

Production Applications for eCognition Architect 8

Building Generalization and Quality Check



DEEPER INSIGHTS FASTER RESULTS BETTER DECISIONS

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Imprint and Version

Document Version

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Introduction to this Module

In this Module you will learn how to use the Application 'Building Generalization' which also includes the new functionality of doing quality checks of classification results. In the later Part of this Module you will also learn how to create a Quality Check widget yourself.

The Application we will load has four Actions:

- Find Buildings
- Generalize Buildings
- Quality Check
- Export

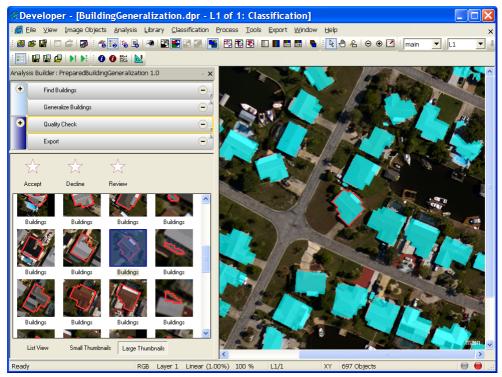


Figure 1: Application 'Generalize Buildings' loaded. Currently the manual classification tool of the Action 'Quality Check is active.

This Module has two Lessons:

Lesson 1 Explore the ready Application

Lesson 2 Create own Quality Check and Export

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 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. Information If the side is hachured and 'Information' is added, this indicates that a text is giving information about the following exercise. 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. Action! If this symbol is shown, compare the settings shown in the screenshot with the settings Ì in the according dialog box in the software. Settings Check If this symbol is shown check the screenshot of the Process Tree with the content of the \checkmark Process Tree in the software. **Rule Set** Check If this symbol is shown check the screenshot aside with the result in the software. It Ì should look similar.

> Result Check

Lesson 1 Explore the ready Application

This Lesson has the following chapters

- → Loading Project and Action Library
- → Action 'Find Buildings'
- → The Action 'Generalize Buildings'
- → The Action 'Quality Check
- The Action 'Export'



Action!

1.1 Loading Project and Action Library

- 1. Open Definiens eCogniton Developer and switch to Configure Analysis view.
- 2. In the main menu 'File' choose '**Open Project...**' or click on the 'Open Project' button in the toolbar.
- Open the project 'BuildingGeneralization.dpr' in the folder '...\WhatsNew_eCog8\Projects\Architect\Buildings_Tampa Bay' at the location where the training data is stored.

 \checkmark

The project is loaded. The Analysis Builder, where the Actions will be shown later, is still empty, a message is indicating: 'No Library Loaded.

Result Check



4. Go to the main menu 'Library' and select 'Open Action Library...'.

Action!

- 5. Browse to '...\WhatsNew_eCog8\Projects**Architect\Buildings_Tampa Bay**' at the location where the training data is stored.
- 6. Select the folder 'PreparedBuildingGeneralization' and confirm with OK.

The Action Library is loaded,

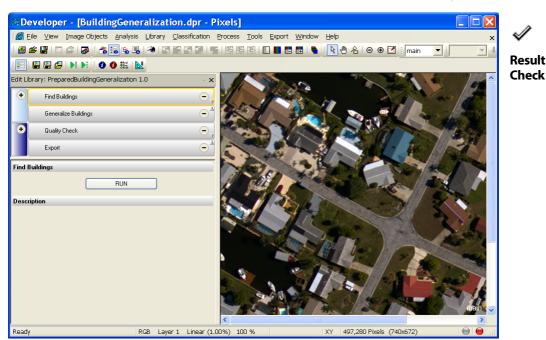


Figure 2: Loaded Project and Action Library.

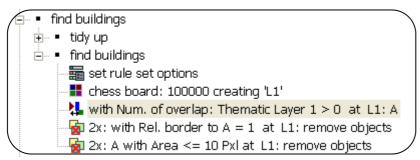
1.2 Action 'Find Buildings'

The Action detects the buildings by simply evaluating a thematic layer. Theses 'Building' Objects are then the basis for the later generalization.

