West University of Timisoara

Faculty of Mathematics and Computer Science

Study Program:
Computer Science in English

Master Dissertation

COORDINATOR:
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GRADUATE:
Maria Minerva Vonica

Timişoara
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Chapter 1

Application

1.1 Dataset

In order to build the dataset, we made use of the freely available data from the Landsat Archive, specifically from collection 1, level 1. This consists of data products generated from Landsat 8 Operational Land Imager/Thermal Infrared Sensor, Landsat 7 Enhanced Thematic Mapper Plus, Landsat 4-5 Thematic Mapper, and Landsat 1-5 Multispectral Scanner instruments [C1L]. For the purpose of this paper, we will focus only on images collected from the Landsat 8 satellite.

1.1.1 World Glacier Inventory

The World Glacier Inventory (WGI) proves to be a useful resource for building our dataset, since it contains information for over 130,000 glaciers. Inventory parameters include geographic location, area, length, orientation, elevation, and classification. The WGI is based primarily on aerial photographs and maps with most glaciers having one data entry only. Hence, the data set can be viewed as a snapshot of the glacier distribution in the second half of the 20th century. It is based on the original WGI (WGMS 1989) from the World Glacier Monitoring Service [WGI].

There are a number of ways to retrieve data from the inventory:

- download the entire database in a single ASCII text file (wgi_feb2012.csv);
- search by parameter using the Search Inventory interface;
- extract regions through the Extract Selected Regions interface.

The ASCII text file will be used with the purpose to define which are the glaciers to be included in the dataset to be built. An example of how this file looks like can be found in Figure 1.1.

The *parameters* which will be extracted for the dataset construction are the following:

- *wgi_glacier_id*: unique id representing one glacier (or part of it, if the coverage area is larger);
- *glacier_name*: name of the glacier (if it has one);

	wgi_glacier_id	political_unit	continent_code	drainage_code	free_position_code	local_glacier_code	glacier_name	lat	lon
2	SU5X1430909	SU	5	X143	9	90	Zyuryuzamin	38.92	71.272
3	AT4J143OE00	AT	4	J143	OE	6	ZWISELBACH W	47.112	11.038
4	AT4J143OE00	AT	4	J143	OE	5	ZWISELBACH	47.11	11.052
5	CH4L01200008	CH	4	L012	0	8	ZWISCHBERGEN GL	46.108	8.041
6	CN5N236I0001	CN	5	N236	I0	1	Zuxuehui	31.828	94.675
7	CH4J14304001	CH	4	J143	4	1	ZUORT VADRET DA	46.738	10.271
8	CN5O282B002	CN	5	O282	B0	23	Zuoqiupu	29.212	96.893
9	CN5O282A047	CN	5	O282	A0	476	Zuoguzasan	29.958	95.92
10	SU5X1430831	SU	5	X143	8	310	ZULUMART	39.13	72.78
11	CN5N224E001	CN	5	N224	E0	12	Zuima	29.839	96.456
12	SU5X1430948	SU	5	X143	9	489	Zotkin	38.649	71.244
13	SU5X1430949	SU	5	X143	9	490	Zotkin	38.649	71.244
14	SU5X1430932	SU	5	X143	9	326	Zordi-Birauso	38.673	71.664
15	NZ6B868B000	NZ	6	B868	B0	7	ZORA	-43.739	169.823
16	SU5T09106366	SU	5	T091	6	366	ZOPKHITO	42.88	43.43
17	IT4L01104020	IT	4	L011	4	20	ZOCCA S	46.285	9.647
18	IT4L01104021	IT	4	L011	4	21	ZOCCA E	46.292	9.653
19	AQ7SSI00012	AQ	7	SSI0	0	125	Znosko Glacier	-62.1005	-58.4865
20	SU4X0300190	SU	4	X030	1	903	ZNAMENITYY	80.53	61.02

Figure 1.1: WGI ASCII

- *lat*: latitude of the glacier;
- *lon*: longitude of the glacier.

1.1.2 Download

Through the ASCII WGI text file we can pick which glacier we want to download based on its coordinates, by implementing an endpoint of the the SpatioTemporal Asset Catalog API: `http://nsidc.org/data/glacier_inventory/index.html` [STA]. We will also specify the maximum allowed cloud coverage and the bounding box for the searched area, which is calculated based on the latitude and longitude values extracted from the ASCII WGI text file.

Chapter 2

Implementation

2.1 Download

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Bibliography

[C1L] Landsat collection 1. https://www.usgs.gov/core-science-systems/nli/landsat/landsat-collection-1?qt-science_support_page_related_con=1#qt-science_support_page_related_con. Accessed: 2021-06-20.

[STA] Stac. https://stacspec.org/STAC-api.html. Accessed: 2021-06-20.

[WGI] World glacier inventory. http://nsidc.org/data/glacier_inventory/index.html. Accessed: 2021-06-20.

Chapter 3

Glossary

3.1 Acronyms

WGI	World Glacier Inventory

Table 3.1: Acronyms table