ForestFragment

Multiscale forest fragmentation utility

The user's short manual

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The ForestFragment program is designed to calculate a multi-scale forest fragmentation index. It uses a measure of the similarity of a forested area to an reference area fully covered by unfragmented forest for the calculation.

The syntax of the ForestFragment program call is as follows:

```
ForestFragment [-h] -i <file_name> [-f <dbl>]
               -o <file_name> -r <n> [-r <n>]...
               [-t <n>]

  -i, --input=<file_name>    name of input files (GeoTIFF)
  -f, --forest-value=<dbl>   value for forest (default: 1)
  -o, --output=<file_name>   name of output file with clumps (GeoTIFF)
  -r, --radius=<n>           radius(es) in cells defining scale(s)
  -t <n>                     number of threads (default: 1)
  -h, --help                 print help and exit
```

The *-i (--input)* option is used to point to an existing geospatial layer containing the forest mask. The format of the indicated file must be supported by the GDAL library. The default is GeoTIFF format. Unless otherwise indicated by the user, a value of 1 represents forest and a value of 0 represents

the remaining terrain. If the input layer contains more categories, the user can indicate a value representing forested terrain with the *-f (--forest-value)* option.

The *-o (--output)* option allows the user to indicate the name of the resulting file in which the forest fragmentation index will be saved. This file will be in GeoTIFF format.

The *-r (--radius)* option allows a user to specify the size of the neighborhood taken into account during the calculation. Thus, this option allows defining the scale of the analysis. The size of the neighborhood is given in the cells of the raster. The user can specify more than one neighborhood size. If the *-r* option occurs more than once, the multi-scale forest fragmentation index will be calculated.

The program is optimized to take advantage of the vectorization of Intel processors. In addition, calculations can be parallelized using the OpenMP library. The *-t (threads)* option allows you to specify how many threads the program will use to perform calculations. A good choice seems to be to indicate the number of cores of the processor minus one.

The user can add the *-h (--help)* option at any time to invoke a description of the syntax of the program call.

During the calculation, the program displays information about the progress of the calculation by displaying the percentage of progress.

An example of a ForestFragment call:

```
ForestFragment -i forest_mask.tif -r 10 -r 20 -r 50 -o jss_index.tif
```

The message about the launch of the program will look as follows:

```
Opening input file... OK
Creating output file... OK
Calculations... 100%
```

The program will create a spatial layer containing a fragmentation index for three scales: 21 (radius: 10), 41 (radius: 20), and 101 (radius: 50) raster cells.

The program call:

```
ForestFragment -i landcover.tif -f 13 -r 35 -o jss_indeks.tif -t 9
```

will run the program using 9 threads for parallel calculations. The input data will be read from the land cover layer. The program will take the number 13 as a value indicating the class representing the forest. A geospatial layer will be generated containing a forest fragmentation index for one scale defined by a neighborhood of 71 raster cells in diameter.