1.2.1 Explore the related Rule Set Part

The actual classification of the buildings is defined in the Process 'with Num. of overlap: Thematic Layer 1 > 0 at L1: A'. The two additional Processes remove too small Objects.

- 1. Open the Process Tree window.
- 2. Expand 'do', the sequence 'find buildings' and the sequence 'find buildings'...





1.2.2 Execute the Action

- 1. In the Analysis Builder select the Action 'Find Buildings'.
- 2. Hit the 'RUN' button.

The buildings are classified as 'A' according to the thematic layer.

7



Action!



Information

Information





Result

Check

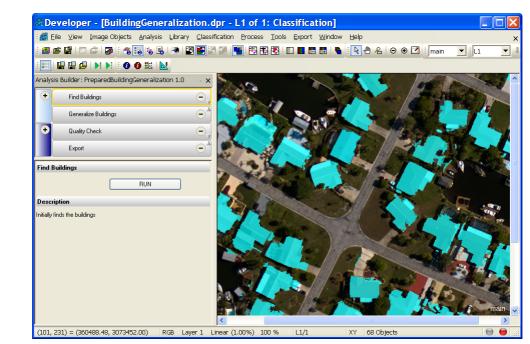


Figure 4: Classification view of initially classified 'Building' Objects.

1.3 The Action 'Generalize Buildings'

Information

Information

This Action is based on a Customized Algorithm 'Buildings Generalization Example', which you can download on the Community Platform.

1.3.1 Explore the related Rule Set

A Customized Algorithm can be created from every Rule Set sequence by right-clicking on it and selecting 'Create Customized Algorithm'. It is then added to the Algorithms list, as any other Algorithm.

1. In the Process Tree expand 'do', the sequence 'generalize buildings' and the sequence 'find buildings'.

Action!



Rule Set Check The last Process of this sequence is the Customized Algorithm 'Building Generalization'.

	generalize buildings
E	🗄 🖷 🌒 update variables
	 apply active action to variables
	 Building Generalization(L1,Buildings,O,Layer 3,P_Precision)

Figure 5: Processes to generalize 'Buildings'.



2. Double-click on the Process 'Building Generalization(L1,Buildings,0,Layer 3,P_Precision)'.

With this Customized Algorithm, you can set the input Level and the input class. In the field 'Orientation mode' you can define whether the orientation of the building is calculated from the shape of the Object or from spectral features.

You can also select the Layer, if orientation mode is set to spectral.

Very important is the field Precision, here it can be define whether the buildings are generalized strongly of stay more detailed.

Name Automatic			Algorithm Description		Settings Check
Building Generalization(L	.1,Buildings,0,Layer 3,P_Precision)		Algorithm parameters		CHECK
Algorithm		_	Parameter	Value	
Building Generalization	•		InputLevel	L1	
∟′ ⊢Image Object Domain			Input Orientation mode	Buildings 0	
execute	-		Select Layer	Layer 3	
1			Precision	P_Precision	
Parameter Threshold condition	Value 				
Map	From Parent				
Loops & Cycles					
Number of cycles 1	•				

Figure 6: Customized Algorithm 'Building Generalization'.

1.3.2 Execute the Action

- 1. In the Analysis Builder select the Action 'Generalize Buildings'.
- 2. Insert a Precision value, high values means the buildings stay detailed, low values means the buildings are generalized strongly.
- 3. Hit the 'RUN' button to execute the generalization.
- 4. Hit the 'Reset' button to recreate the initial building Objects.

Analysis E	uilder: PreparedBuildin	gGeneralization 1.0	~ X
+	Find Buildings		\odot_{\forall}
	Generalize Buildings		Θ^{\dagger}
+	Quality Check		$\Theta_{\mathbf{y}}$
	Export		Θ^{Λ}
Set Abst	action Parameter		
Precision	4 .		 20
Generalize		Run	
		Reset	
Descripti	on		

Figure 7: Action 'Generalize Buildings'.





