



HUGIN QGIS PLUGIN

HOWTO

[Abstract](#)

This is a short document describing how to use the HUGIN QGIS plugin. Please notice that the current version is a prototype suggest to bugs, errors and change.

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Introduction

This document is a short HOWTO on the HUGIN QGIS BBN plugin. It describes the process of applying the HUGIN QGIS BBN plugin on a set of raster layers by example. The example has kindly been provided by David N Barton (NINA) and Zofie Cimburova (NINA).

The basic principle of the plugin is to apply a Bayesian network to each point in one or more raster layers (must be aligned) and output a new raster layer with the results. For each point potential covering multiple layers, the Bayesian network inserts and propagates the values of the nodes linked to raster layers. The user can select a number of output values: index of state with maximum probability, probability of state with maximum probability, and maximum expected utility. Additional output values are to be included at a later stage.

The document and the HUGIN QGIS BBN are both work in progress.

Mac OS X

Pre-requisites

- QGIS with all its dependencies already installed.
- The HuginQgis zip-archive

Install

1. Copy the 'pyhugin' folder to your Desktop (or some other location on the local disk)
/Users/<YOUR-USER-NAME>/Desktop/pyhugin
2. Copy the 'HUGIN_belief_update.py' found in scripts folder to a place within .qgis2 folder in your home dir
/Users/<YOUR-USER-NAME>/~/.qgis2/processing/scripts/HUGIN_belief_update.py

Launch

In a terminal execute:

```
$ export PYTHONPATH=/Users/<YOUR-USER-NAME>/Desktop/pyhugin/lib  
$ open -a QGIS
```

Windows

Pre-requisites

- QGIS with all its dependencies already installed.
- The HuginQgis zip-archive

Install

1. Copy the 'pyhugin' folder to your Desktop (or some other location on the local disk)
C:\Users\<YOUR-USER-NAME>\Desktop\pyhugin
2. Copy the 'HUGIN_belief_update.py' found in scripts folder to a place within .qgis2 folder in your home dir
C:\Users\<YOUR-USER-NAME>\~\.qgis2\processing\scripts\HUGIN_belief_update.py

3. Configure PYTHONPATH environment variable:

- Browse through Windows Control Panel -> System and Security -> System
- Click 'Advanced system settings'
- Click 'Environment variables' button
- Under 'System Variables' section, create variable
Name: PYTHONPATH
Value: C:\Users\<YOUR-USER-NAME>\Desktop\pyhugin\lib

Launch

Launch QGIS the regular way

How to Run the Example

The next few sections describe the use of the plugin starting with a set of pre-conditions.

Pre-conditions

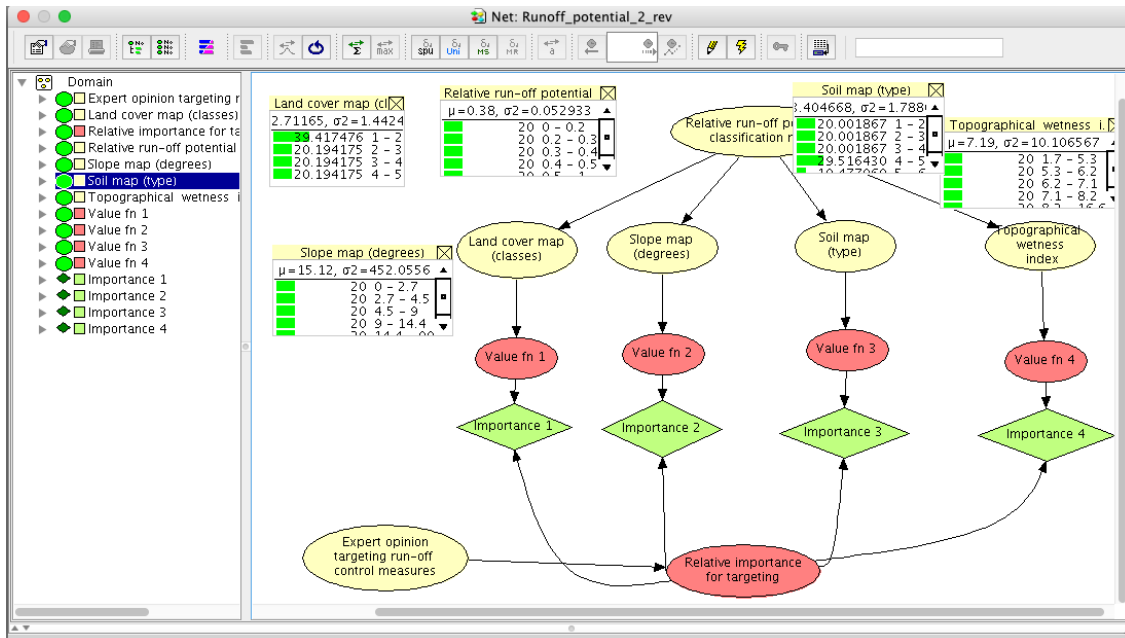
The following pre-conditions are assumed satisfied:

- Model
 - Model is created in HUGIN software in advance. The model used is:
Runoff_potential_2_rev.net
 - Input and output nodes must be of type “interval”. That is, each node in the BBN linked to a value in a raster layer must be of type “interval”.
- Raster layers
 - The HOWTO document uses the non-normalized version of the example consisting of the files:
 - twi_oslo_komunne_10m.tif
 - soils_infilt_oslo_komunne_10m.tif
 - slope_oslo_komunne_10m.tif
 - landcver_oslo_komunne_10m.tif
- Configuration of HUGIN QGIS BBN plugin
 - HUGIN initialization file: hugin_test.ini

The model is displayed in the HUGIN Graphical User Interface below:

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The content of the hugin_test_ini configuration file is:

```

[input]
; The input section maps a set of nodes to raster layers.
; Node names must match in verbatim the node in the HUGIN domain.
; RASTER identifies a raster image file by matching a substring of the file name
; BAND indicates band index
; NODE=RASTER|BAND
Land_cover=landcover|1
Slope=slope|1
Soil=soils|1
twi=twi|1

[output]
; BANDINDEX=FUNCTION ARGS ...
; functions are:
; MAX NODE
; PMAX NODE
; MEU
; EU NODE STATE
; AVG NODE
; VAR NODE
; QUANTILE NODE PROBABILITY
; SAMPLE NODE ?

1=MAX run_off
2=PMAX run_off
3=MEU
  
```

uu:---F1 hugin_test.ini All L1 (Conf[WinIni])-----
Loading conf-mode...done

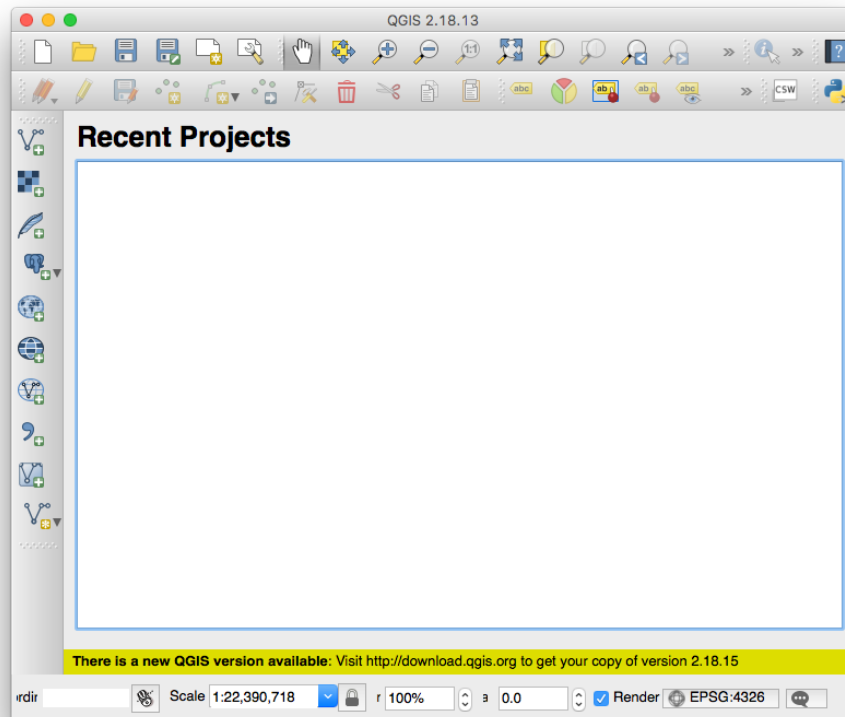
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The first part “[input]” specifies how the nodes of the network are linked to raster layers. The second part “[output]” specifies the output values to be computed. Options marked with “?” are not yet available.

