CircPacker Documentation

Release 0.1.0

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Contents:

CHAPTER 1

Installation

1.1 Stable release

To install CircPacker, run this command in your terminal:

```
$ pip install circpacker
```

This is the preferred method to install CircPacker, as it will always install the most recent stable release.

If you don't have pip installed, this Python installation guide can guide you through the process.

1.2 From sources

The sources for CircPacker can be downloaded from the Github repo.

You can either clone the public repository:

```
$ git clone git://github.com/aarizatr/circpacker
```

Or download the tarball:

```
$ curl  -OL https://github.com/aarizatr/circpacker/tarball/master
```

Once you have a copy of the source, you can install it with:

```
$ python setup.py install
```

CHAPTER 2

Modules

This application software is divided into three modules. The following sections correspond to the documentation of each module that defines the structure of the aplication software.

2.1 basegeom

Module to define the `Triangle`, `Circle` and `Polygon` classes. Some properties related to the geometry of these classes are determined. These classes are the basic inputs to pack circular particles in a closed polygon in $\mathbb{R}^2$.

class basegeom.**Circle**(*center*, *radius*)

Bases: `object`

Creates an instance of an object that defines a Circle once the cartesian coordinates of its center and the radius are given.

center

(x, y)-cartesian coordinates of circle center.

Type *tuple* or *list*

radius

Length of the segment that joins the center with any point of the circumference.

Type *float* or *int*

Examples

```
>>> center, radius = (0, 0), 1
>>> circle = Circle(center, radius)
>>> circle.__dict__
{'area': 3.141592653589793,
 'center': array([0, 0]),
 'curvature': 1.0,
```

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```
 'diameter': 2,
 'perimeter': 6.283185307179586,
 'radius': 1}
```

```
>>> center, radius = (2, 5), 2.5
>>> circle = Circle(center, radius)
>>> circle.__dict__
{'area': 19.634954084936208,
'center': array([2, 5]),
'curvature': 0.4,
'diameter': 5.0,
'perimeter': 15.707963267948966,
'radius': 2.5}
```

Note: The class `Circle` requires NumPy

descartesTheorem(*circle1*, *circle2=None*)

Method to determine the tangent circles of the Descartes theorem.

To find centers of these circles, it calculates the intersection points of two circles by using the construction of triangles, proposed by Paul Bourke, 1997.

Parameters: circle1 (*circle* object): Tangent circle to the circle object intantiated. circle2 (*circle* object): Tangent circle to the circle object intantiated and to the *circle1*.

Returns Each element of the tuple is a circle object.

Return type circles (*tuple*)

Examples

```
>>> import matplotlib.pyplot as plt
>>> from basegeom import Circle
>>> # Special case Descartes' Theorem (cicle with infite radius)
>>> circle = Circle((4.405957, 2.67671461), 0.8692056336001268)
>>> circle1 = Circle((3.22694724, 2.10008003), 0.4432620600509628)
>>> c2, c3 = circle.descartesTheorem(circle1)
>>> # plotting
>>> plt.axes()
>>> plt.gca().add_patch(plt.Circle(circle.center,
                        circle.radius, fill=False))
>>> plt.gca().add_patch(plt.Circle(circle1.center,
                        circle1.radius, fill=False))
>>> plt.gca().add_patch(plt.Circle(c2.center,
                        c2.radius, fc='r'))
>>> plt.gca().add_patch(plt.Circle(c3.center,
                        c3.radius, fc='r'))
>>> plt.axis('equal')
>>> plt.show()
```

```
>>> import matplotlib.pyplot as plt
>>> from basegeom import Circle
```

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```
>>> # General case Descartes Theorem (three circle tangent mutually)
>>> circle = Circle((4.405957, 2.67671461), 0.8692056336001268)
>>> circle1 = Circle((3.22694724, 2.10008003), 0.4432620600509628)
>>> circle2 = Circle((3.77641134, 1.87408749), 0.1508620255299397)
>>> c3, c4 = circle.descartesTheorem(circle1, circle2)
>>> # plotting
>>> plt.axes()
>>> plt.gca().add_patch(plt.Circle(circle.center,
                        circle.radius, fill=False))
>>> plt.gca().add_patch(plt.Circle(circle1.center,
                        circle1.radius, fill=False))
>>> plt.gca().add_patch(plt.Circle(circle2.center,
                        circle2.radius, fill=False))
>>> plt.gca().add_patch(plt.Circle(c3.center,
                        c3.radius, fc='r'))
>>> plt.axis('equal')
>>> plt.show()
```

class basegeom.**Triangle**(*coordinates*)

Bases: object

Creates an instance of an object that defines a Triangle once the coordinates of its three vertices in cartesian $\mathbb{R}^2$ space are given.

