Package 'RCSF'

May 7, 2026

Type Package

Title Airborne LiDAR Filtering Method Based on Cloth Simulation

Version 1.0.2

Date 2020-02-04

Description
Cloth Simulation Filter (CSF) is an airborne LiDAR (Light Detection and Ranging) ground points filtering algorithm which is based on cloth simulation. It tries to simulate the interactions between the cloth nodes and the corresponding LiDAR points, the locations of the cloth nodes can be
determined to generate an approximation of the ground surface <https://www.mdpi.com/2072-4292/8/6/501/htm>.

Depends R (>= 3.1.0)

Suggests testthat

License Apache License 2.0

Encoding UTF-8

LazyData true

LinkingTo Rcpp

Imports Rcpp

RoxygenNote 7.0.2

NeedsCompilation yes

Author Jean-Romain Roussel [aut, cre, cph],
Jianbo Qi [aut, cph],
Wuming Zhang [cph],
Peng Wan [cph],
Hongtao Wang [cph],
State Key Laboratory of Remote Sensing Science, Institute of Remote Sensing Science and Engineering, Beijing Normal University [cph]

Maintainer Jean-Romain Roussel <jean-romain.roussel.1@ulaval.ca>

Repository CRAN

Date/Publication 2020-02-04 19:30:06 UTC

Contents

CSF *Airborne LiDAR filtering method based on Cloth Simulation*

Description

Airborne LiDAR filtering method of ground points based on Cloth Simulation (Zhang et al. 2016, see references). This function is an R wrapper around the library written by the orignal authors of the algorithm. The ALS point cloud is inverted, and then a rigid cloth is used to cover the inverted surface. By analyzing the interactions between the cloth nodes and the corresponding LiDAR points, the locations of the cloth nodes can be determined to generate an approximation of the ground surface.

Usage

```
CSF(
  cloud,
  sloop_smooth = FALSE,
  class_threshold = 0.5,
  cloth_resolution = 0.5,
  rigidness = 1L,
  iterations = 500L,
  time_step = 0.65
)
```

Arguments

`cloud`	data.frame with 3 columns named X Y, Z containing the coordinates of the point cloud.
`sloop_smooth`	logical. When sharp slopes exist, set this parameter to TRUE to perform a post-processing which will reduced errors.
`class_threshold`	scalar. The distance to the simulated cloth to classify point cloud into ground and non-ground. The default is 0.5.
`cloth_resolution`	scalar. The distance between paticles in cloth. This is usually set to the average distance of the points in the point cloud. The default value is 0.5.
`rigidness`	integer. The ridiness of the cloth. 1 stands for very soft cloth (to fit rugged terrain), 2 stands for medium cloth and 3 stands for hard cloth (for flat terrain). The default is 1.

iterations	integer. Maximum iteration for simulating cloth. The default value is 500. Usually, users do not need to change this.
time_step	scalar. Time step when simulating the cloth under the gravity. The default value is 0.65. Usually, Do not change this value. It is suitable for most cases.

Value

An integer vector containing the ids of the points that belong on the ground.

References

W. Zhang, J. Qi*, P. Wan, H. Wang, D. Xie, X. Wang, and G. Yan, "An Easy-to-Use Airborne LiDAR Data Filtering Method Based on Cloth Simulation", Remote Sens., vol. 8, no. 6, p. 501, 2016

Examples

```
data(rcsf_cloud)
head(rcsf_cloud)

id_ground = CSF(rcsf_cloud)
```

---

rcsf_cloud *Airborne LiDAR point cloud*

Description

A dataset containing a small point cloud aquiered with airborne LiDAR.

Usage

```
rcsf_cloud
```

Format

A data frame with 28668 rows and 3 variables:

X x coordinates

Y y coordinates

Z z coordinates

Index