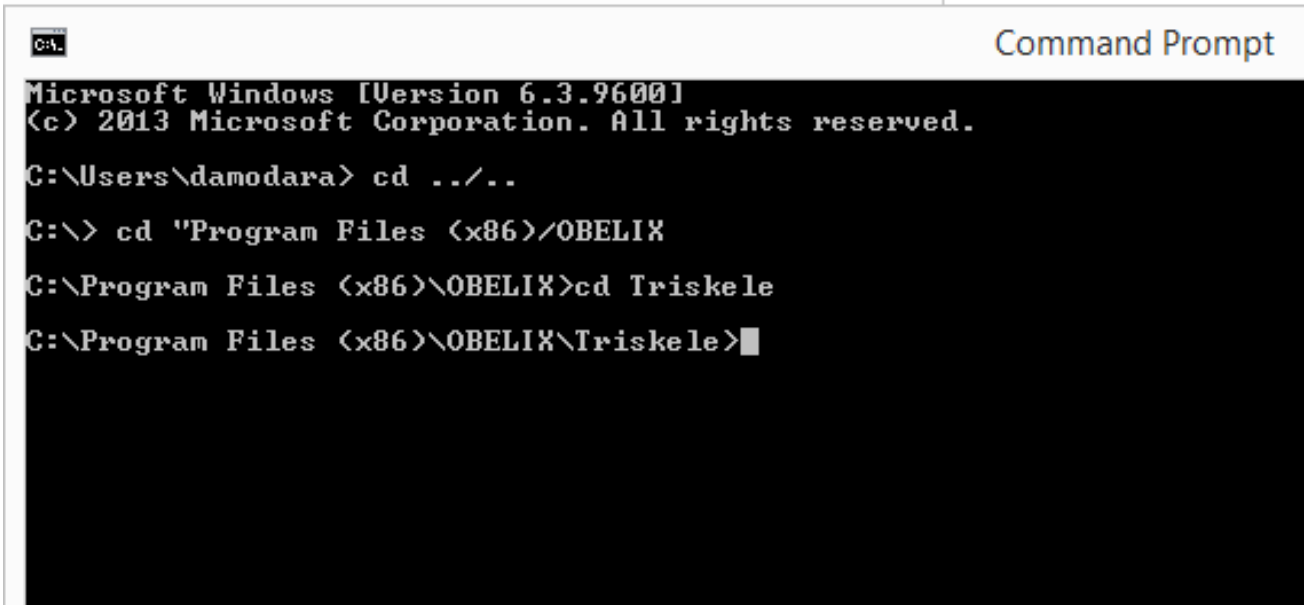
Please see **AP Tool** folder in the Moodle to download the software tools or you can directly download windows version from: https://triskele.parlenet.org/download/debut

Once downloaded the tool, double click and follow the instructions to install.

Please let us know, if you have problem in installing the tool.

Now let's see how to use the tool:

1) Open command window, and change the directory to the installed location as shown below