It considers the usual notation for the triangle ABC in which *A*, *B* and *C* represent the vertices and a, b, c are the lengths of *the segments BC*, *CA* and *AB* respectively.

coordinates

Coordinates of three vertices of the triangle.

Type (3, 2) *numpy.ndarray*

Note: The class Triangle requires NumPy, SciPy and Matplotlib.

Examples

```
>>> from numpy import array
>>> from circpacker.basegeom import Triangle
>>> coords = array([(2, 1.5), (4.5, 4), (6, 2)])
>>> triangle = Triangle(coords)
>>> triangle.__dict__.keys()
dict_keys(['vertices', 'area', 'sides', 'perimeter', 'distToIncenter',
           'incircle'])
```

```
>>> from numpy import array
>>> from circpacker.basegeom import Triangle
>>> coords = array([[2, 1], [6, 1], [4, 5.5]])
>>> triangle = Triangle(coords)
>>> triangle.__dict__.keys()
dict_keys(['vertices', 'area', 'sides', 'perimeter', 'distToIncenter',
           'incircle'])
```

getGeomProperties()

Method to set the attributes to the instanced object

The established geometric attributes are the following:

- Area.
- Lenght of its three sides.
- Perimeter.
- Incircle (`Circle` Object)
- Distance of each vertice to incenter.

circInTriangle(*depth=None*, *lenght=None*, *want2plot=False*)

Method to pack circular particles within of a triangle. It apply the Descartes theorem (special and general case) to generate mutually tangent circles in a fractal way in the triangle.

Parameters

- **depth** (*int*) – Fractal depth. Number that indicate how many circles are fractally generated from the *incirle* to each vertice of the triangle.
- **lenght** (*int* or *float*) – lenght as which the recurse iteration stop because the circles diamters are smaller than lenght.
- **want2plot** (*bool*) – Variable to check if a plot is wanted. The default value is `False`.

Returns *list* that contains all the circular particles packed in the triangle.

Return type lstCirc (*list*)

Note: Large values of *depth* might produce internal variables that tend to infinte, then a `ValueError` is produced with a warning message `array must not contain infs or NaNs`.

Examples

```
>>> from numpy import array
>>> from circpacker.basegeom import Triangle
>>> coords = array([(2, 1.5), (4.5, 4), (6, 2)])
>>> triangle = Triangle(coords)
>>> cirsInTri = triangle.circInTriangle(depth=2, want2plot=True)
```

```
>>> from numpy import array
>>> from basegeom import Triangle
>>> coords = array([[1, 1.5], [6, 2.5], [4, 5.5]])
>>> triangle = Triangle(coords)
>>> cirsInTri = triangle.circInTriangle(lenght=0.5, want2plot=True)
```

plot()

