Quick start guide

for the

LACO-WIKI ONLINE TOOL

An Open Access Online Portal for Land Cover Validation

http://laco-wiki.net

Date of release: 30.11.2016



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1 Introduction

The LACO-Wiki Online Tool is an open access online portal for land cover validation.

This document gives you a quick overview over the basic functionality of the LACO-Wiki Online Tool and guides you through uploading and validating your first dataset.

2 What is the LACO-Wiki Online Tool?

LACO-Wiki provides a software framework which serves as a single online access point for the **map** validation process.

It guides the user through the set-up of all necessary input data and the entire validation process.

LACO-Wiki enables the user to set-up methodologically sound **sampling designs** and the convenient interpretation of samples in a **user-friendly environment**.

It also allows the user to easily generate **state-of-the-art accuracy reports** ready for communication to map users.

Hence, the tool also includes data management and **sharing functionality** so that every data uploaded or generated in LACO-Wiki can be managed by the owner and shared with other users which could provide a valuable resource for building improved hybrid land cover maps.

Features:

- LACO-Wiki offers a single online access point for the complete map validation process.
- A user-friendly environment to upload new maps and create sampling designs.
- State-of-the-art accuracy reports generated with just a few clicks.
- Easy access to shared datasets and validations sessions, allowing users to share the workload with other people in their team and have multiple people validate datasets at once.

3 The Validation Process from Start to Finish

The following chapter guides you through a quick example of a complete validation session – from login to generating the final report.

3.1 Login

LACO-Wiki currently supports three different login options:

- An existing Geo-Wiki account,
- your Facebook login or
- your Google account.

Use of the offered options to create your account and get started using LACO-Wiki right away.

LACO-Wiki may ask you to access your email address and public profile in order to create your account.

	LA The La	CO-Wik	i alidation-	Platform	
Home Welcome to LACO-Wiki	Data Create and manage data	Samples Generate your validation samples	Validations Interpretate your samples	Reports View your validation results	
Login					
Login to L	ACO-Wiki				
To enjoy the benefit	s of validated landcover d	atasets you have to login with o	ne of the following Accoun	ts:	
GEO-	*	facebook	Go	ogle	
Stay In Touch		Project Members		Languages	
Send us a Mai	l ebook	Ge	oville_	Ж ∉ English Deutsch <mark> </mark> Español Italiano ө Русский <mark></mark> Українська	Français Português
Follow us on ⁻	Twitter			🚈 Ελληνικά 💽 Türkçe 🚬	Český
This project was fu	nded by the Austrian Researc	th Promotion Agency		6	About LACO-Wiki

Figure 1: Login with your Geo-Wiki, Facebook or Google account

3.2 Upload

After a successful login you are ready to upload and create your first dataset.

Select "Data" in the menu bar at the top and then hit the "Upload" button at the bottom of the page to begin creating a new Dataset.

		CO-Wik		\sim		
				Diet		
	r,ne_⊭a	na/Cover_v	alidation	Platt	orm	
Home	Data	Samples	Validations	Reports		
welcome to DACO-wiki	Create and manage data	Generate your validation samples	Interpretate your samples	view your vain	ation results	
lo Thomas Mondel (Lo	gout)					
Managa						
Manage y	pur Datasets					
Manage y	our Datasets					
Here you can view yo	ur previously uploaded of	or shared datasets.				
Here you can view yo	ur previously uploaded o	or shared datasets.				
Here you can view yo Own datasets only: [Filter by Dataset Nan	ur previously uploaded o	or shared datasets.				
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Here you can view yo Own datasets only: E Filter by Dataset Name Dataset Name 5 V	DUIT DATASETS	Land Cover Type No results for the current filter set	Uploaded v tings found.	Owner	Preview 0 - 0 of 0	
Here you can view yo Own datasets only: Filter by Dataset Name Dataset Name	v Dataset.	Land Cover Type No results for the current filter set	Uploaded v tings found.	Owner	Preview 0 - 0 of 0	

Figure 2: Click "Upload" to start creating your first dataset.

You will be forwarded to the "Create a new Dataset" screen. Here you can specify your new dataset and enter your dataset information like name, land cover type and description.

LACO-Wiki currently supports three different land cover types for your dataset:

- Categorical
- Continuous
- Background

Categorical

Categorical data, also called thematic, discrete, or classified data, are used both for vector and raster data to represent discrete information. Examples of categorical data are land cover or land use maps like pan-European CORINE land cover, Urban Atlas or regional LISA Land Cover as well as global CCI Land Cover, GlobCover etc.

