

# RIDGE DETECTION USING GEOPROCESSING TOOLS IN ARCOBJECTS APPLICATIONS



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## BACKGROUND

- Ridge represents the top of a mountain/hill or a local high in the terrain.
- Is one of the most important topographic features, used in a wide variety of applications:
  - Geomorphologic studies
  - Determining watersheds and flow surfaces
  - Locating infrastructure as: wind turbines, communication towers, aviation signaling, view points, among others
- Algorithms and software for automating the extraction of ridges from DEMs are, however, still not easily available or not widely acceptable.
- ArcGIS does not have a specific tool for ridges detection



## OBJECTIVES

Create a ArcGIS Add-In using the geoprocessing assembly approach to chaining tools for the identification of ridges from DEM inputs.

- Public Function CheckOutSpatialAnalystLicense 'Enabling the Spatial Analyst license
- Public Function SetNewDefaultEnvironment 'Setting the general processing environment
- Private Sub Btn\_SetWorkspace 'Setting the Workspace
- Private Sub Btn\_Input 'Input DEM button with IGxDialog
- Public Sub Geoprocessing 'Analysis
- Private Sub Btn\_Delete\_Click 'Deleting intermediate raster

## GUI

Ridges Button



Dockable window



## THE GEOPROCESSOR

Main object used for executing chained geoprocessing tool.

- Execute tools
- Set global environment settings
- Examine the resulting messages
- Perform batch processing
- Access data properties

'Create the geoprocessor

```
Dim GP As ESRI.ArcGIS.Geoprocessor.Geoprocessor = New ESRI.ArcGIS.Geoprocessor.Geoprocessor()
```

## GEOPROCESSING - Initializing Geoprocessor and setting for analysis

' Initialize the geoprocessor.

```
Dim GP As IGeoProcessor2 = New GeoProcessor
```

'Create a IVariantArray to hold parameters values

```
Dim parameters As IVariantArray = New VarArray
```

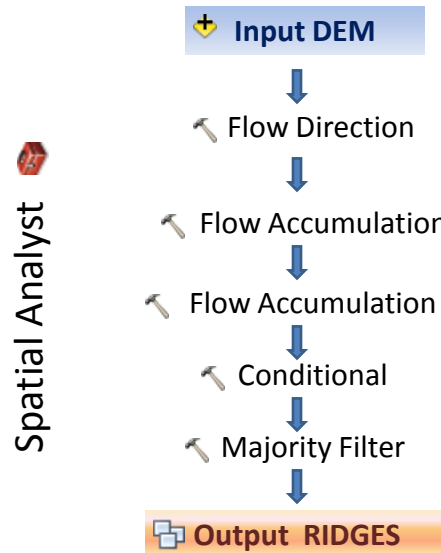
'Create the result object

```
Dim result As ESRI.ArcGIS.Geoprocessing.IGeoProcessorResult2
```

'Set the workspace

```
GP.SetEnvironmentValue("workspace", TxtWorkspace.Text)
```

## GEOPROCESSING - Workflow



## GEOPROCESSING - Chaining and Executing Tools

```

'Populate the variant array with parameters values
parameters.Add(TxtInput.Text)
parameters.Add("flowdir")

'Execute Flow Direction tool
result = GP.Execute("FlowDirection", parameters, Nothing)

'If the Flow direction tool succeed retrieve the result as the input for the Flow
accumulation tool
If result IsNot Nothing Then
    Dim outVal As IGPValue = result.GetOutput(0)

'Clean out parameters
parameters.RemoveAll()

'Populate the variant array with parameters values
parameters.Add(outVal)
parameters.Add("flowaccum")
parameters.Add("")
parameters.Add("INTEGER")

'Execute Flow Accumulation tool
result = GP.Execute("FlowAccumulation", parameters, Nothing)
  
```

## ADVANTAGES

- ✓ Useful to chaining tool together and implement custom workflows
- ✓ Used and deployed by users to automate their work, build repeatable and well established methods and procedures to model spatial processes
- ✓ Significant reduction of processing time and ability to discard “unwanted” data.

## SHORTCOMINGS

- ✗ Geoprocessing tools have a set of fixed parameters required for execution
- ✗ Parameters value must be correctly set and in appropriate order
- ✗ Geoprocessor object is late-bound, so Intellisense is not supported for all calls.

## SOURCES

- Daya Sagar, B. S.; Murthy M. B. R.; Babu Rao, C. and Raj, B. (2003): Morphological approach to extract ridge and valley connectivity networks from Digital Elevation Models. Int. J. Remote Sensing Vol. 24 No.3 73–581.
- Slides/Labs Instructions/Sample codes from GEOG590 GIS Programming Winter 2011
- [ArcObjects .NET API Code Gallery](#)
- [ArcGIS 9.3 Desktop Help \(VB samples\)](#)
- [ArcObjects SDK 10 Microsoft .NET Framework](#)