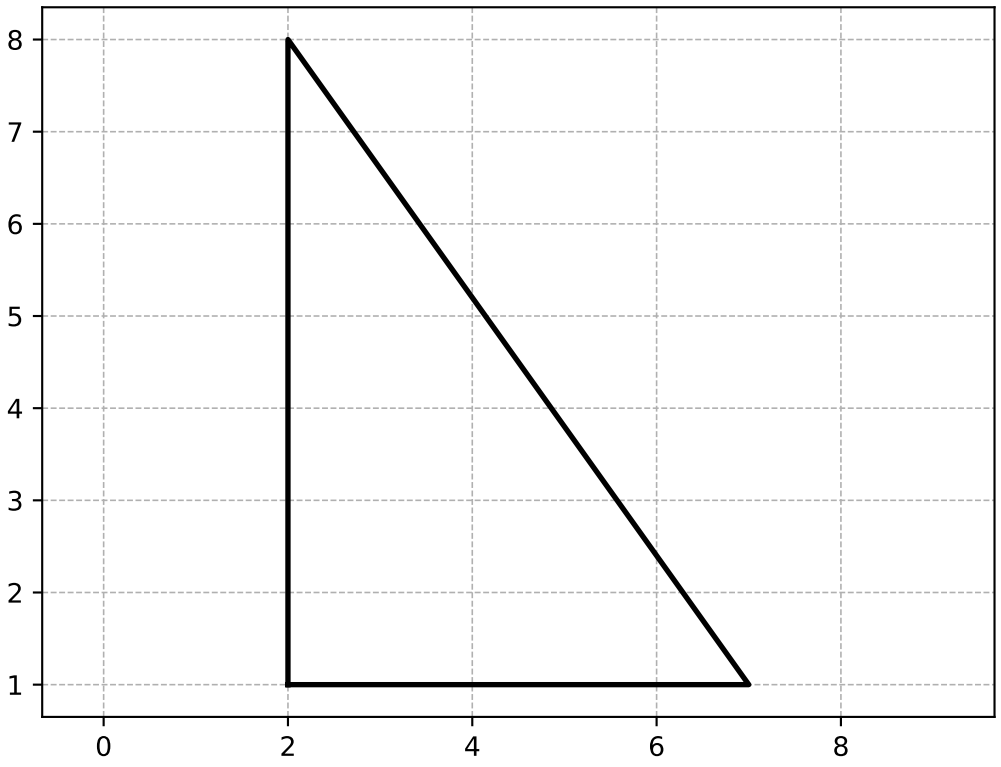
Method for show a graphic of the triangle object.

Returns object associated with a matplotlib graphic.

Return type ax (*matplotlib.axes._subplots.AxesSubplot*)

Examples

```
>>> from numpy import array
>>> from circpacker.basegeom import Triangle
>>> coords = array([(1, 1), (4, 8), (8, 5)])
>>> triangle = Triangle(coords)
>>> triangle.plot()
```



class basegeom.**Polygon**(*coordinates*)

Bases: object

Creates an instance of an object that defines a Polygon once the cartesian coordinates of its vertices are given.

coordinates

Coordinates of the vertices of the polygon.

Type (n, 2) *numpy.ndarray*

area()

Method for determine the area of the polygon.

Returns area of the polygon surface.

Return type area (*float*)

Examples

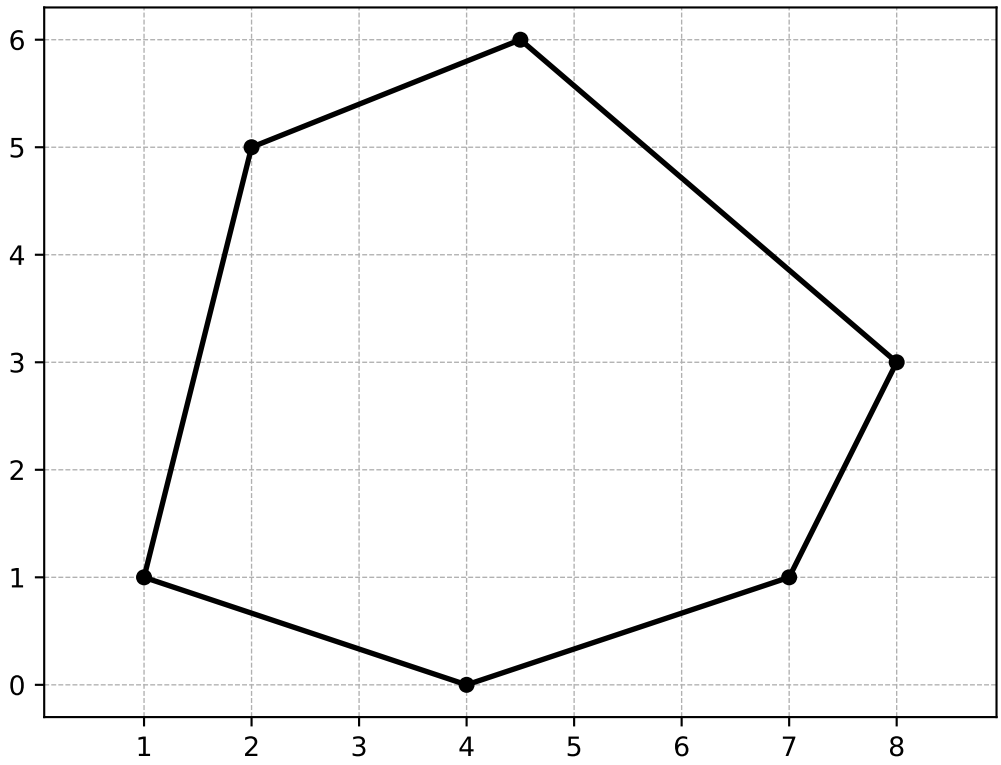
```
>>> from numpy import array
>>> from circpacker.basegeom import Polygon
>>> coords = array([(1, 1), (4, 8), (8, 5)])
>>> polygon = Polygon(coords)
>>> polygon.area
18.5
```

```
>>> from numpy import array
>>> from circpacker.basegeom import Polygon
>>> coords = array([[1, 1], [2, 5], [4.5, 6], [8, 3],
                    [7, 1], [4, 0]])
>>> polygon = Polygon(coords)
>>> polygon.area
27.5
```