Continuous

Continuous data, representing phenomena such as percentage, elevation data or density such as the Copernicus high resolution layers of imperviousness degree and forest density or population (density) maps.

Background

Background layers can be used additionally to Google and Bing maps base imagery in the validation step. Examples of such datasets would be an orthophoto of the study area.

Create a new Dataset

Here you can create a new dataset. Define a name, the land cover type and choose the corresponding files.

Dataset Information		
Dataset Name:	LISA_LandCover_Innsbruck_WGS84	0
Land Cover Type:	Categorical 🗸 🥝	
Categorical: Categorical data, also for vector and raster categorical data are lau cover, Urban Atlas or r GlobCover etc.	called thematic, discrete, or classified data, are used both r data to represent discrete information. Examples of nd cover or land use maps like pan-European CORINE land regional LISA Land Cover as well as global CCI Land Cover,	
Continuous: Continuous data, repre density such as the Co and forest density or p	esenting phenomena such as percentage, elevation data or opernicus high resolution layers of imperviousness degree nopulation (density) maps.	
De channen de		
Some nice text about l	background layers.	

Figure 3: Enter your dataset information.

The final step in creating your new dataset is adding shape files or GeoTiffs to the dataset. Currently the following file types are supported:

- Supported file types: Shape (.shp, .shx, .dbf, .prj), GeoTiff (.tif, .tiff)
- Supported SRS: WGS84 or ETRS89 LAEA

Add your files to the dataset by clicking the "Select Files" button and manually selecting them on your file browser or simply drag-and-dropping them into the marked area.



Figure 4: Adding files to the new dataset.

Unsupported file types are shown in red. Unknown file types are shown in grey. You can remove unrequired files from the list again by clicking the trash bin icon on the left.

Once you are happy with your selection, hit "Create Dataset" to start the upload process and create your first dataset.

3.3 Legend

After the upload is finished, LACO-Wiki automatically forwards you to the "Dataset Details" page and starts processing the dataset right away.

Here you can see basic information about the new dataset, share it with other users and define a legend.

Dataset Details

K Go to Dataset Overview

Basic Information

Owner: Thomas Mondel (you) Dataset Name: LISA_LandCover_Innsbruck_WGS84 Dataset Type: Vector Land Cover Type: Categorical Uploaded: Friday, October 21, 2016 2:18 PM

Dataset Description

Detailed description of the LISA_LandCover_Innsbruck_WGS84 dataset

Vector Details

Shape Type Polygon Extent [11.4228 47.2479, 11.5063 47.2937] Projection Name WGS84 Extent WGS84 [11.4228 47.2479, 11.5063 47.2937] Feature Count 25460



You haven't defined any legend yet. You can define a new legend here.

Figure 5: Dataset details page

In the "Legend" box click the button to define the legend for the new dataset.

You can define legend entries for all data values in the dataset, add new values or remove existing ones and select from pre-defined legend templates. The preview screen shows what your dataset will look like.

Legend Designer

K Back to Details

Modify Current Legend Values

Edit your current values. Add or remove values. Change value ranges and pick colors for each set. The preview image on the right shows you how the final result may look like.

Va	lue		Name	Color	
1	•	Buildings		#DB0000	
2	•	Other const	ructed area	#FEF8A4	
3	•	Bare soil		#D7C29E	
4	*	Scree		#D2D2D2	
5	•	Bare rock		#A5A5A5	
6	* *	Surface wat	er	#0000FF	
7	•	Snow		#FFFFFF	
8	•	Ice		#00FFFF	
9	•	Trees		#018100	
10	•	Bushes		#92AE2F	
11	* *	Dwarf shrul	05	#A5FEA4	
12	•	Herbaceous	vegetation	#00FF00	
13	•	Reed		#FFFF00	
14	•	Shadow		#000000	
15	•	Clouds		#73004C	
			Add New Value		
	Save	_			



Figure 6: Define your dataset values and the associated color values in the legend editor.

Once you are satisfied with your selection, hit "Save" and return to the "Dataset Details" screen.

3.4 Sample

The next step in the process is creating a sample collection based on your new dataset.

To do that you have to click the button in the "Validation Samples" section on the "Dataset Details" screen.

This will forward you to the "Create a new Sample Collection" page.

Add name and description to your new sample collection.

Then add different sampling methods to the collection. Depending on your dataset's land cover type and the uploaded data type (vector or raster file) different sampling methods will be available.

Currently the following sampling methods are supported:

- Random Point
- Random Pixel

LACO-WIKI – WORKFLOW

- Random Polygon
- Polygon at Random Point
- Stratified Random Point
- Stratified Random Pixel
- Stratified Random Polygon

Random Point

This approach creates a sample dataset with a definable number of points, which will be randomly distributed over the reference dataset.