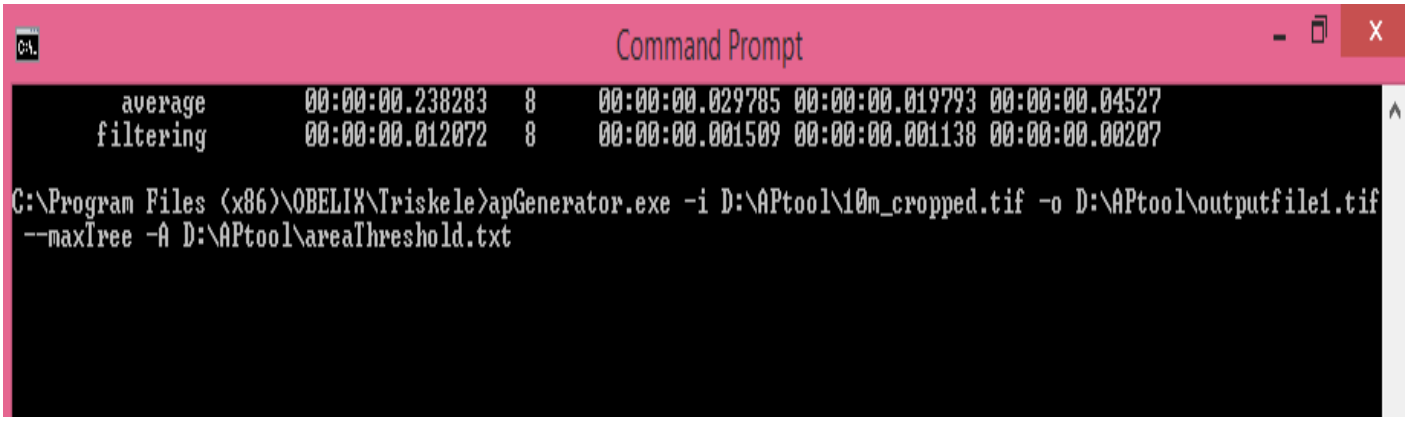


2) To compute the attribute profiles, you have to type the following command:

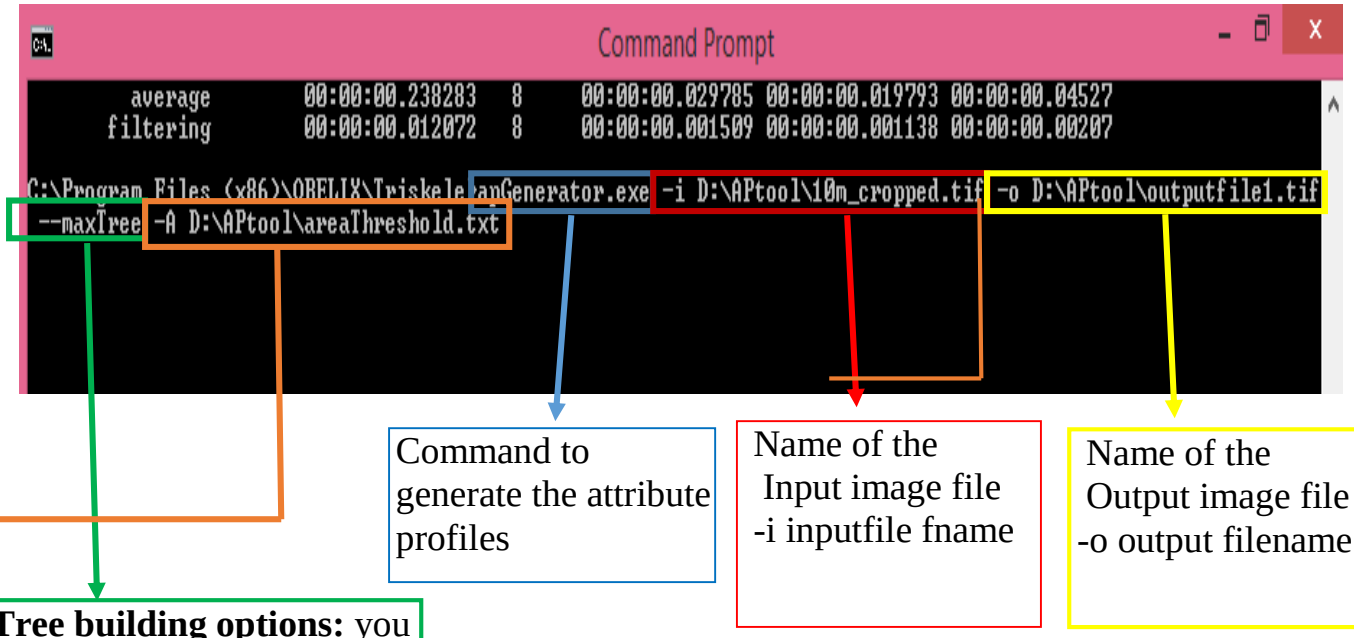
>>apGenerator.exe –i inputfilename.tif –o outputfilename.tif --treeoptions
-attribute1 attribute1thesholdfilename.txt
-attribute2 attribute2thesholdfilename.txt

Once you typed the above command, press enter. That's it, you completed generating AP.