Result Check



Figure 8: Buildings after generalization.

1.4 The Action 'Quality Check'

Information

In this Action you can manually **accept** or **decline** Objects or assign them to a '**review'** class using the buttons in the upper part. All Objects are stored in a list, which can also be displayed in a thumbnails view. If one thumbnail is selected 2, the viewer automatically zooms to it. If the object is assigned to 'Accept', 'Reject' or 'Review' the widget automatically jumps to the next one.

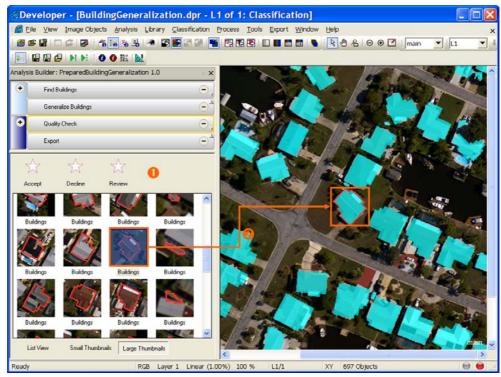


Figure 9: Action 'Quality Check'.

1.4.1 Explore the related Rule Set

Whenever a button is hit in the Action it executes a Process to either assign the selected Object to the class. The algorithm assign class' together with a special Image Object Domain item 'image object list' is used to force the Process to use the currently selected Object as domain.

(accept 	
		🖳 📜 UI Selection: Building checked	
	÷	 decline 	
		UI Selection: Building declined	
	÷	 review 	
		🖳 🎝 UI Selection: Building review	

Figure 10: Processes to utilize the Action 'Quality Check'.

1.4.2 Execute the Action

- 1. Select the Action 'Quality Check'.
- 2. Choose the 'Large Thumbnails' view by pressing the button in the lower right.
- 3. Zoom into the viewer, so that the buildings are represented in detail.
- Click either the 'Accept', 'Decline' or 'Review' button until all buildings are assigned to one of the classes. Alternatively you can use the numbers on your number pad. 1=accept, 2=decline and 3= review.



Figure 11: Buildings after 'Quality Check'.

1.5 The Action 'Export'

The Action has no setting possibilities, a vector shape file is exported together with the class name and size of the Object.

- 1. Select the Action 'Export'.
- 2. Hit the 'Export' button.

A shape file together with the attributes is exported.



Information



Result Check





Action!

Lesson 2 Create own Quality Check and Export

This Lesson has the following chapters

- \rightarrow Preparation
- → Create the Processes for the Action
- ➔ Add Action Definition 'Quality Check
- Insert and configure widget 'Manual Classification Tool'
- ➔ Action 'Export'

2.1 Preparation

- 1. Open a new Definiens eCogniton Developer and switch to Configure Analysis view.
- 2. In the main menu 'File' choose '**Open Project...**' or click on the 'Open Project' button in the toolbar.
- Action!
- Open the project 'TampaBay.dpr' in the folder '...\WhatsNew_eCog8\Projects\Architect\Buildings_Tampa Bay' at the location where the training data is stored.

The project is loaded. The Analysis Builder, where the Actions will be shown later, is still empty, a message is indicating: 'No Library Loaded.

- 4. Go to the main menu 'Library' and select 'Open Action Library...'.
- 5. Browse to '...\WhatsNew_eCog8\Projects**Architect\Buildings_Tampa Bay**' at the location where the training data is stored.
- 6. Select the folder 'BuildingGeneralization' and confirm with OK.

The Action Library is loaded, it contains only the first two Actions 'Find Buildings' and 'Generalize Buildings'. Additionally a new Group 'Quality Check and Export' is already added.