plot()

Method for show the graph of the polygon.

Examples



2.2 packer

Module to define particular circular tangents in a closed polygon in $\mathbb{R}^2$.

class packer.**CircPacking**(*coordinates*, *minAngle=None*, *maxArea=None*, *length=None*, *depth=None*)

Bases: object

Creates an instance of an object that defines circular particles tangent in a fractal way inside of a closed polygon in $\mathbb{R}^2$.

coordinates
Coordinates of vertices of the polygon.

Type (n, 2) *numpy.ndarray*

depth
Depth fractal for each triangle that compose the triangular mesh. Large values of *depth* might produce internal variables that tend to infinite, then a `ValueError` is produced with a warning message `array must not contain infs or NaNs`.

Type *int*

minAngle
Minimum angle for each triangle of the Delaunay triangulation.

Type *int* or *float*

maxArea
Maximum area for each triangle of the Delaunay triangulation.

Type *int* or *float*

length
Characteristic length This variable is used to model bimsoils/bimrock. The default value is None.

Type *int* or *float*

Note: The class `CircPacking` requires NumPy, Matplotlib and Triangle

Examples

```
>>> from numpy import array
>>> from circpacker.packer import CircPacking as cp
>>> coords = array([[1, 1], [2, 5], [4.5, 6], [8, 3], [7, 1], [4, 0]])
>>> pckCircles = cp(coords, depth=5)
>>> pckCircles.__dict__.keys()
dict_keys(['coordinates', 'minAngle', 'maxArea', 'lenght', 'depth',
           'CDT', 'listCirc'])
```

triMesh()
Method to generate a triangles mesh in a polygon by using Constrained Delaunay triangulation.

Returns Vertices of each triangle that compose the triangular mesh. n means the number of triangles; (3, 2) means the index vertices and the coordinates (x, y) respectively.

Return type verts ((n, 3, 2) *numpy.ndarray*)

Examples

```
>>> from numpy import array
>>> from circpacker.basegeom import Polygon
>>> from circpacker.packer import CircPacking as cp
>>> coordinates = array([[1, 1], [2, 5], [4.5, 6], [6, 4], [8, 3],
                        [7, 1], [4.5, 1], [4, 0]])
>>> polygon = Polygon(coordinates)
>>> boundCoords = polygon.boundCoords
>>> circPack = cp(boundCoords, depth=8)
>>> verts = circPack.triMesh()
```

```
>>> from numpy import array
>>> from circpacker.basegeom import Polygon
>>> from circpacker.packer import CircPacking as cp
>>> coordinates = array([[2, 2], [2, 6], [8, 6], [8, 2]])
>>> polygon = Polygon(coordinates)
>>> boundCoords= polygon.boundCoords
>>> circPack = cp(boundCoords, depth=3)
>>> verts =  circPack.triMesh()
```

generator()

Method to generate circular particles in each triangle of the triangular mesh.

Returns *list* that contain all the circles object packed in the polygon.

Return type listCirc (*list* of Circle objects)

Examples

```
>>> from numpy import array
>>> from circpacker.packer import CircPacking as cp
>>> coords = array([[2, 2], [2, 6], [8, 6], [8, 2]])
>>> circPack = cp(coords, depth=4)
>>> lstCircles = circPack.generator() # list of circles
```

plot(*plotTriMesh=False*)

Method for show a graphic of the circles generated within of the polyhon.