See the below screen shot for more details



The details of the each options are described below



Command to generate the attribute profiles

Name of the Input image file
-i inputfile fname

Name of the Output image file
-o output filename

Tree building options: you can include two types of tree building algorithms.
Max tree: *--maxTree*
Min tree: *--minTree*
Both Max tree and Min tree: *--maxTree --minTree*

areaThresholds.txt : Text file which contains the thresholds value for area attributes. Like the input image and output image file, you have to mention the path of the location Like wise for, *stdThresholds.txt*

Attributes option: you can include two types of attributes as follows. Here you need to mention the type of attributes and the threshold values. The format is as follows:
-type of attribute thesholdvalues.txt
Area: *-A areaThresholds.txt*
Standard deviation: *-S stdThresholds.txt*

If you want both of the attributes:
-A areaThresholds.txt –S stdThresholds.txt

As mentioned above, when press enter after the following command

```
C:\Program Files (x86)\OBELIX\Triskele>apGenerator.exe -i D:\APtool\10m_cropped.tif -o D:\APtool\outputfile1.tif
 --maxTree -A D:\APtool\areaThreshold.txt
```

The attribute profiles using area attribute is computed and saved in the output file name.

```
C:\Program Files (x86)\OBELIX\Triskele>apGenerator.exe -i D:\APtool\10m_cropped.tif -o D:\APtool\apoutput.tif --
maxTree -A D:\APtool\areaThreshold.txt
Warning 1: TIFFReadDirectory:Sum of Photometric type-related color channels and ExtraSamples doesn't match Sampl
esPerPixel. Defining non-color channels as ExtraSamples.
Input:D:\APtool\10m_cropped.tif (chanels of Byte
Crop:(0,0,0) / [450,271,1]
 band:[0, 1, 2, 3]
Output:D:\APtool\apoutput.tif
core count:8

*** apGenerator done!

Leaf            Count   Mean            Min             Max
        Max       4        121950          121950          121950

Comp            Count   Mean            Min             Max
        Max       4          20030           17139           21327


Time                    Sum             Count   Mean            Min             Max
      build tree        00:00:00.035138   4     00:00:00.008785 00:00:00.007598 00:00:00.009897
         setup          00:00:00.013058   4     00:00:00.003264 00:00:00.002791 00:00:00.004259
       parents          00:00:00.010377   4     00:00:00.002594 00:00:00.002026 00:00:00.002944
         merge          00:00:00.002262   4     00:00:00.000565 00:00:00.000431 00:00:00.000781
    forest mgt.         00:00:00.000000   4     00:00:00.000000 00:00:00.000000 00:00:00.000000
         index          00:00:00.002623   4     00:00:00.000656 00:00:00.000606 00:00:00.000684
      compress          00:00:00.004741   4     00:00:00.001185 00:00:00.001037 00:00:00.001322
      children          00:00:00.036995   4     00:00:00.009249 00:00:00.008119 00:00:00.010377
            area        00:00:00.148062   4     00:00:00.037016 00:00:00.023803 00:00:00.045788
         average        00:00:00.145859   4     00:00:00.036465 00:00:00.022913 00:00:00.044719
       filtering        00:00:00.006095   4     00:00:00.001524 00:00:00.001278 00:00:00.001766

C:\Program Files (x86)\OBELIX\Triskele>
```

The output file contains the information as follows:

For example, let the area thresholds are: [a0, a1, a2, a3], and the number of bands in the input image are: [band0, band1, band2, band3]. The order of profiles (also contains the original bands) in the output files is as follows:

band0, band0_max_tree_a0, band0_max_tree_a1…, band0_max_tree_a3, *band1, band1_max_tree_a0, band1_max_tree_a1… band1_max_tree_a3, band2, band2_max_tree_a0, band2_max_tree_a1… band2_max_tree_a3, band3, band3_max_tree_a0, band3_max_tree_a1… band3_max_tree_a3*

When are using both max trees and min trees, the output order will be as follows: *band0, then area attributes using mintree with band0, then area attributes using maxtree with band0, then band1, then area attributes using mintree with band 1, then area attributes using maxtree with band 1, band 2 and so on....*

band0
- ***min_tree_a0***
- ***min_tree_a1***
- .
- .
- ***min_tree_a3***
- *max_tree_a0*
- *max_tree_a1*
- .
- .
- *Max_tree_a3*

band 1
- ***min_tree_a0***
- ***min_tree_a1***
- .
- .
- ***min_tree_a3***
- *max_tree_a0*
- *max_tree_a1*
- .
- .
- *Max_tree_a3*

band 2
- *so on*

For the max tree and min tree, the attributes are ordered in increasing thresholds (for e.g: a0, a1, a2, a3).