Random Pixel

This approach creates a sample dataset with a definable number of pixels which will be randomly selected from the reference dataset. Duplicates are not possible.

Random Polygon

This approach creates a sample dataset with a definable number of polygons which will be randomly selected from the reference dataset. Duplicates are not possible.

Polygon at Random Point

This approach creates a sample dataset with a definable number of polygons, which will be randomly selected from the reference dataset, whereby the probability for selection will be influenced by the size of the polygons (i.e. higher probability of large polygons to be selected). Duplicates are not possible.

Stratified Random Point

This approach creates a sample dataset with a definable number of points per class (e.g. land cover), which will be randomly distributed over the specified classes of the reference dataset.

Stratified Random Pixel

This approach creates a sample dataset with a definable number of pixels per class (e.g. land cover), which will be randomly selected from the specified classes of the reference dataset.

Stratified Random Polygon

This approach creates a sample dataset with a definable number of polygons per class (e.g. land cover), which will be randomly selected from the specified classes of the reference dataset.

ample Name:	Test Sample #1 for LISA_LandCover_Innsbr 🥝	Your Samples
escription:	A simple sample collection for the LISA_LandCover_Innsbruck_WGS84 dataset.	Add new samples by clicking the buttons on the left.
he given dataset	contains a vector file and supports the	23x Random Polygon Edit
ollowing sample	types:	3x Polygon at Random Location Edit
	his approach creates a sample dataset with a definable	Submit Sa
the the	Add Sample >>>	
the second secon	ndom Polygon his approach creates a sample dataset with a definable	
the second secon	ndoer of points, which will be randomly distributed over e reference dataset." Add Sample >>> ndom Polygon his approach creates a sample dataset with a definable mber of polygons which will be randomly selected from e reference dataset. Duplicates are not possible."	

Figure 7: Create a new sample collection by adding different sampling methods to the collection. Based on the dataset different sampling methods are available.

3.5 Validate

Your sample collection will now appear on the "Dataset Details" page and you can now add a new validation session using this sample collection you just created.

Click "add a validation session" to get started.

This will bring up the "Create your validation exercise" screen.

Create your Validation exercise

Here you can define a validation exercise for your previously created samples.

Basic Settings		
Name:	Validation session #1	0
Description:	A simple blind test validation exercise.	0
Validation Method:	Blind ~	
Blind: The user has no inform needs to provide a new	ation about the classification of the sample and therefore interpretation based on a pre-defined list of classes.	
Plausibility : The user has informati the plausibility of the th	on about the classification of the sample and evaluates rematic classification with yes or no.	
Validation Platform:	Web ~	
Web : Some infos about web p	olatform validations.	
Mobile: Some infos about mobil	e platform validations.	

Figure 8: Create your Validation exercise.

Again, enter your name and description for your validation session and choose a validation method. The following validation methods are currently supported:

- Blind
- Plausibility

Blind

The user has no information about the classification of the sample and therefore needs to provide a new interpretation based on a pre-defined list of classes.

Plausibility

The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no.

You can also choose your validation platform. There are two supported validation platforms available:

- Web
- Mobile

Web

The validation process will be carried out inside a web browser and using a variable number of base imagery datasets.

Mobile

The validation process will be carried out using the LACO-Wiki mobile smartphone app in-situ.

For the web version there are additional validation settings and layer configurations available. You can set minimum and maximum zoom level, sample navigation (feature extend or fixed zoom level) and define base layers and overlays.

Validation Settings	
Min. Zoom:	6 (default) 🗸
Max. Zoom:	18 (default) 🗸
Sample Navigation:	Feature Extent 🗸
Layer Configuration	
Base layers:	0
â Google Maps	✓ ✓
LACO-Wiki RGB	✓
💼 Bing (Areal)	✓ ✓
+ Add base layer	
Overlays:	
Validation Dataset	~ @
External Web Map Serv	ice 🗸 👁
http://your-web-map-	service.net layer1,layer2,layer3
+ Add overlay	
▲ Create Validation Sessio	on

Figure 9: Configure your validation settings and layer configuration.

When you are ready you can click "Create Validation Session" to start validating your sample collection of the new dataset.

The process of validating all your samples can be paused and continued at any time.

LACO-Wiki also allows you to split the workload by sharing the current validation session with other users and let them continue validating your dataset.