Result Check

Ì



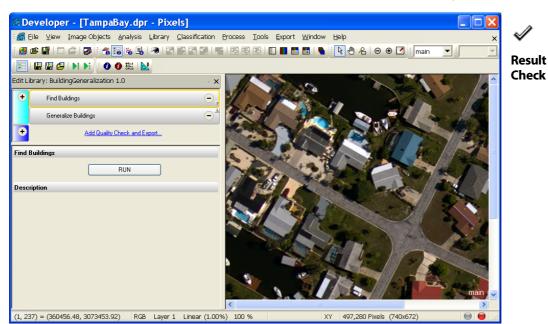


Figure 12: Loaded Project with Action Library.

- 1. Execute Action 'Find Buildings'.
- 2. Execute Action 'Generalize Buildings'.



Action!

Information

Action!

2.2 Create the Processes for the Action

The Rule Set must have Processes which point to the Object list of the Manual Classification Tool. This can be set via the Image Object Domain type 'image object list'

- 1. Insert a Parent Process and name it 'accept'.
- 2. Insert a **Child Process** and select 'assign class' as algorithm.
- 3. From the Image Object Domain drop-down list, select 'image object list'
- 4. In the new field 'Image Object List' select 'UI Selection'.
- 5. In the field 'Use Class' insert 'Building_accepted' to create the new class.

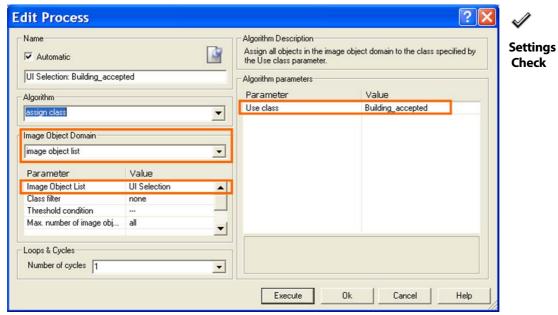


Figure 13: Process settings to activate the manual classification to 'Building_acceppted'.

Create own Quality Check and Export

. /	e do	$\overline{}$
~	🖅 🔹 find buildings	
Rule Set	 generalize buildings 	
Check	accept	
	UI Selection: Building_accepted	

Figure 14: Process Tree for later Button 'Accept'.



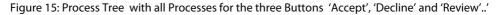
6. Repeat the same for 'decline' and 'review'. You can copy, paste and modify the Processes.

Action!

ℐ

Rule Set Check

(÷	 accept
		🖳 💺 UI Selection: Building_accepted
	÷	 decline
		🖳 📜 UI Selection: Building_decline
	:	 review
		🖳 💺 UI Selection: Building_review 🏒



Add Action Definition 'Quality 2.3 Check'



- 2. Right-click Action Group 'Quality Check and Export' and select 'Add Action Definition'.
- 3. Name it 'Quality Check'
- Define the Rule Set 'buildinggeneralization_quality.dcp'. 4.
- Keep all other fields clear, confirm with 'OK', ignore the warning message. 5.

\checkmark	
Settir	1

Action De	finition				X
General					
Name	Quality Check				-
Description					-
Icon					1
Version	, 	Action ID	Quality Check		=
Priority	0	Group ID	Quality Check	and Export 🔄	J
Rule Set					
Parameter Set					•
Rule Set File	buildinggeneralizat	tion_qualityche	ck.dcp		
Process to exec	;ute				
				Callbacks	
🔽 Use only once	Depend	encies	OK	Cancel	

Figure 16: Action Definition for 'Quality Check'.



2.4 Insert and configure widget 'Manual Classification Tool'

In opposite to other widgets, the Manual Classification Tool does not need a Widget Group. It can be directly inserted.

Action!

2.4.1 Insert the widget

1. Right-click in the lower pane of the Analysis Builder and select 'Add Manual Classification Tool'.

Find Buildings			
Generalize Buildings			
Quality Check	(
Сору	٦		
Paste			
Add Group			
Add Manual Classification Tool			

Figure 17: Selecting the 'Manual Classification Tool' to be added.

