



eCognition Developer

Tutorial 2 - working with regions

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Introduction	3
About this Tutorial	3
Requirements	3
Data included with the Tutorial	3
Lesson 1 – Introduction to regions	4
Lesson 2 - Creating and using regions	5
2.0 Lesson content	5
2.1 Deriving a region from an object	5
2.1.1 The process settings to create a region from an object	6
2.1.2 The process settings to use the region in the Domain	8
2.2 Deriving a region from coordinates	9
2.2.1 The process settings to create a region by coordinates	10
2.2.2 Use the region in the Domain	11
Where to get additional help & information?	13
The eCognition Community	13
The User Guide & Reference Book	13
eCognition Training	13

Introduction

About this Tutorial

This tutorial gives you an introduction to the use of so called Regions within **eCognition Developer**.

The goal of this tutorial is to give you an introduction to the concept of 'regions' in the software, how to create and use them. A later tutorial 'Maps and regions', explains how regions and maps work together.

This Module has two lessons:

- Lesson 1 Introduction to regions
- Lesson 2 Creating and using regions

Further information about eCognition products is available on our website:

www.eCognition.com

Requirements

To perform this Guided Tour, you will need:

- **eCognition Developer** installed on a computer
- A computer **mouse** is highly recommended

All steps of this tutorial can be done using the **eCognition Developer** or [the free-trial version](#).

This tutorial is designed for self-study.

Data included with the Tutorial

Image data

We will be working with a QuickBird satellite image (*.tif) file in this tutorial:

- '02MAR02_multi_Subset_Maps_Regions.TIF' contains the **RGB** and **NIR** data

Thematic data

In addition to the image data, we will also use a shapefile:

- 'ManagableLandUnits_noGeo.shp' as the name implies does not contain any projection or coordinate system.

Rule Sets

A Rule Sets is available representing the final state of Rule Set development. Whenever the tutorial refers to a Rule Set, it can be found in the tutorial folder.

Project

An eCognition Project is provided for this tutorial and can be found in the tutorial folder.

Lesson 1 – Introduction to regions

In **eCognition Developer**, you have the possibility to work with so called 'regions'. A region is a defined area which can be processed individually and is part of the new image object **Domain**. With regions you can **improve performance** through the limitation of the analysis on specific areas.

- Within one Project you can have **several** regions.
- A defined region can be used in the **Domain**.
- You can create regions using the algorithm 'update region'.
- Regions are per se **non visible**.

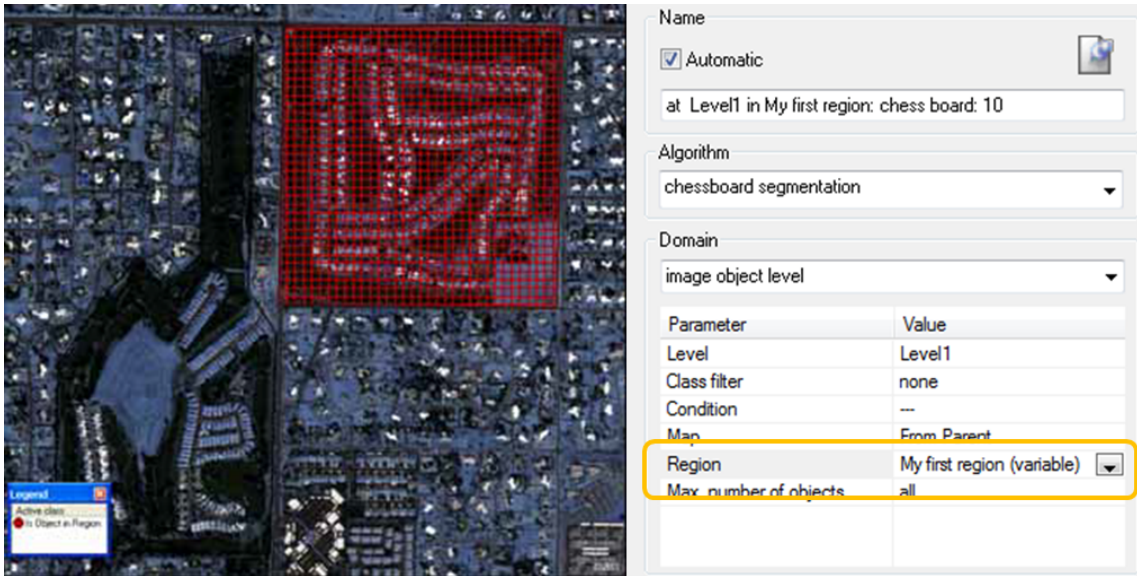


Figure 1: Segmented and classified region (left); region used in the Domain (right).