Parameters **plotTriMesh** (*bool*) – Variable to check if it also want to show the graph of the triangles mesh. The default value is `False`

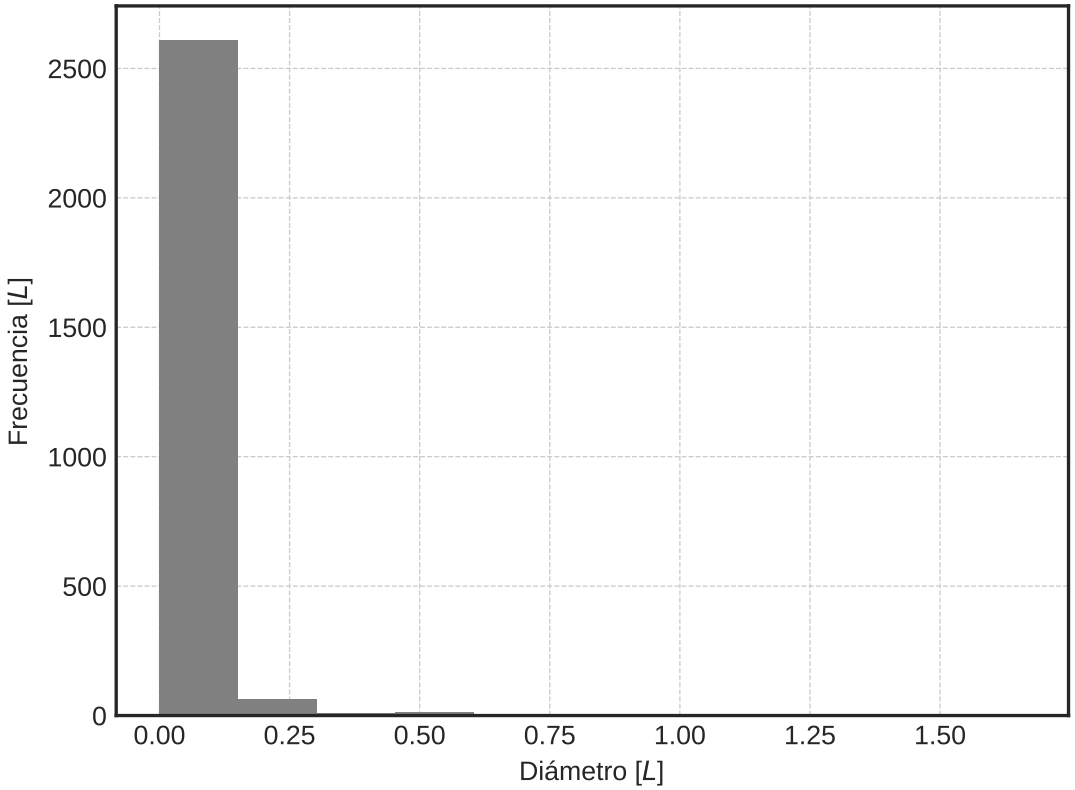
Examples

```
>>> from numpy import array
>>> from circpacker.basegeom import Polygon
>>> from circpacker.packer import CircPacking as cp
>>> coordinates = array([[1, 1], [2, 5], [4.5, 6], [6, 4], [8, 3],
                        [7, 1], [4.5, 1], [4, 0]])
>>> polygon = Polygon(coordinates)
>>> boundCoords = polygon.boundCoords
>>> pckCircles = cp(boundCoords, depth=8)
>>> pckCircles.plot()
```

```
>>> from circpacker.slopegeometry import AnthropicSlope
>>> from circpacker.packer import CircPacking as cp
>>> slopeGeometry = AnthropicSlope(12, [1, 1.5], 10, 10)
>>> boundCoords = slopeGeometry.boundCoords
>>> pckCircles = cp(boundCoords, depth=3)
>>> pckCircles.plot(plotTriMesh=True)
```

frecHist()
Method to show the histogram of the diameters of the circular particles packed in a closed polygon in $\mathbb{R}^2$.