The 'Widget Configuration' dialog box opens.

2.4.2 Configure general settings

- 1. In the field 'Rule Set' define 'buildinggeneralization_quality.dcp'.
- 2. Keep the thumbnail settings as they are
- 3. In the field 'Class Filter' select: only the class 'Building'.

This has the effect that the Object list will be updated and already reviewed Objects are disappearing from the list.

4. In the field '**Feature**' define '**Area**'. This feature helps later sorting the Objects after size.



and the second second	imeter	Value
	nage Object List Settings	
	ule Set	buildinggeneralization_qualitycheck.dcp
	elect next object	Yes
12	Thumbnail Settings	
	Image object border size	10
	Large thumbnail size	75
	Small thumbnail size	32
1	Image Object Domain	
	Threshold condition	
	Class filter	Building
	Max. number of image objects	al
E	Columns	
	Default sort column	1
	Default sort order	Ascending
	Show current class	Yes
	Feature 1	Area
	Feature 2	***

Figure 18: Configuration of the general settings for the Manual Classification Tool.

Configure the Buttons 2.4.3

Button 1 'Accept'



1. Insert in the field 'text': 'Accept'

- Action!
- 2. Define the Process Path: do/accept.
- 3. Select from the drop-down list of field 'Update after Action': 'Update all objects'
- Click on the '...' next to the field 'Hot key'. Press the 1 on the number pad. 4.

Automatically the hot key is entered, here 1(ZEHNERTASTATUR).

In the field 'Image file' you can select an image for the button, if you like, here 5. 'accept.tif'.

Button 2 'Decline'

- Insert in the field 'text': 'Decline' 1.
- 2. Define the Process Path: do/decline.
- 3. Select from the drop-down list of field 'Update after Action': 'Update all objects'
- Click on the '...' next to the field 'Hot key'. Press the 2 on the number pad. 4.

Automatically the hot key is entered, here 2(ZEHNERTASTATUR).

In the field 'Image file' you can select an image for the button, if you like, here 5. 'decline.tif'.

Button 3 'Review'

- Insert in the field 'text': 'Review' 1.
- 2. Define the Process Path: do/Review.
- 3. Select from the drop-down list of field 'Update after Action': 'Update all objects'

Settings Check

4. Click on the '...' next to the field 'Hot key'. Press the 3 on the number pad.

Automatically the hot key is entered, here 3(ZEHNERTASTATUR).

5. In the field '**Image file**' you can select an image for the button, if you like, here '**review.tif**'.

rameter	Value	
Image Object List Settings		
Action Buttons		_
Button1		
Text	Accept	
Description		
Process path	do/accept	
Update after action	Update all objects	
Execute on a separate thread	No	
Image file	accept.tif	
Highlight image file		
Hot key	1 (ZEHNERTASTATUR)	
Button2		
Text	Decline	
Description		
Process path	do/decline	
Update after action	Update all objects	
Execute on a separate thread	No	
Image file	decline.tif	
Highlight image file		
Hot key	2 (ZEHNERTASTATUR)	
Button3		
Text	Review	
Description		
Process path	do/review	
Update after action	Update all objects	
Execute on a separate thread	No	
Image file	review.tif	
Highlight image file		
Hot key	3 (ZEHNERTASTATUR)	
Rutton4		•

Figure 19: Configuration of the buttons of the Manual Classification Tool.

- 6. Confirm the settings with 'OK'.
- 7. Switch off the editing mode of the Action Library

The Manual Editing Tool is added to the Action Library.

- 8. Sort the 'Area' column descending and switch to 'Large Thumbnail' view.
- 9. **Multi-select** the thumbnails of the small Objects in the object list and click on the 'Decline' button.