If you want to generate the attribute profiles using area and standard deviation attributes, you can use the following command

```
          area        00:00:00.148062   4     00:00:00.037016 00:00:00.023803 00:00:00.045788
       average        00:00:00.145859   4     00:00:00.036465 00:00:00.022913 00:00:00.044719
     filtering        00:00:00.006095   4     00:00:00.001524 00:00:00.001278 00:00:00.001766

C:\Program Files (x86)\OBELIX\Triskele>apGenerator.exe -i D:\APtool\10m_cropped.tif -o D:\APtool\apoutput.tif --
maxTree -A D:\APtool\areaThreshold.txt -S D:\APtool\stdThreshold.txt
Warning 1: TIFFReadDirectory:Sum of Photometric type-related color channels and ExtraSamples doesn't match Sampl
esPerPixel. Defining non-color channels as ExtraSamples.
Input:D:\APtool\10m_cropped.tif (chanels of Byte
Crop:(0,0,0) / [450,271,1]
 band:[0, 1, 2, 3]
Output:D:\APtool\apoutput.tif
core count:8
sd max value:4.29493e+09
sd max value:4.29495e+09
sd max value:4.29488e+09
sd max value:4.29484e+09

*** apGenerator done!

Leaf            Count   Mean            Min             Max
       Max        4        121950          121950          121950

Comp            Count   Mean            Min             Max
       Max        4          20030           17139           21327


Time                    Sum             Count   Mean            Min             Max
      build tree        00:00:00.036133   4     00:00:00.009033 00:00:00.008113 00:00:00.010255
         setup          00:00:00.012339   4     00:00:00.003085 00:00:00.002712 00:00:00.003564
       parents          00:00:00.011524   4     00:00:00.002881 00:00:00.002023 00:00:00.003392
         merge          00:00:00.002762   4     00:00:00.000691 00:00:00.000532 00:00:00.000855
    forest mgt.         00:00:00.000000   4     00:00:00.000000 00:00:00.000000 00:00:00.000000
         index          00:00:00.002864   4     00:00:00.000716 00:00:00.000541 00:00:00.000893
      compress          00:00:00.004762   4     00:00:00.001191 00:00:00.000961 00:00:00.001689
      children          00:00:00.037808   4     00:00:00.009452 00:00:00.008536 00:00:00.010673
            area        00:00:00.145943   4     00:00:00.036486 00:00:00.023488 00:00:00.043719
         average        00:00:00.146918   4     00:00:00.036729 00:00:00.022498 00:00:00.044602
              sd        00:00:00.147611   4     00:00:00.036903 00:00:00.023916 00:00:00.044071
       filtering        00:00:00.014635   8     00:00:00.001829 00:00:00.001410 00:00:00.002387
```

The outputfile "*results.tif*" contains both area attributes and standard deviation attributes.

In this case, the order of attribute profiles in the output file is as follows: *band0, then area attributes using maxtree with band0, then std attributes using maxtree with band0, then band1, then area attributes using maxtree with band 1, then std attributes using maxtree with band 1, band 2 and so on….*

Let area threshold is: [a0, a1,…, a3], standard deviation threshold is:[s0, s1, …, s3]

band0

area

max_tree_a0

max_tree_a1
.
.
Max_tree_a4
Std
max_tree_s0
max_tree_s1
.
.
Max_tree_s4

band 1
area
max_tree_a0
max_tree_a1
.
.
Max_tree_a4
Std
max_tree_s0
max_tree_s1
.
.
Max_tree_s4

band 2
so on

When both max tree and min tree are used, then the order is as follows: *band0, then area attributes using min tree with band0, then std attributes using min tree with band0, then area attributes using max tree with band0, then std attributes using max tree with band0, then band1, then area attributes using min tree with band1, then std attributes using min tree with band1, then area attributes using max tree with band1, then std attributes using max tree with band1, band 2 and so on….*

band0
area
min_tree_a0
min_tree_a1
.
.
min_tree_a3

std

min_tree_s0

min_tree_s1

.

.

min_tree_s3

area

max_tree_a0

max_tree_a1

.

.

Max_tree_a3

Std

max_tree_s0

max_tree_s1

.

.

Max_tree_s3

Band1

area

min_tree_a0

min_tree_a0

.

.

min_tree_a3

std

min_tree_s0

min_tree_s1

.

.

min_tree_s3

area

max_tree_a0

max_tree_a1

.

.

Max_tree_a3

Std

max_tree_s0

max_tree_s1

.

.

Max_tree_s3

band 2

so on

You have completed generating the attribute profiles, now you are ready to use it for the classification tasks and other related tasks.