Running the Example

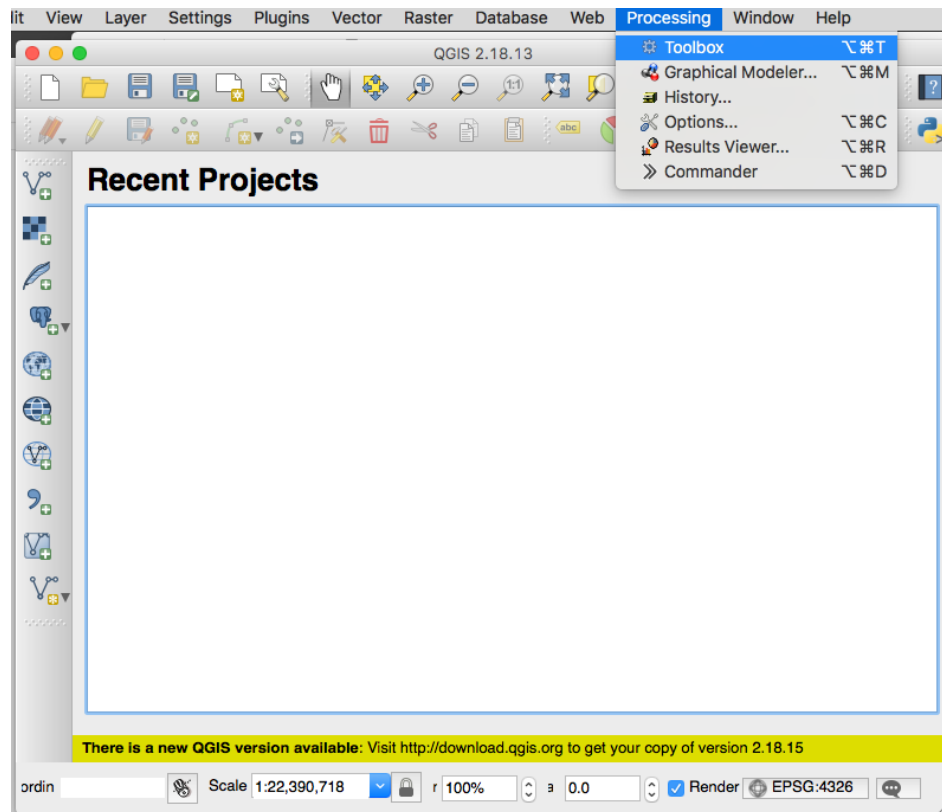
The figure below shows the startup window of QGIS.