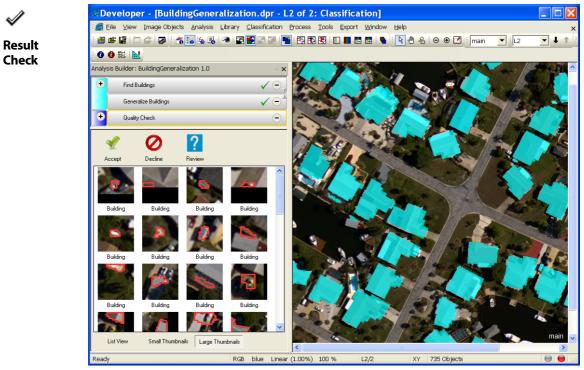


Figure 20: The Manual Classification Tool added to the Action Library.

2.5 Action 'Export'

2.5.1 Add Process to Export



- 1. Add a new Process under 'do' and name it 'export'.
- 2. Choose 'export vector layers' as algorithm.
- 3. In the field 'Export item name' insert 'Buildings'.
- 4. As Attributes choose 'Area' and 'Class name'
- 5. As 'Shape Type' select 'Polygons'.



Settings Check

Edit Process								? 🗙
Name Automatic		ß		gorithm Description— port vector layers to a	a file.			
do			Alg	gorithm parameters				
Algorithm			Ρ	arameter		Valu	e	
export vector layers		•		xport mode			xport item	
1				xport item name		Buildir	ngs	
Image Object Domain				xport series		No		
image object level		•		Export Data				
1				Attribute table			Pxl; Class_na	me
Parameter	Value			Shape Type		Polyg		
Level	L2			Export Type Dimension		Raste	1	
Class filter	none			E monoriori	P 1	2D		
Threshold condition			Use geo-coded coordinates Yes					
Мар	From Parent	=1	Export Format Name of feature class to ex		_			
Region	From Parent			In ame or reature cla	ass to ex			
Loops & Cycles Number of cycles		•						
				Execute	Ok		Cancel	Help

Figure 21:Process to export vector layer.

export
 at L2: export object shapes to Buildings

Figure 22: Process structure for Action 'Export'.

2.5.2 Add the Action 'Export

Add the Action Definition

- 1. Activate the **editing mode** for the Action Library
- 2. Add a new Action Definition.
- 3. Name it 'Export'.
- 4. Create the Parameter set 'Export' by simply typin it in.
- 5. Define the Rule Set file 'buildinggeneralization_qualitycheck.dcp'
- 6. Define the Process Path 'do/export'

Action De	finition			
General				
Name	Export			
Description				
Icon				
Version		Action ID	Export	
Priority	0	Group ID	Quality Check	and Export 💌
Phoney	0	Group ID		
Rule Set				
Parameter Set	Export			•
Rule Set File	buildinggeneralizat	tion_qualityche	eck.dcp	
Process to exec	cute			
do/export				Callbacks
🔽 Use only once	Depende	encies	ОК	Cancel

Figure 23: Action Definition for Action 'Export'.

Add Widget Group and Button

- 1. Add a Widget Group and name it 'Export'.
- 2. Add a Button and define the Process Path 'do/export' and button text 'Export'.
- 3. Confirm the Settings with 'OK':

The buttons is added to the Action Library.



Action!



Rule Set

Check



Settings Check



Parameter	Value
Text	
Description	
Show/Hide Variable	
Enable/Disable Varia	ble
Process on press	do/export
Process on release	
Button Text	Export
Image	_
Radio Button	No
Ruleset	buildinggeneralization_q 🖣

Figure 24: Configuration for the 'Export' button.

\checkmark	
Result Check	

Analysis I	Builder: BuildingGeneralization 1.0	~ X
÷	Find Buildings	🗸 🔿 4
	Generalize Buildings	$\checkmark \bigcirc^{\scriptscriptstyle A}$
÷	Quality Check	\odot^{Λ}
	Export	Θ
Export		
	Export	
Descript	ion	_

Figure 25: The Action 'Export' with button added to the Action Library.