DEF:NIENS®
Understanding Images

What's new in eCognition Developer 8?

Working with 'Regions'

New OBIA dimensions

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Legal Notes

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Introduction to this Module

This Module gives you an introduction to a new functionality in eCogntiton Developer 8, the so called Regions. A subset of a Quickbird scene is used together with a thematic shape file.

Goal of this Module is to give you an introduction to the new concept of 'Regions' in the software, how to create and use them. A following Module 'Maps and Regions'.. explains how Regions and Maps (another new concept) work together.

This Module has two Lessons:

Lesson 1 Introduction to Regions and Lesson 2Creating and using Regions

Symbols at the side of the document

The symbols at the side of the document shall guide you through the exercises and help you to identify whether to read something or an action is needed or whether the screenshot is meant to be compared with settings in the software.

Introduction

Information

If the side is hachured and 'Introduction' is added, this indicates that a text is giving a general introduction or methodology about the following chapter, method or exercise.

If the side is hachured and 'Information' is added, this indicates that a text is giving information about the following exercise.

Action!

If this symbol is shown, you have to follow the numbered items in the text. If you just want to work through the exercises without reading the theory part, follow only this sign.

Settings Check

If this symbol is shown, compare the settings shown in the screenshot with the settings in the according dialog box in the software.

Rule Set Check

If this symbol is shown check the screenshot of the Process Tree with the content of the Process Tree in the software.

Result Check

If this symbol is shown check the screenshot aside with the result in the software. It should look similar.

Lesson 1 Introduction to Regions

In eCognition Developer 8, 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 limitation of analysis on specific areas.

- Within one Project you can have **several** Regions.

- A defined Region can be used in the **Image Object Domain.**
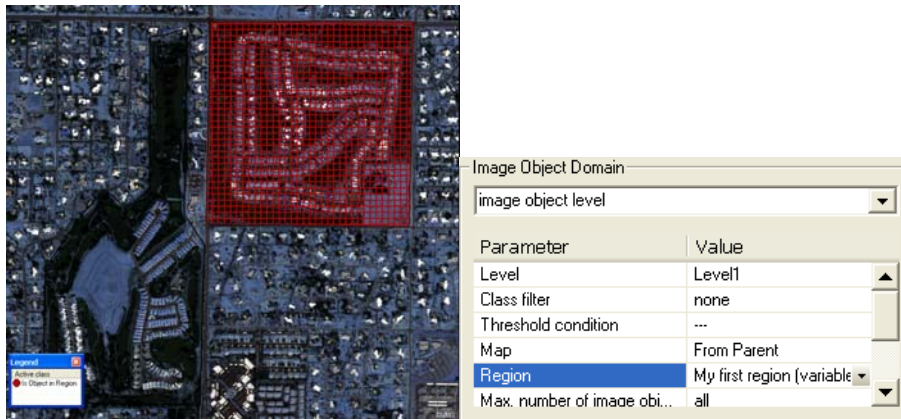
Figure 1: Right: segmented and classified Region; Left: Region used in the Image Object Domain.

- You can create regions using the algorithm '**update region**'.

- Regions are per se **non visible**.

- You can define a region by **Object**.
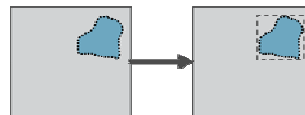
- You can define a region by **coordinates**.
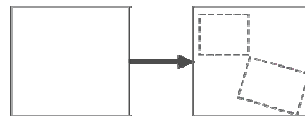
- You can **move and resize** Regions.

- You can use a Region as domain and do **individual processing** only in the specified Region.

- You can transfer a Region in a **Map** for individual processing of only this subset.