- You can define a region by **object** (a).
- You can define a region by **coordinates** (b).
- You can **move** and **resize** regions.
- You can use a region as domain and do **individual processing** only in the specified region (c).
- You can transfer a region in a **map** for individual processing of only this subset (d).

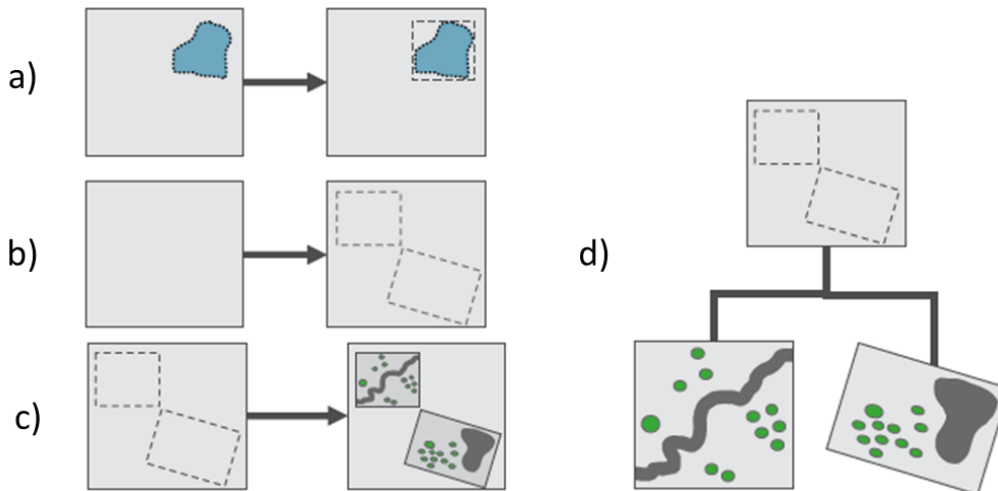


Figure 2: Various uses for regions.

Lesson 2 - Creating and using regions

2.0 Lesson content

- Deriving regions from an object
- Deriving regions from coordinates

The Project used in the lesson contains the multispectral layers of a subset of a Quickbird scene and a thematic layer shapefile. A Rule Set is already loaded. The first section of the Rule Set **'Create a Region using Objects'** will be explained in the first chapter, the section **'Create a Region using coordinates'** in the second chapter.

