Lesson 00
Overview course, marking, etc

GEO1015.2019

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Course content (1/3)

Digital terrain models (DTMs) are computer representations of the elevation of a given area, and they play an important role in understanding and analysing our built environment.

They are the necessary input for several applications (eg flood modelling, visibility, effects of climate change on the north poles, etc.), and they are also relevant for studying for seabed and other planets.

Course content (2/3)

The course provides an overview of the fundamentals of digital terrain modelling (DTM):

- different representations of DTMs: TINs, rasters, point clouds, contour lines
- reconstruction of DTMs from different sources (LiDAR, photogrammetry, InSAR)
- spatial interpolation methods
- conversion between different DTM representations
- processing of DTM: outlier detection, filtering, segmentation, and identification and classification of objects
- applications, eg runoff modelling, watershed computations, visibility
- techniques to handle and process massive datasets

Course content (3/3)

The course has both a theoretical part and a practical part where students reconstruct, manipulate, process, and extract information from DTMs.

All the labs are programming tasks (to be done with the Python programming language), and other open-source libraries and software are used.

Prerequisites

Prerequisites:

- GEO1000 (or knowledge of scripting/programming in at least one language (eg Matlab, Java or Python)
- GEO1001
- GEO1002

Study goals

- describe the characteristics of elevations datasets from different sources (LiDAR, photogrammetry, InSAR)
- describe the pros and cons of different representations of DTMs, and compare them for different applications
- explain how elevation datasets can be automatically converted to DTMs
- reconstruct and manipulate DTMs using with open-source libraries (in Python)
- explain, analyse, and discuss how DTMs can be useful in different applications related to built environment
- given a specific problem where elevation plays a role (eg visibility or flood modelling), analyse and identify which data and algorithms are needed to solve the problem, and assess the consequences of these choices;

Education methods

- **Blended-learning**: each week there are 2 main topics, and students first watch the videos and read the material at home.
- Then there are 2x2h sessions (contact hours), the most difficult parts are discussed and students get help/support for the practicals.

YouTube +  + python™

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Contact hours

- Tuesdays 13:45–15:30 (room R)
- Fridays 10:45–12:30 (room R)
- presence not mandatory (except at the mid-term exam)
- we’re here to help, no new material will be introduced
- but we will explain, if needed, key concepts that seem misunderstood
- bring your laptop: we help for the labs

3 guest lectures

1. *Overview of AHN3, and... AHN4*
   (Jeroen Leusink, het Waterschapshuis)
   19 November 2019

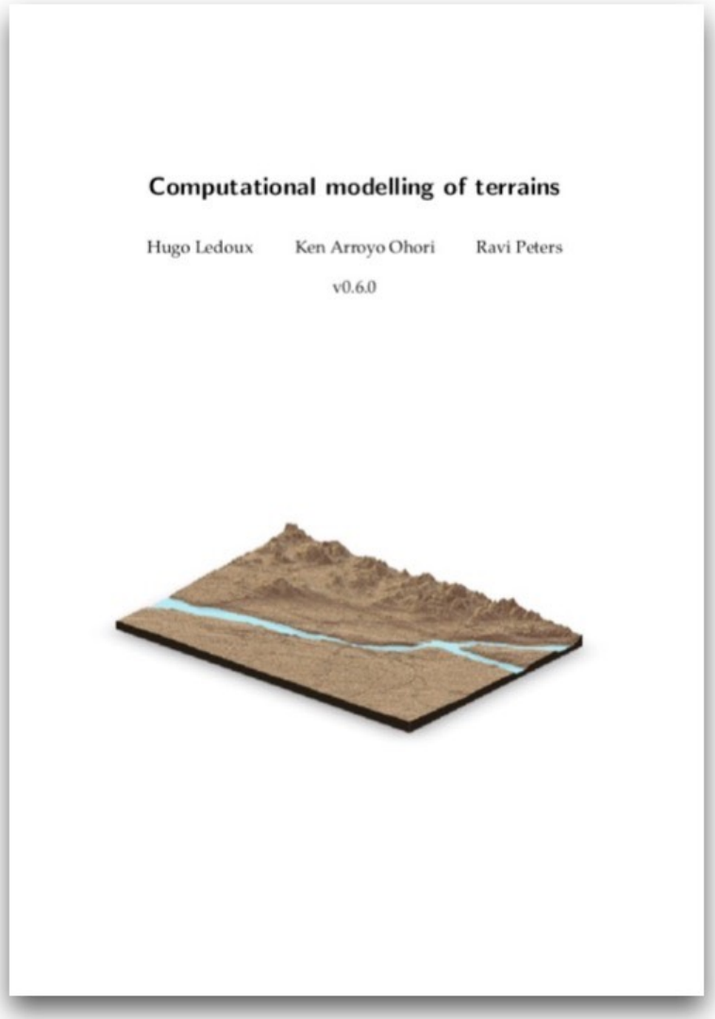
2. *Dense matching of images to construct a countrywide point cloud*
   (Willem van Hinsbergh, Kadaster)
   17 December 2019