Validation Session Details	
K Go to Validation Session Overview	
Basic Information Owner: Christoph Perger (you) Validation Session Name: Validation session #1 Associated Dataset: LISA Associated Sample: Random points Created: Saturday, October 29, 2016 4:20 PM Validation Method: Blind	Sharing Shared validation sessions can be validated and used by other users to create reports. Share with users or groups
Validation Session Description A simple blind validation session Reports based on this validation session You haven't created any reports based on this validation session yet. You can create a new report here.	Validation Progress 2 of 100 samples have been validated. Progress: 2.0 %
	Continue Validation

Figure 10: Details page of the validation session that has been created

Depending on the validation session settings, the validation page will display the sample that should be validated displayed in a map with base imagery and additional layers that are accessible using the layer switcher control. The actual validation is done by classifying the object using one of the legend items in case of a blind validation, or just selecting correct or incorrect for the given classification of the object in case of a plausibility validation.

Validate your Samples

Go to Validation Session Details	
<< Validation # : 4 >>	
	Classify the object:
	Buildings (1)
ATTENDED TO THE OWNER OF THE OWNER	Other constructed area (2)
	Bare soil (3)
	Scree (4)
	Bare rock (5)
	Surface water (6)
	Snow (7)
	Lce (8)
(O)(O)	Trees (9)
	Bushes (10)
	Dwarf shrubs (11)
	Herbaceous vegetation (12)
	Reed (13)
	Shadow (14)
The share is the statement of	Clouds (15)
Doogle	Sample Information Sample Item ID: 400 Validated by: -
Progress in Total:	Timestamp: –

Figure 11: An example validation session.

3.6 Report

After validating all samples in the validation session you can head back to the "Validation Session Details" page to generate a report.

You can do so by clicking "create a new report" in the "Reports based on this validation session" section.

This will bring up the "Create your Report" screen.

Create your Report

Here you can create a new report for your validation.

Report name:	#1 for dataset LISA_LandCover_Innsbruck_WGS84 🥝		
Description:	An example report for the new LISA_LandCover_Innsbruck_WGS84 dataset.		
Raw Data:			
Style:	Deep Blue 🗸 🥝		
Statistical values:			
Producer Accur The producer accur of correctly classif	acy <i>iracy presents the accuracy of your classification: it is the fraction</i> <i>ied pixels with regard to all pixels of a given ground truth class.</i>		
Overall Accurac The overall accura (diagonal element)	Y cy is calculated as the total number of correctly classified pixels divided by the total number of test pixels.		

Figure 12: Create your Report screen

Give it a name and specify a description.

You can select from different pre-defined styles.

Next, check the check boxes for the statistical values you want to add to the report.

Currently the following values are supported:

- User Accuracy
- Producer Accuracy
- Overall Accuracy
- Average Mutual Information
- Quantity Disagreement

- Allocation Disagreement
- Kappa
- Portmanteau Accuracy

User Accuracy

The user accuracy presents the reliability of classes in the classified image: it is the fraction of correctly classified pixels with regard to all pixels selected as a given class.

Producer Accuracy

The producer accuracy presents the accuracy of your classification: it is the fraction of correctly classified pixels with regard to all pixels of a given ground truth class.

Overall Accuracy

The overall accuracy is calculated as the total number of correctly classified pixels (diagonal elements) divided by the total number of test pixels.

Average Mutual Information

The average mutual information is measuring the dependence between two variables. AMI provides a means of assessing the similarity of maps with different themes, i.e. the amount of information that one map predicts of the other (Finn, 1993, Foody, 2006)

Quantity Disagreement

The amount of difference between the reference map and a comparison map that is due to the less than perfect match in the proportions of the categories. (Pontius and Millones, 2011)

Allocation Disagreement

The amount of difference between the reference map and a comparison map that is due to the less than optimal match in the spatial allocation of the categories, given the proportions of the categories in the reference and comparison maps. (Pontius and Millones, 2011)

Kappa

Cohen's kappa coefficient is a statistic which measures inter-rater agreement for qualitative (categorical) items. It is generally thought to be a more robust measure than simple percent agreement calculation, since kappa takes into account the agreement occurring by chance.

Portmanteau Accuracy

The portmanteau accuracy describes the overall accuracy when the data are collapsed to two classes, the land cover type of interest, and all other land cover types combined into a single class.

Afterwards you can generate your report by clicking "Create Report".

Download the report in Excel format.



Figure 13: An example validation report in Excel

4 Conclusion

You have now successfully uploaded, created, sampled and validated your first dataset using the LACO-Wiki online tool and downloaded your first accuracy report.

For more detailed instructions please refer to the official LACO-Wiki user manual.