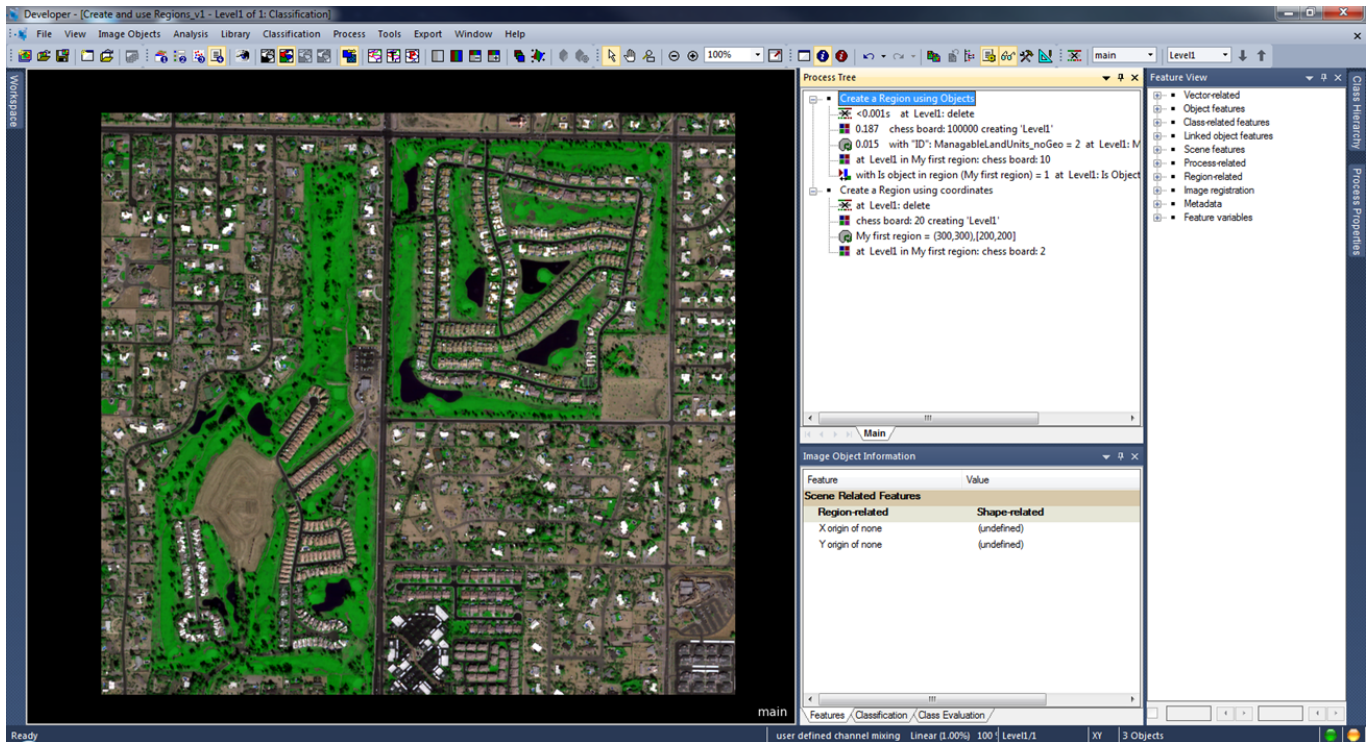


Figure 3: Project with Rule Set loaded.

2.1 Deriving a region from an object

This chapter explains how to create a region from an object using the algorithm 'update region'. This means an object is basis for the extent of the new region. In preparation, an Image Object Level is created with the chessboard segmentation algorithm.

1. Start **eCognition Developer**.
2. Switch to predefined view setting number 4 **'Develop rulesets'**
3. In the main menu 'File' choose 'Open Project' or click on the 'Open Project' button in the toolbar.
4. Open the Project **'Create and use Regions.dpr'** in the tutorial folder.
5. Execute the chessboard segmentation process **'chessboard: 100000 creating 'Level1'**.

An Image Object Level is created representing the polygons of the loaded thematic layer.



Figure 4: Image objects after executing the segmentation process. Only the outlines of the shapefile are represented.

2.1.1 The process settings to create a region from an object

With the algorithm 'update region' the region shall be created based on the 'ID' column of the thematic layer. The object with the value 2 is the object the regions will be based on.

1. Expand the parent process 'Create a Region using Objects'.

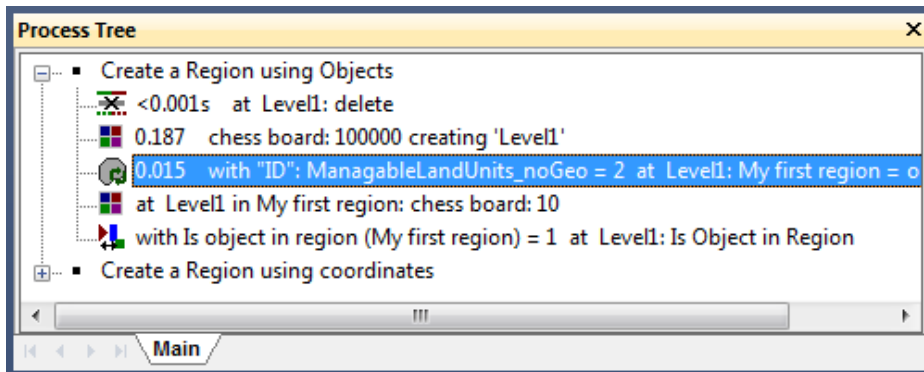


Figure 5: Process Tree with process for creating a region highlighted.

2. Double-click on the third child process 'with ID: ManagableLandUnits_noGeo = 2 at Level1: My first region = object region' to open it.
 - In the 'Condition' field of the Domain, the object which is the basis for the new region must be specified. In this example only the object with value 2 in the column 'ID' of the thematic layer 'AOI_noGeo' is used to derive the region.
 - The name of the new region is defined in the Field 'Variable', here 'My first Region'. The user can enter a name, this stored in a 'Region Variable'.
 - In the field 'Mode', 'From object' is chosen. This defines, that the object meeting the criteria set in the Domain is used as basis for creating the region.