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Lesson 2 Creating and using Regions

This Lesson covers the following content

➔ *Region from an Object (Mode: From object)*

➔ *Region by coordinates (Mode: Set by origin/extent)*

✓

Result Check

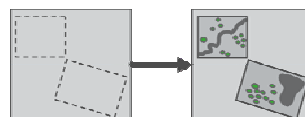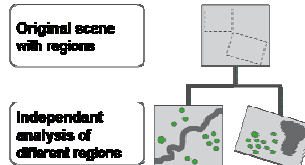The Project used in the Lesson contains the multispectral layers of a sub set of a Quickbird scene and a thematic layer shape file. A Rule Set is already loaded. The first section of the Rule Set '**Create a Region using Objects**' will be explained in the first chapter, the section '**Create a Region using coordinates**' in the second chapter.
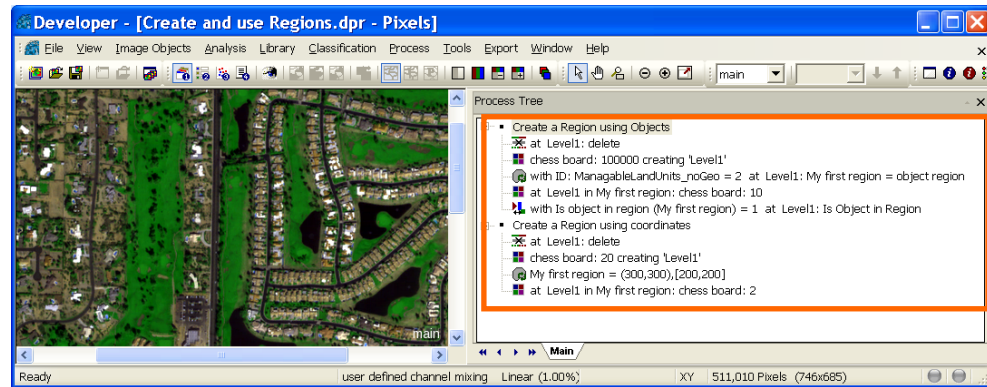
Figure 2: Loaded Project with Rule Set.

2.1   Region from an Object (Mode: From object)

This Chapter has the following sub-chapters

➔ *The Process settings to create a Region from an Object*

➔ *Execute the Process and visualize Region using a new feature*

➔ *The Process Settings to use the Region in the Image Object Domain*

➔ *Execute the Process and review the result*

Information

In this chapter it is explained how to create a Map from an Object using the algorithm '**update region**'. This means an Object is basis for the extend of the new Region. As preparation an Image Object Level is created with chess board segmentation.

Preparation

Action!

1.   Start Definiens eCogniton Developer in 'Rule Set' mode.

2.   Switch to predefined view setting number 4 'Develop rulesets'

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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 folder '…\WhatsNew_eCog8\Projects**Regions**' at the location where the training data is stored.

5.   Execute the chessboard segmentation Process '**chess board: 100000 creating 'Level1'**'.

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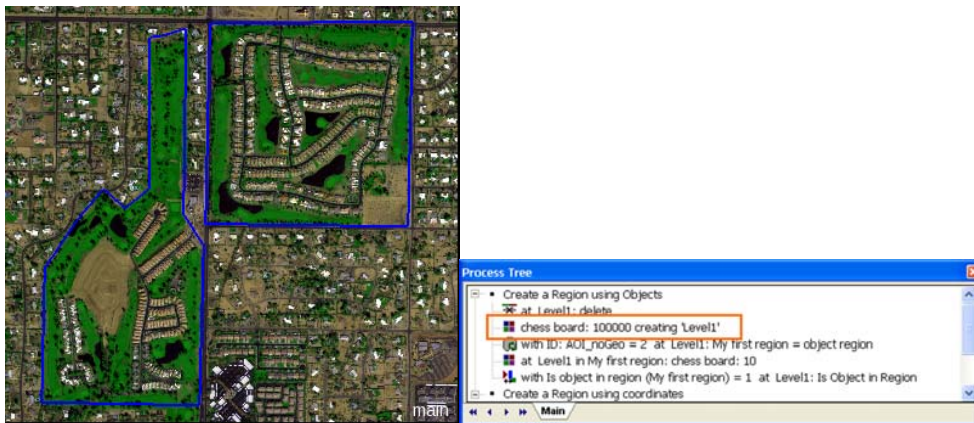

Result Check

Figure 3: Image Objects after executing the segmentation Process. Only the outlines of the shape file 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 on basis of the 'ID' column of the loaded thematic layer '. The Object with the value 2 is the Object the regions has as basis.