Examples

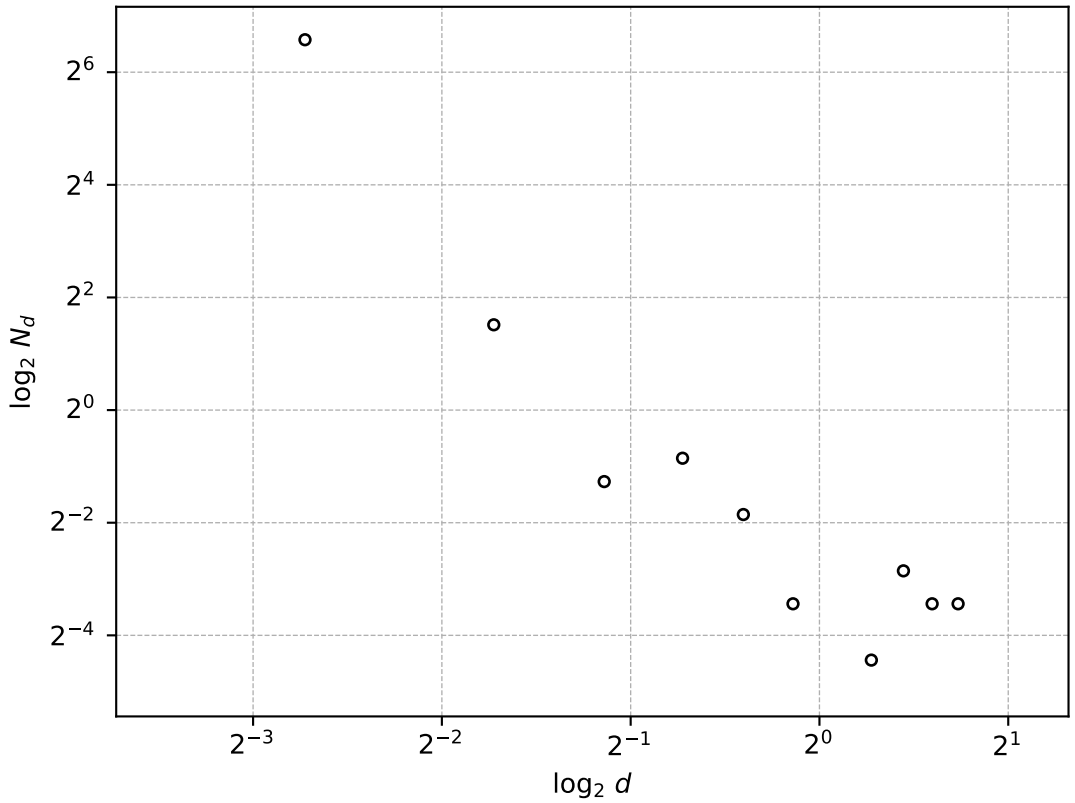


logDiagram()
Method to show the log-log graph of the diameters and quantities of circular particles packed in a closed polygon in $\mathbb{R}^2$.

Examples

2.3 slopegeometry

Module for defining the class related to the slope geometry.


2^{6}
2^{4}
2^{2}
2^{0}
2^{-2}
2^{-4}
$\log_2 N_d$
2^{-3}
2^{-2}
2^{-1}
2^{0}
2^{1}
$\log_2 d$

class slopegeometry.**AnthropicSlope**(*slopeHeight*, *slopeDip*, *crownDist*, *toeDist*, *maxDepth=None*)

Bases: object

Creates an instance of an object that defines the geometrical frame of the slope to perform the analysis.

The geometry of the slope is as follow:

- It is a right slope, i.e. its face points to the right side.
- Crown and toe planes are horizontal.
- The face of the slope is continuous, ie, it has not berms.

slopeHeight
Height of the slope, ie, vertical length betwen crown and toe planes.

Type *int* or *float*

slopeDip
Both horizontal and vertical components of the slope inclination given in that order.

Type (2,) *tuple*, *list* or *numpy.ndarray*

crownDist
Length of the horizontal plane in the crown of the slope.

Type *int* or *float*

toeDist
Length of the horizontal plane in the toe of the slope.

Type *int* or *float*

maxDepth
Length of the maximum depth the slope can reach.

Type *int* or *float* or *None*

Note: The class slopegeometry requires NumPy and Matplotlib.

Examples

```
>>> slopeGeometry = AnthropicSlope(12, [1, 1.5], 10, 10)
>>> slopeGeometry.__dict__.keys()
dict_keys(['slopeHeight', 'slopeDip', 'crownDist', 'toeDist',
           'maxDepth', 'boundCoords'])
```

maxDepth()
Method to obtain the maximum depth of a slope where a circular slope failure analysis can be performed.

The maximum depth is such that the biggest circle satisfished the following conditions:

- It is tangent to the bottom.
- crosses both the extreme points at the crown and toe.
- It is orthogonal to the crown plane.