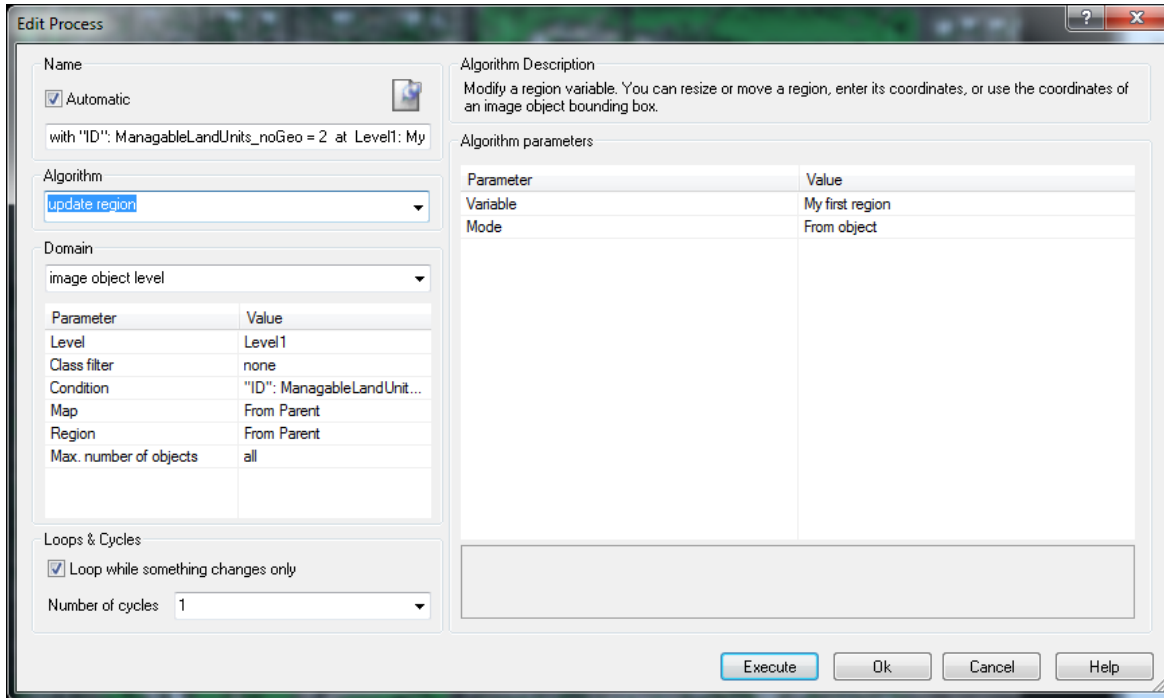


Figure 6: Process settings to create a region from an object.

3. Click in the 'Value' field next to 'Condition' to examine the set condition.

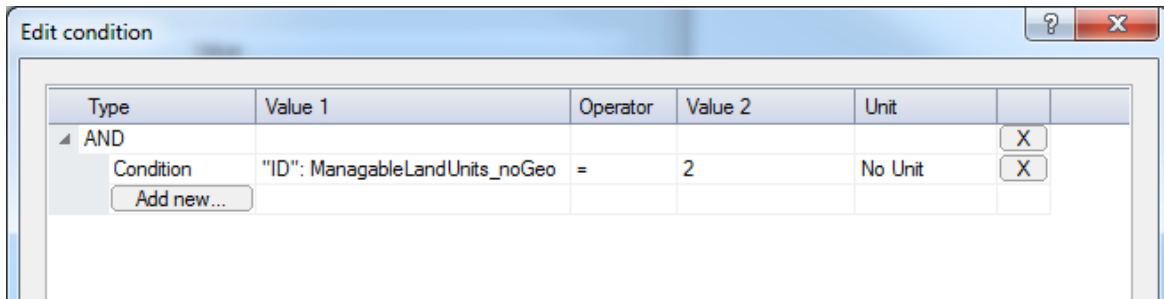


Figure 7: Threshold to use only objects with value 2 for column 'ID'.

4. Close the dialog box without any changes, by clicking on 'Cancel'.
5. **Close** the 'Edit Process' window.
6. **Execute** the process, by either right-clicking on it and select 'Execute' from the context menu or by selecting it and pressing F5 on your keyboard.

The region is created, but as regions are not directly visible, you can not display them. Nevertheless, you can use the feature 'Is object in region' to get information about which object is inside or outside the region.

7. Browse in the 'Feature View' window to '**Object Features > Position**' and expand '**Is object in region**'.
8. Double-click on '**Is object in region (My first region)**'.

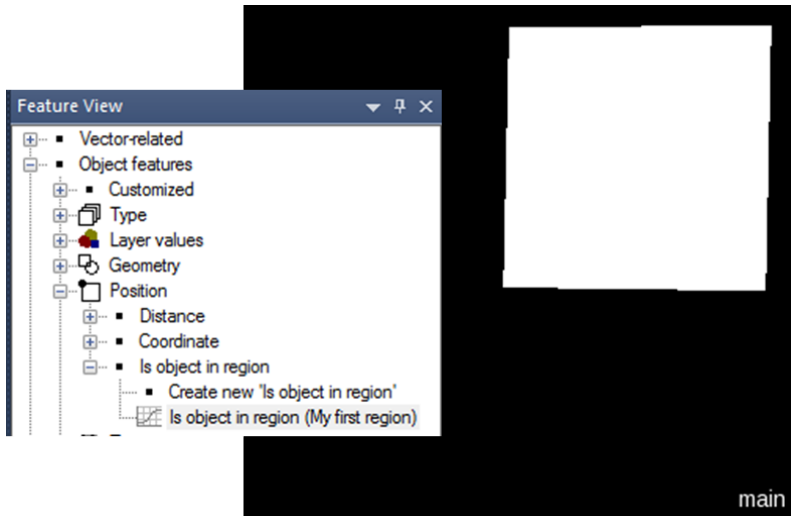


Figure 8: The feature 'Is object in region' in the Feature View.