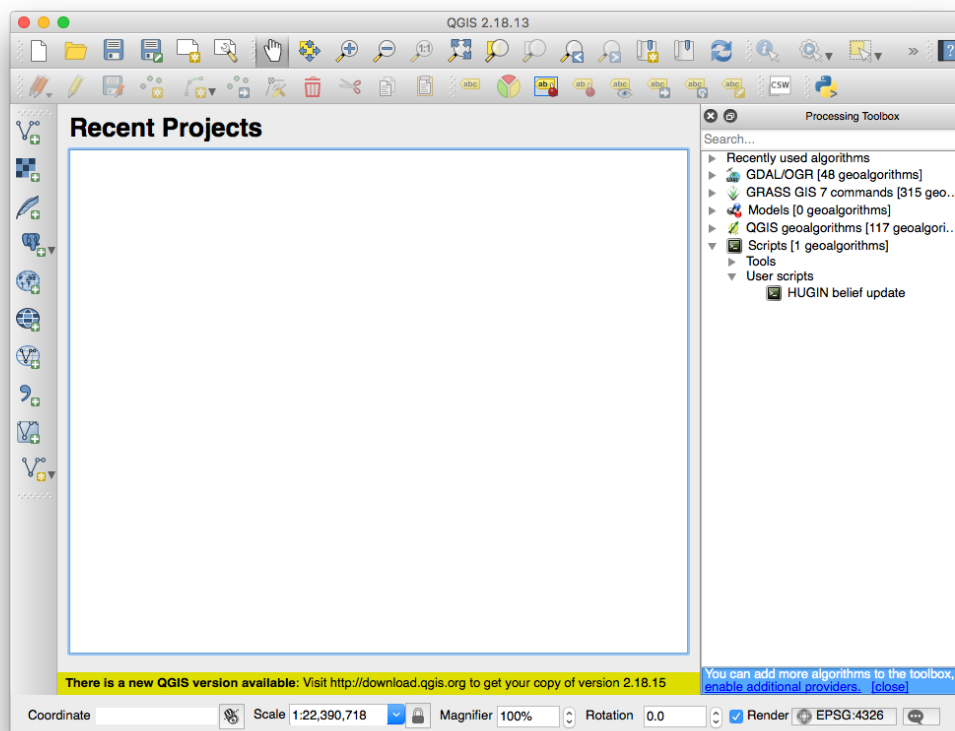
Select Processing->Toolbox to be able to launch the HUGIN QGIS BBN plugin:

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This opens the panel on the left where we notice that the user script HUGIN belief update is now available.