3. *Management and processing of LiDAR datasets at Deltares*
   (Maarten Pronk)
   7 January 2020

- topics presented are <u>not</u> directly at the exams
- meant to broaden your horizons and see how practitioners work

Material used

- we provide our book in PDF
- all the videos, papers, chapters are available on the website
- nothing to buy thus



It’s the 1st public version of the book, please report errors, typos, and suggestions for improvement at:

https://github.com/tudelft3d/terrainbook/issues

Marking

- **final exam** **30%** (2020-01-31)
- **mid-term exam** **15%** (2019-12-10)
- **3 assignments** **55%**

Important rules:

- a total of 60% or above is necessary to successfully pass the course;
- minimum 50% for the combined exams (mid-term + final);
- there is one resit for the exams (thus one exam worth 45%);
- there is one resit for each assignment (only at the end of the course if the whole course is failed; can't just redo one assignment to aim at higher score);
- if the student still fails after the resits, then the student has to redo the whole course the following year.

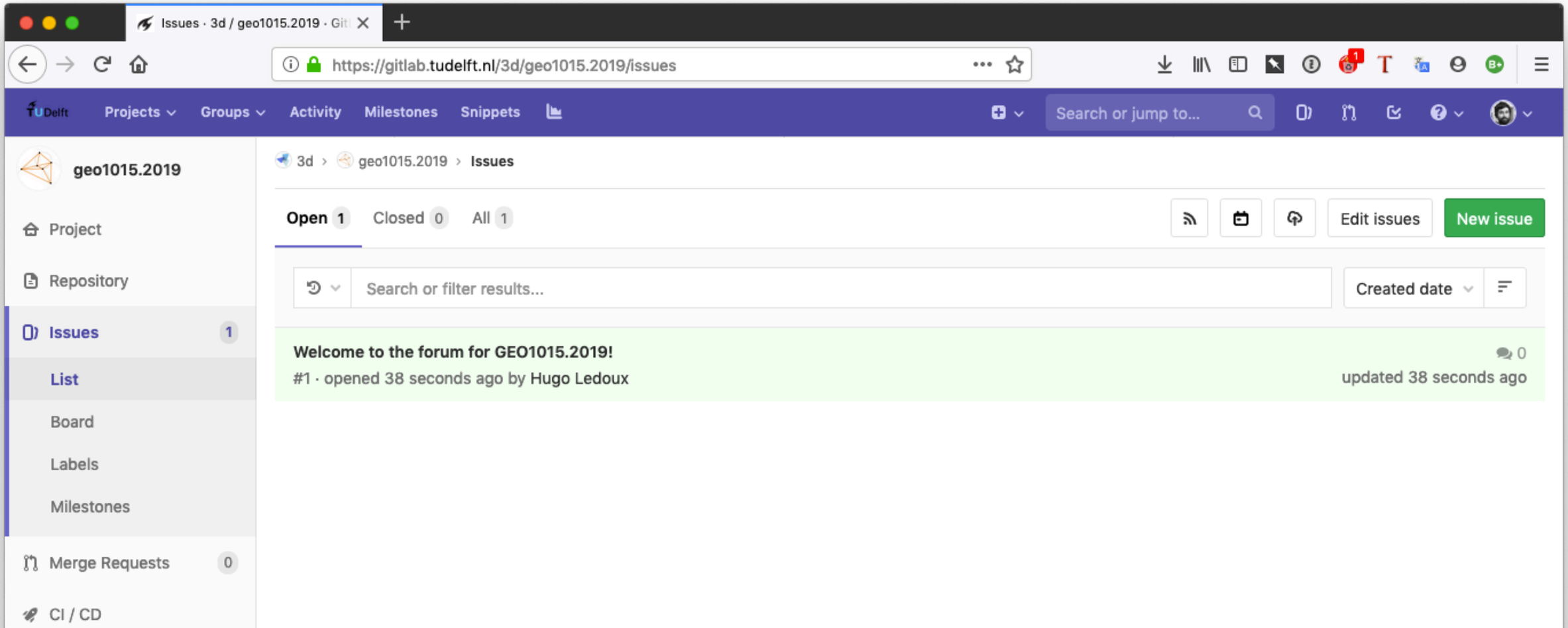
3 assignments

1. Implementation of the Delaunay triangulation & Voronoi diagram (20%)
2. Runoff modelling (15%)
3. Ground filtering from lidar datasets (20%)

All assignments involve programming in Python, and can be done in teams of 2.

Brightspace is not used

- instead: https://3d.bk.tudelft.nl/courses/geo1015/
- all announcements will be posted at https://3d.bk.tudelft.nl/courses/geo1015/news/
- questions? do *__not__* email us, we won't answer (!)
- instead use the GitLab forum: https://gitlab.tudelft.nl/3d/geo1015.2019/issues (login with NetID)



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