In the Feature View you can now see that the upper, square object is the only object within this region. It has the value 1 for this feature. A value of 0 would indicate that it is not within the region.

2.1.2 The process settings to use the region in the Domain

Now that the region is created it can be used in the **Domain**. A small chessboard segmentation is applied only to the region 'My first Region'.

1. Double-click on the fourth child process '**at Level1 in My first region: chessboard: 10**' to open it.
 - As Level, the 'Level1' is chosen to split up already existing objects.
 - In the field '**Regions**' the region '**My first Region**' is chosen from the drop-down list. A region can only be chosen if the if a region variable is created beforehand. Only objects within this region will be split up by the segmentation.

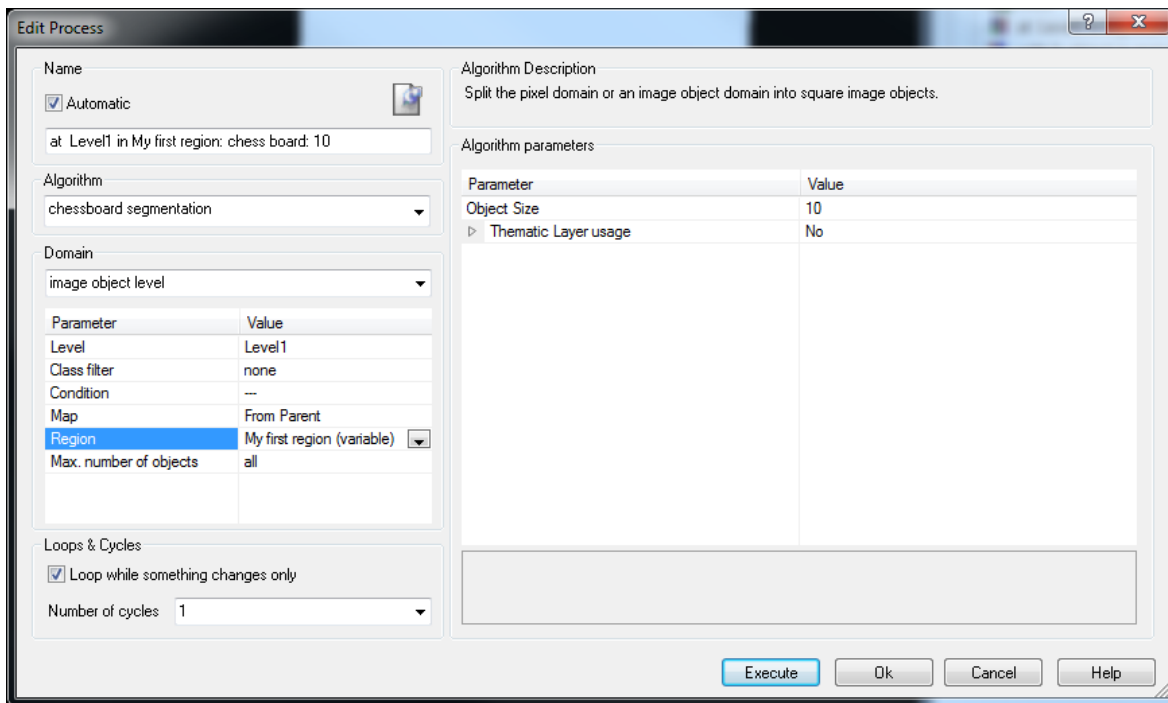


Figure 9: Process settings to define a region in the algorithm Domain.

3. Close the 'Edit Process' window.
4. Execute the process, by either right-clicking on it and select 'Execute' from the context menu or by selecting it and pressing F5 on your keyboard.

Only objects within the region are segmented into smaller squares.