Information

1.   Expand the Parent Process '**Create a Region using Objects**'.

2.   Double-click on the third Child Process '**with ID: ManagableLandUnits_noGeo = 2 at Level1: My first region = object region**' to open it.

Action!
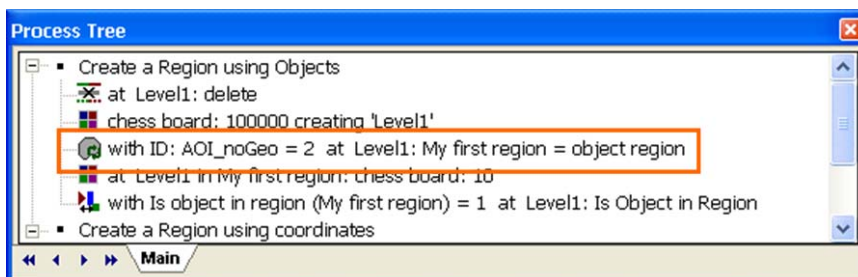
Rule Set Check

Figure 4: Process Tree with Process for creating a Region highlighted.

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**Settings
Check**

Figure 5: Process settings to create a Region from an Object.

**Settings
Check**

- As algorithm '**update region**' from the '**Variables operations**' section is chosen. With this algorithm maps are created.
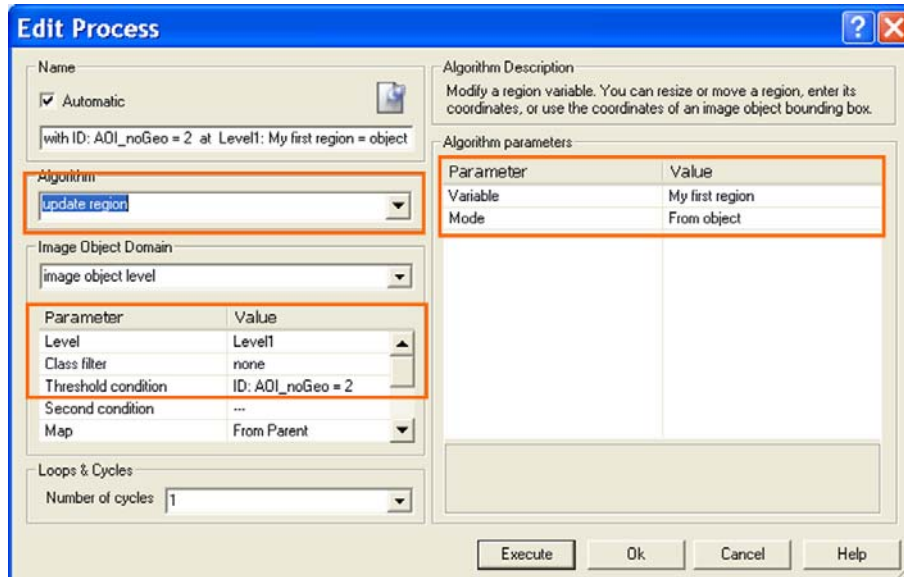
Image Object Domain

- In the 'Threshold condition' field of the Image Object Domain the object which is 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 basis for the Region to be created.

Action!
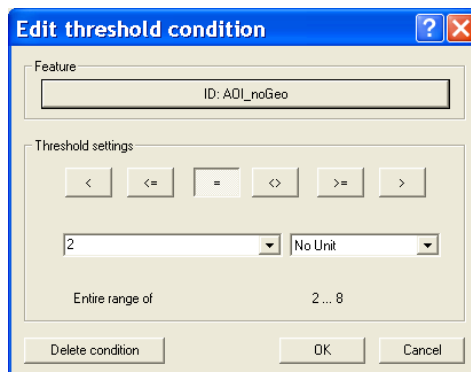
1. Click in the 'Value' field next to 'Threshold condition' to examine the set condition.

Figure 6: Threshold to use only Objects with value 2 for column 'ID'.

2. Close the dialog box without any changes, by clicking on '**Cancel**'.

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Region name and mode

- The name of the new region is defined in the Field '**Variable**', here 'My first Region'. The typed in name is stored in a so called 'Region Variable'.