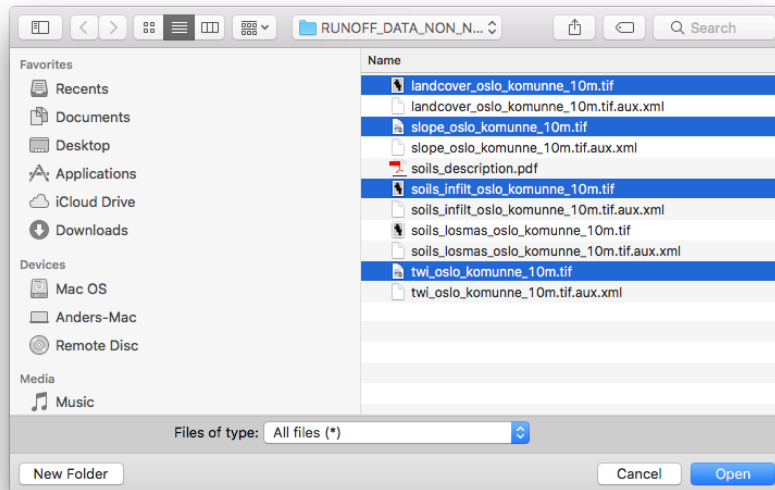
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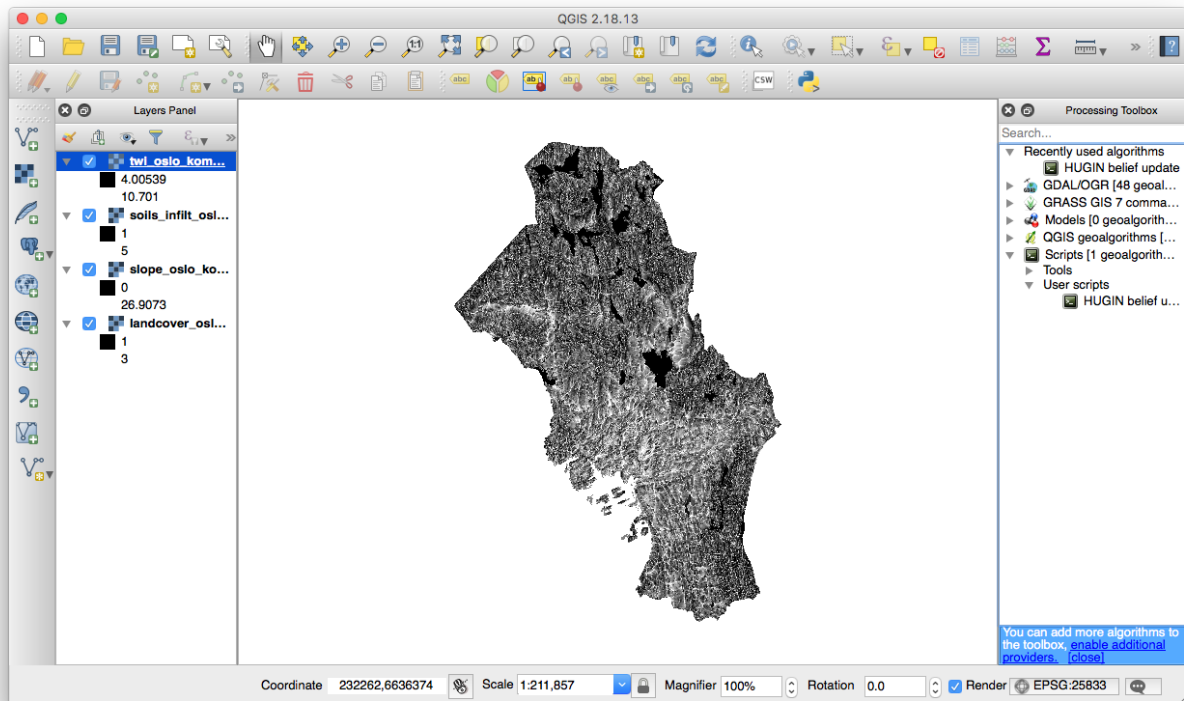
Next, we open the four raster layers of interest by pressing the Add Raster Layer tool on the left:



This opens a file dialog where the raster layers of interest are selected:



This opens the files and produces this result:

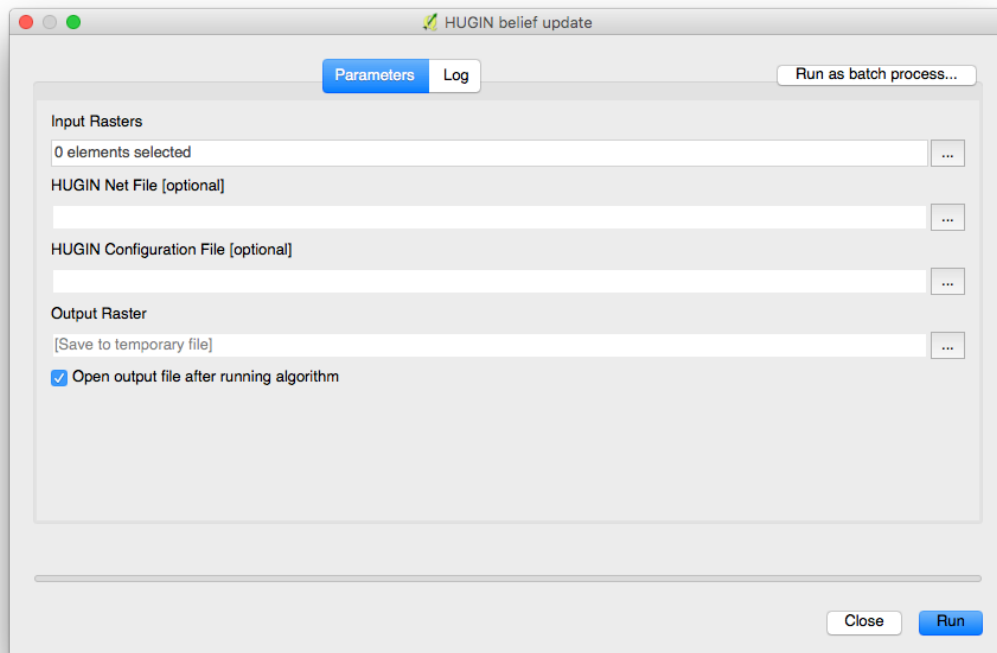


(If the panel on the left with the layers is not shown, then select View->Panels->Layers Panel)

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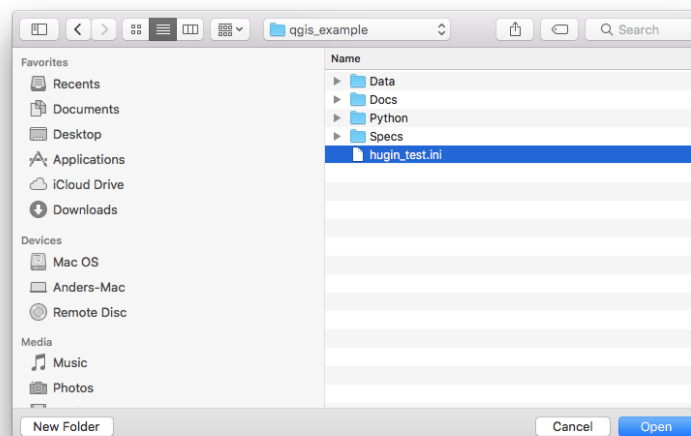
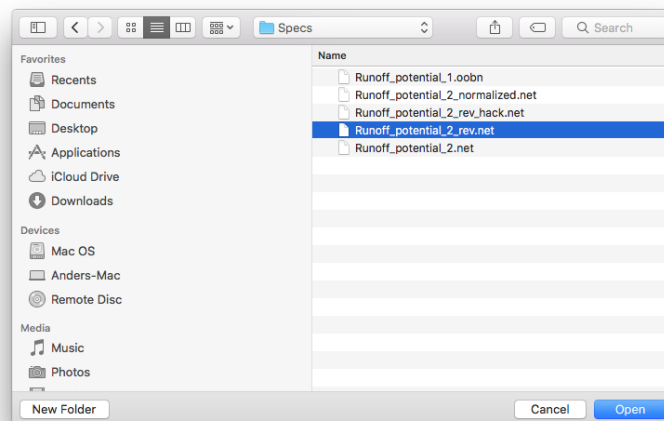
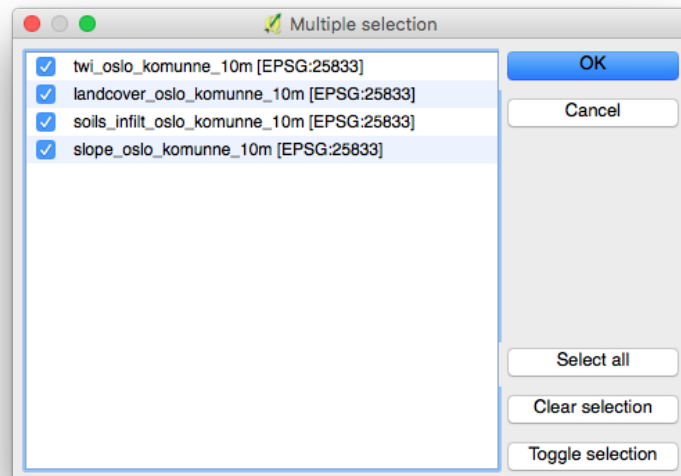
Select Processing Tools->Scripts->User Scripts->HUGIN Belief update in the right panel to open the dialog:



Here the values should be selected for Input raster layers, HUGIN Net File and HUGIN Configuration file through the following sequence of windows:

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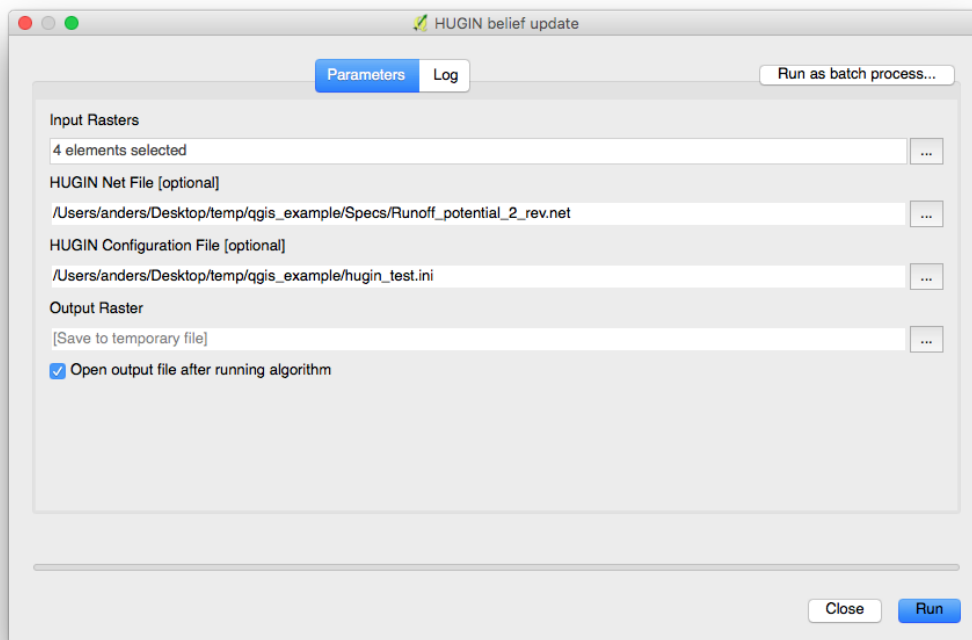
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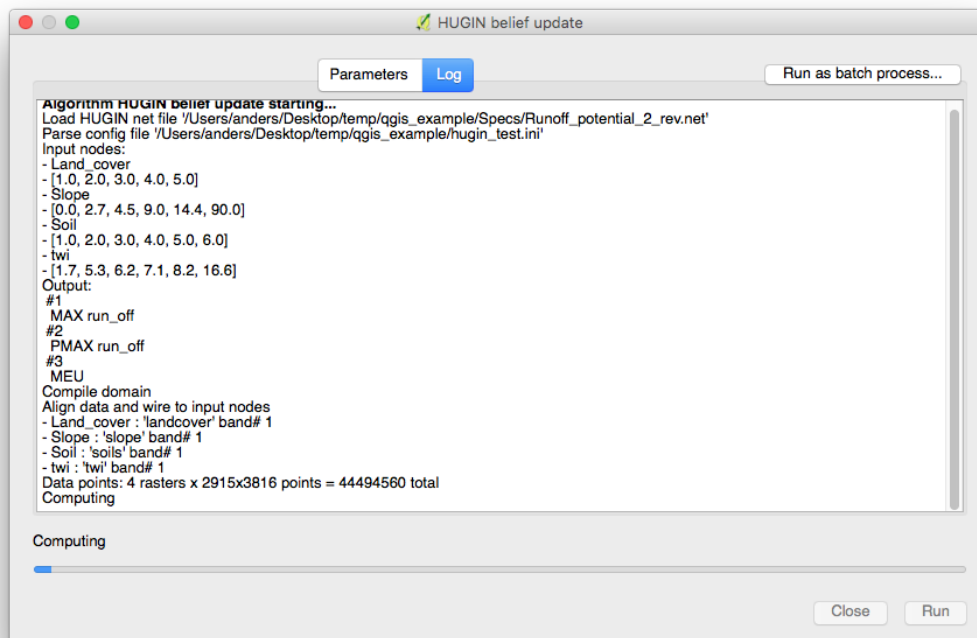
This should produce the window below:

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Now press Run to perform the analysis:



Information on the analysis is displayed to the user in the window.

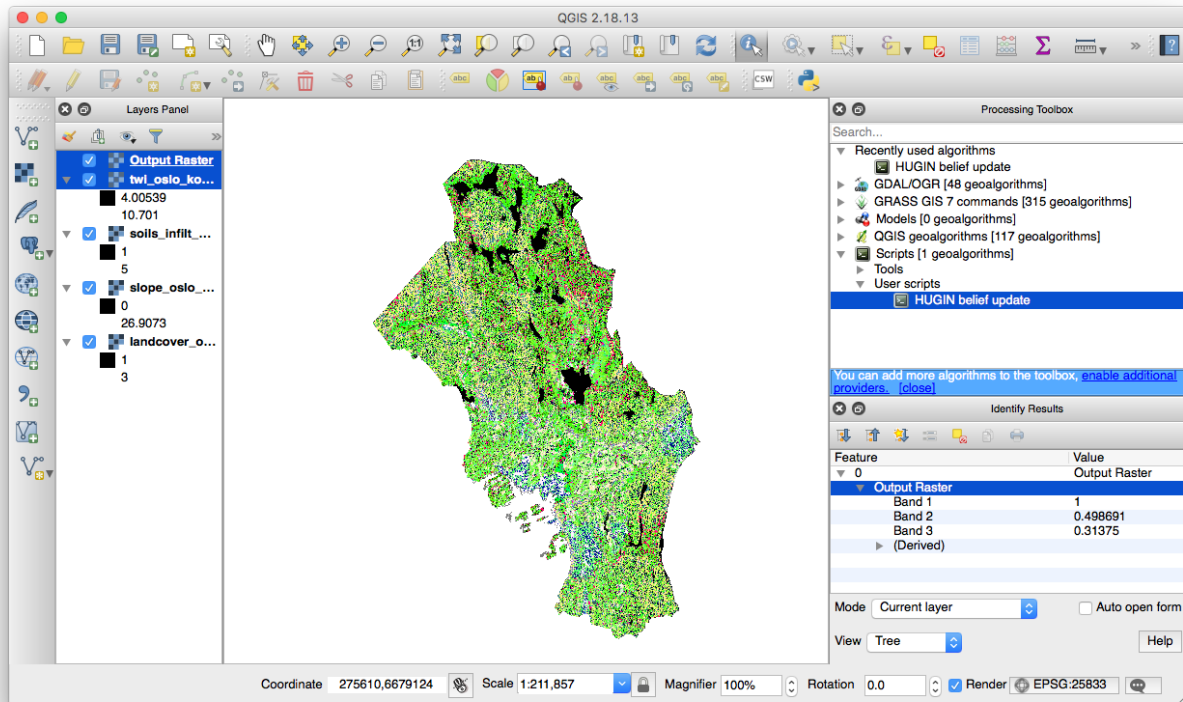
Select the Identify Features tool in the toolbar:

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Press a point on the map and notice the information displayed in the right side of the figure below.



The output of the analysis is displayed in three bands. Band 1 is the index of the state with maximum probability, Band 2 is the probability of the state with maximum probability and Band 3 shows the expected utility.

End Note

The plugin does not yet support all operations listed in the configuration file. Operators marked with “?” are not yet implemented.

Have fun!