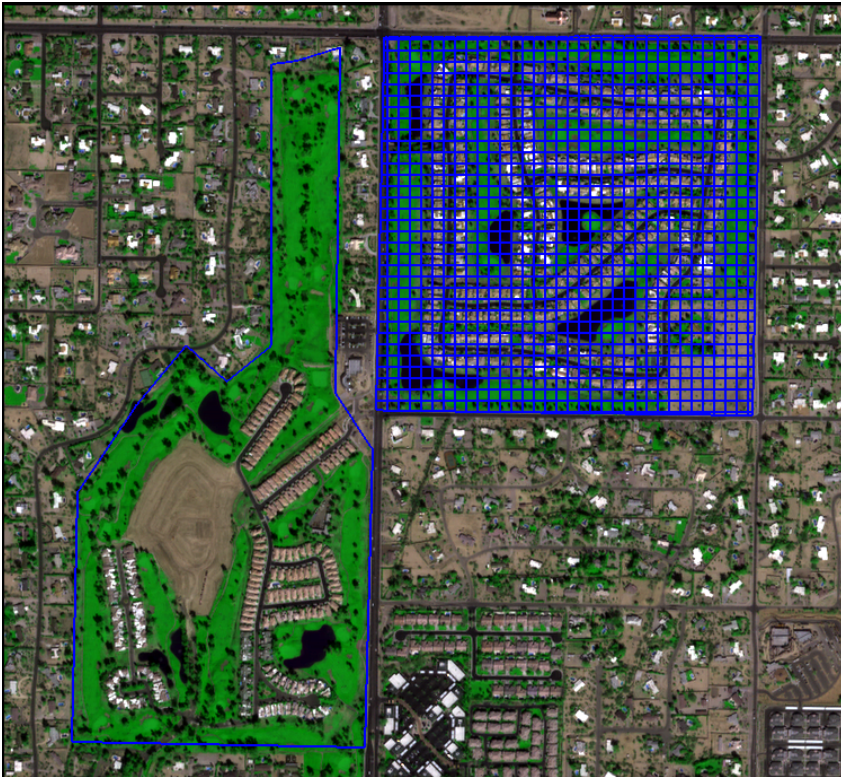


Figure 10: Only the defined region is segmented.

2.2 Deriving a region from coordinates

In addition to defining a region based on an image object, you have also the possibility to define a region by **coordinates**. We will use the Mode **'Set by origin/extent'** to create a defined rectangle. In the example loaded, no geo information is available so the coordinates related to the scene extent are used. If you have geocoding available, you can use the real-world coordinates.

1. Collapse the process sequence 'Create a Region using Objects' and expand the process sequence **'Create a Region using coordinates'**.
2. Execute the process **'at Level1: delete'** and the Process **'chessboard: 20 creating 'Level1'**.

The old Level is deleted and a new Level is created with chessboard size 20. No thematic layer is used for segmentation this time.

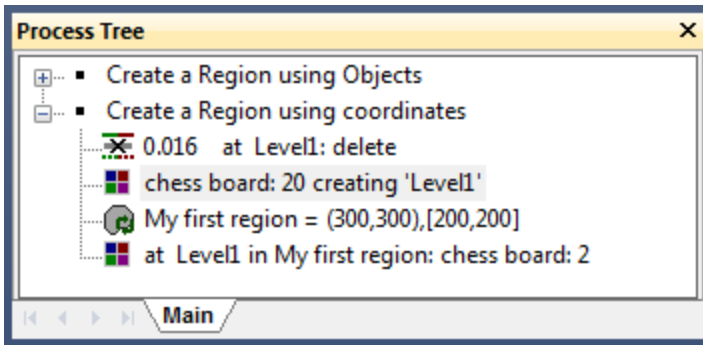


Figure 11: Process Tree with processes for deleting and creating an Image Object Level highlighted.

2.2.1 The process settings to create a region by coordinates

1. Double-click on the third child process '**My first region = (300,300),[200,200]**' to open it.
 - For creating a region by coordinates, the default settings of the Domain are kept.
 - To define the name of the new region again the **Variable** 'My first region' is chosen.
 - As 'Mode', '**Set by origin/extent**' is chosen.

When choosing 'Mode' 'Set by origin/extent' 4 additional fields appear.

- **OriginX** and **OriginY** - Here for both fields 300 is chosen, so the lower left corner of the rectangular region will be at this location.
- **ExtentX** and **ExtentY** - Here for both 200 is chosen. The region has 200 by 200 pixel.