Settings Check

> **Tip: Creating a new Region variable**
>
> If you want to create a new one, simply type in the name and click in another area of the dialog box. Confirm the upcoming dialog box and the variable is created and added to the Process setting. If you have created region variables already, you can select from the drop-down list.

- In the field 'Mode' '**From object**' is chosen. This defines, that the object meeting the criteria set in the Image Object domain is used as basis for creating the Region.

2.1.2 Execute the Process and visualize Region using a new feature

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

2. **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.

Action!

Information

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

1. Browse in the 'Feature View' window to '**Object Features>Position**' and expand '**Is object in region**'.

2. Double-click on 'Is object in region (My first region)'.

Action!
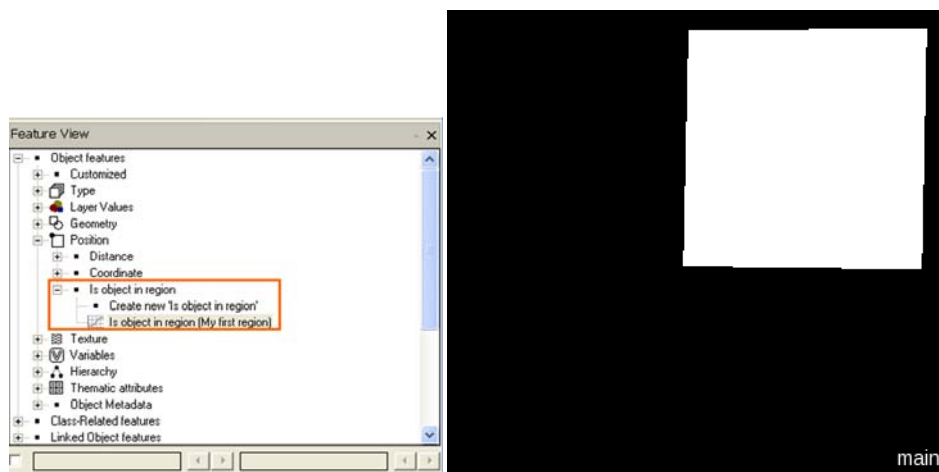
Result Check

Figure 7: New Feature 'Is object in region' in the Feature View.

In the Feature View you can see now that the upper, square object is the only object within this region. It has the value 1 for this feature.

2.1.3 The Process Settings to use the Region in the Image Object Domain

Information

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

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Action!

3. Double-click on the fourth Child Process '**at Level1 in My first region: chess board: 10**' to open it.
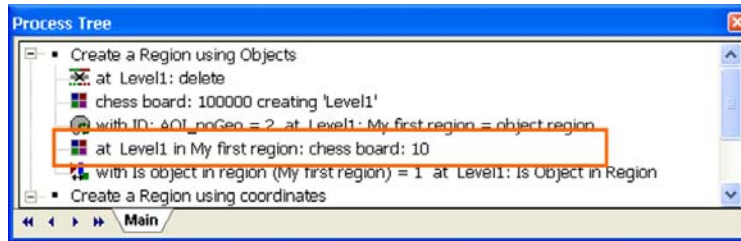
Rule Set Check

Figure 8: Process Tree with Process for segmenting only the Region highlighted.

Settings Check

- The algorithm 'chessboard segmentation' is chosen.
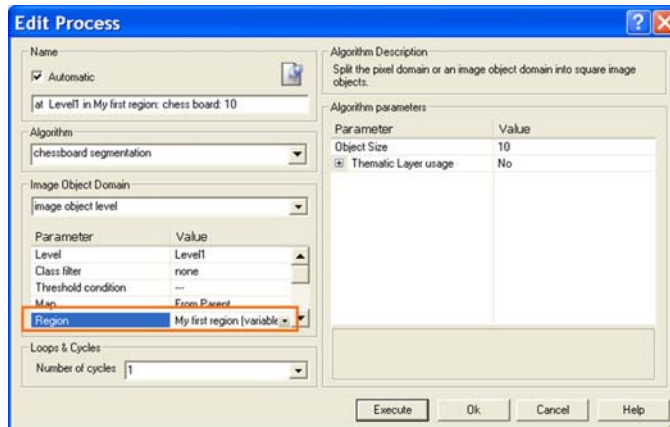
Image Object Domain

Figure 9: Process settings to define a Region in an Image Object Domain.