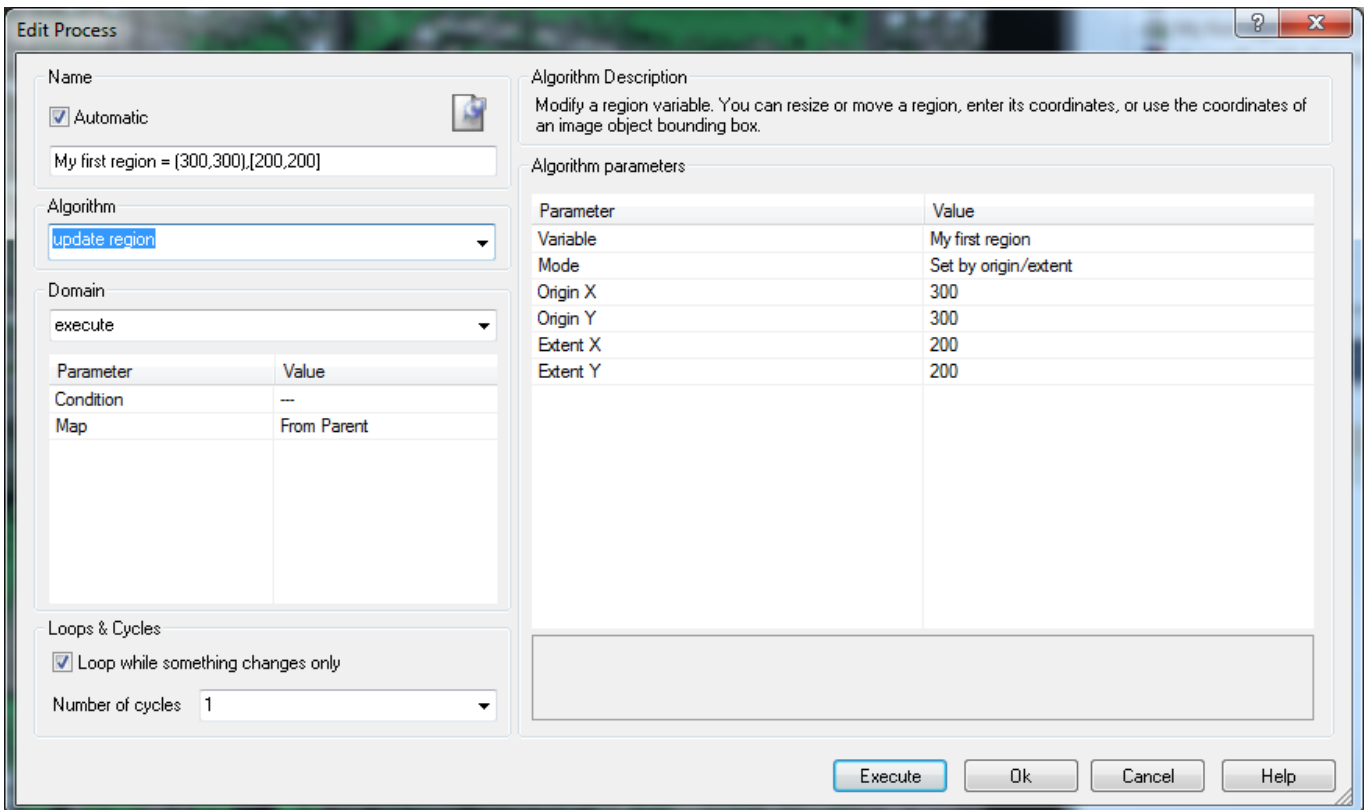


Figure 12: Process settings to create a region by coordinates.

2. **Close** the 'Edit Process' window.

3. **Execute** the process, by either right-clicking on it and select 'Execute' from the context menu or by selecting it and pressing F5 on your keyboard.
4. Browse in the 'Feature View' window to '**Object Features > Position**' and expand '**Is object in region**'.
5. Double-click on '**Is object in region (My first region)**'.

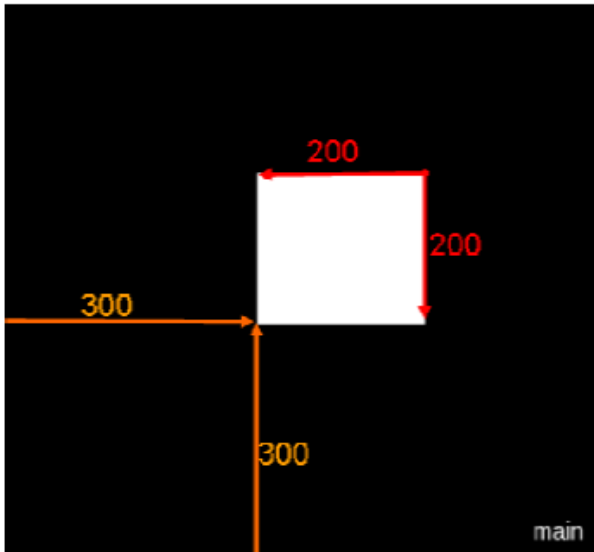


Figure 13: Extent and location of created region.

2.2.2 Use the region in the Domain

Now that the region is created it can be used in the Domain. A small chessboard segmentation is applied only to the objects of the region 'My first Region'.