- As Level, the 'Level1' is chosen to split up already existing Objects.

- In the field '**Regions**' the Regions '**My first Region**' is chosen from the drop-down list. Only if a Region variable is created beforehand it can be chosen from this list. Only Object within this Region will be split up by the segmentation.

Settings Check

Algorithm Parameters

- The 'Object size' is set to 10

2.1.4 Execute the Process and review the result

Action!

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

2. **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.

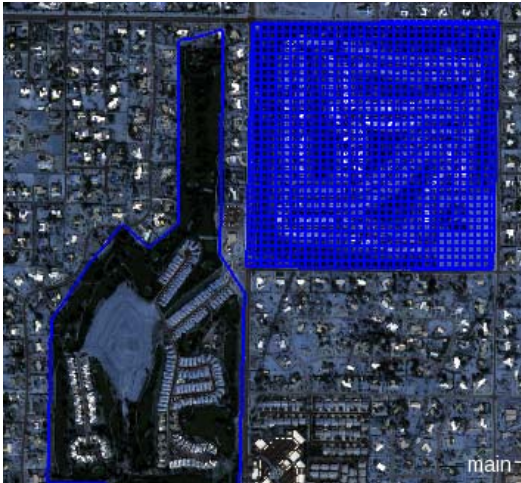Only objects within the Region are segmented into smaller squares.

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Figure 10: Only the defined Region is segmented.

Result Check

2.2 Region by coordinates (Mode: Set by origin/extent)

This Chapter has the following sub-chapters

➔ *Process settings to create a region by coordinates*

➔ *Execute the Process and visualize Region using a new feature*

➔ *Use the Region in the Image Object Domain*

➔ *Execute the Process and review the result*

Different to the last example 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 coordinates of course.

Information

Preparation

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 'chess board: 20 creating 'Level1'**'.

Action!

The old Level is deleted and a new Level is created with chessboard size 20. No thematic layer is used for segmentation this time.
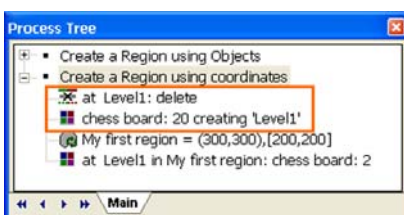
Figure 11: Process Tree with Processes for deleting and creating an Image Object Level highlighted.

Rule Set Check

2.2.1   Process settings to create a region by coordinates

Rule Set Check

3.   Double-click on the third Child Process '**My first region = (300,300),[200,200]**' to open it.
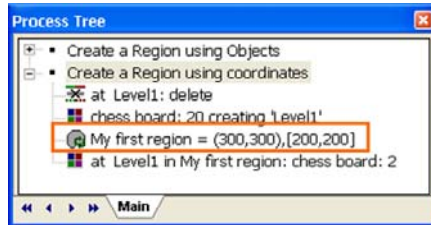

Figure 12: Process Tree with Process for creating a Region highlighted.

Settings Check

Image Object Domain

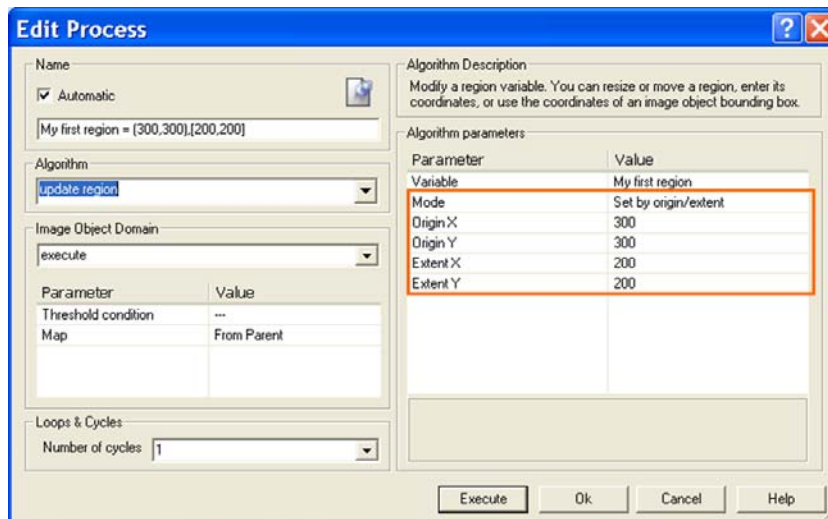*   For creating a Region by coordinates, the default settings of the Image Object Domain are kept.

Figure 13: Process settings to create a Region by ccoordinates.

Settings Check

Algorithm Parameters

*   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.

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- **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.

2.2.2 Execute the Process and visualize Region using a new feature

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

2. **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.

Action!

3. Browse in the 'Feature View' window to '**Object Features>Position**' and expand '**Is object in region**'.

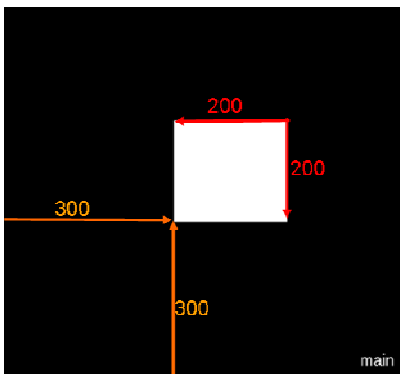4. Double-click on 'Is object in region (My first region)'.

Result Check

Figure 14: Extent and location of created Region.

2.2.3 Use the Region in the Image Object Domain

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

Information

5. Double-click on the fourth Child Process '**at Level1 in My first region: chess board: 10**' to open it.
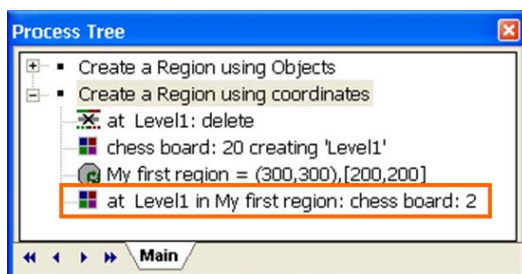

Rule Set Check

Figure 15: Process Tree with Process for segmenting only within the Region highlighted.

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**Settings
Check**

Image Object Domain

- As Level, the 'Level1' is chosen to split up already existing Objects.

- In the field '**Region**' the Regions '**My first Region**' is chosen from the drop-down list. Only if a Region variable is created beforehand it can be chosen from this list. Only Object fulfilling the condition will be split up by the segmentation.

Algorithm Parameters

- The 'Object size' is set to 2.

2.2.4 Execute the Process and review the result

Action!

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

2. **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.

**Result
Check**

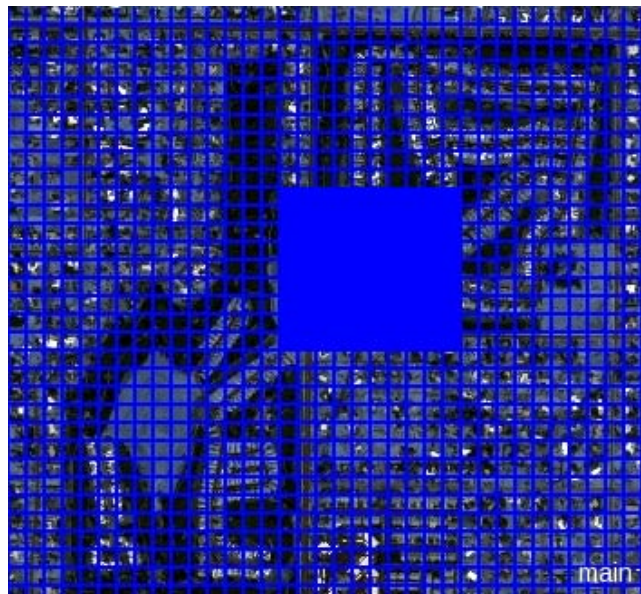Only objects within the Region are segmented into smaller squares.

Figure 16: Only the defined Region is segmented.

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