1. Double-click on the fourth child process '**at Level1 in My first region: chessboard: 10**' to open it.
 - As Level, the 'Level1' is chosen to split up already existing objects.
 - In the field '**Region**' the region '**My first Region**' is chosen from the drop-down list. A region can only be chosen if the if a region variable is created beforehand. Only object fulfilling the condition will be split up by the segmentation.
2. Close the 'Edit Process' window.
3. Execute the process, by either right-clicking on it and select 'Execute' from the context menu or by selecting it and pressing F5 on your keyboard.

Only objects within the region are segmented into smaller squares.

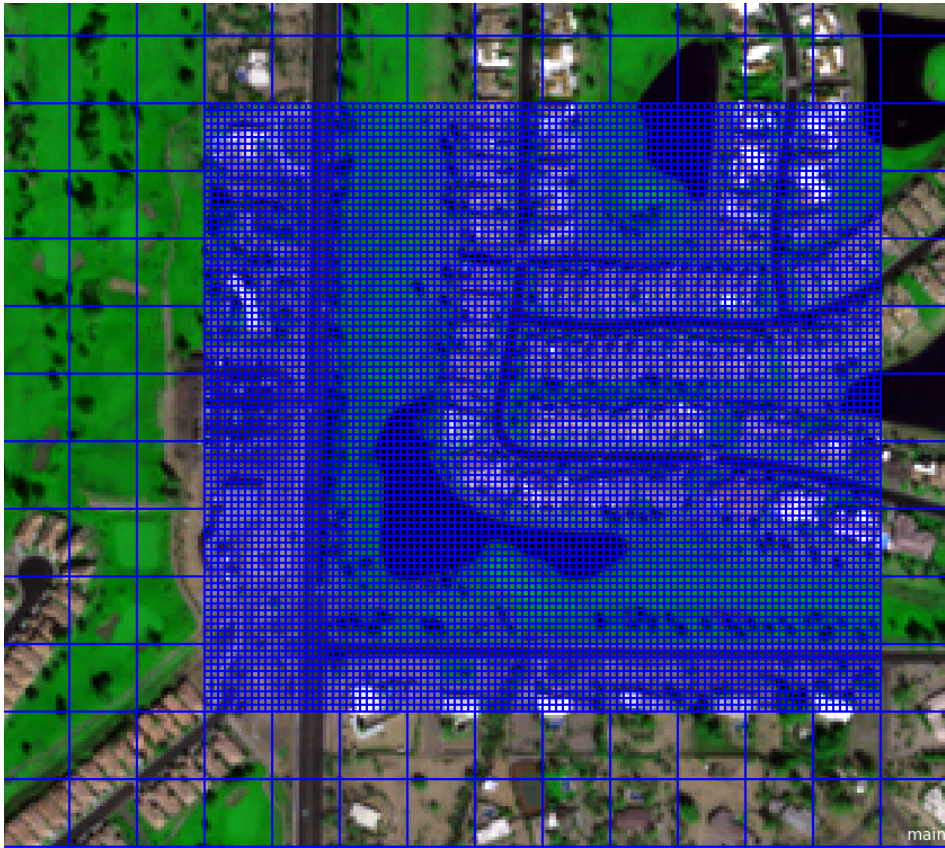


Figure 14: Only the defined region is segmented at the finer chessboard scale.

Where to get additional help & information?

The eCognition Community

The eCognition Community helps to share knowledge and information within the user, partner, academic and developer community to benefit from each other's experience.



The Community contains content such as:

- **Wiki:** collection of eCognition related articles (e.g. Rule Set tips and tricks, strategies, algorithm documentation...).
- **Discussions:** ask questions and get answers.
- **File exchange:** share any type of eCognition related code such as Rule Sets, Action Libraries, plug-ins...
- **Blogs:** read and write insights about what's happening around our industry...

Share your knowledge and questions with other users interested in using and developing image intelligence applications for Earth Sciences at:

<http://community.ecognition.com/>.

The User Guide & Reference Book

Together with the software a User Guide and a Reference book is installed. You can access them in the Developer interface in the main menu 'Help>eCognition Developer User Guide' or Reference Book.

The Reference Book lists detailed information about algorithms and features, and provides general reference information.

eCognition Training

eCognition Training Services offer a carefully planned curriculum that provides hands-on, real-world exercises. We are dedicated to enhancing customers' image analysis skills and helping these organizations to accomplish their goals.

Our courses are held in our classrooms around the world and on-site in our customer's facilities. We offer regular Open Training courses, where anyone can register and In-Company Training. We also offer Customized Courses to meet a customer's unique image analysis needs, thereby maximizing the training effect.

For more information please see our website or contact us at: eCognition_Training@trimble.com