Returns Maximum depth of the slope measured vertically from the toe plane.

Return type maxDepth (*int* or *float*)

Examples

```
>>> slopeGeometry = AnthropicSlope(12, [1, 1.5], 10, 10)
>>> slopeGeometry.maxDepth()
4.571428571428573
```

defineBoundary()

Method to obtain the coordinates of the boundary vertices of the slope and plot it if it is wanted.

The origin of the coordinates is in the corner of the bottom with the back of the slope. The coordinates define a close polygon, ie, the first pair of coordinates is the same than the last one.

Returns Coordinates of the boundary vertices of the slope.

Return type (*numpy.ndarray*)

Examples

```
>>> slopeGeometry = AnthropicSlope(12, [1, 1.5], 10, 10)
>>> slopeGeometry.defineBoundary()
array([[  0.        ,   0.        ],
       [ 28.        ,   0.        ],
       [ 28.        ,   4.57142857],
       [ 18.        ,   4.57142857],
       [ 10.        ,  16.57142857],
       [  0.        ,  16.57142857],
       [  0.        ,   0.        ]])
```

plotSlope()

Method for generating a graphic of the slope boundary.

Examples

```
>>> slopeGeometry = AnthropicSlope(12, [1, 1.5], 10, 10)
>>> slopeGeometry.plotSlope()
```

class slopegeometry.**NaturalSlope**(*surfaceCoords*)

Bases: object

Creates an instance of an object that defines the geometrical frame of the slope to perform the analysis.

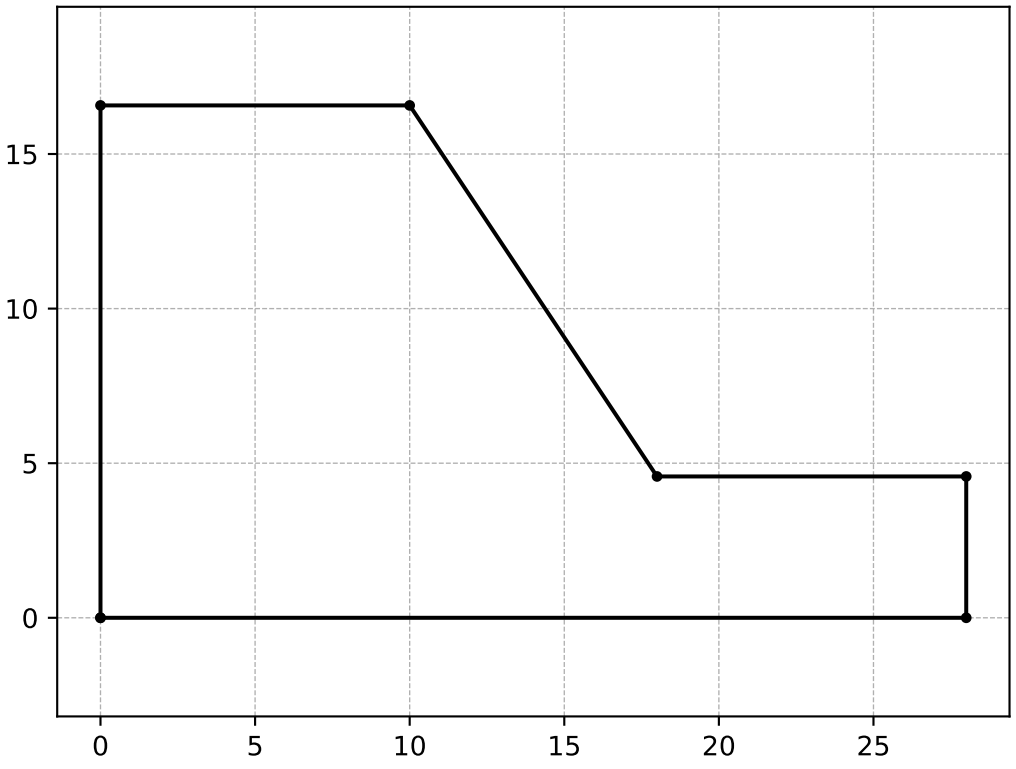
The geometry of the slope is as follow:

- It is a right slope, i.e. its face points to the right side.
- The slope is defined with its surface's coordinates.
- The surface is defined as a polyline such that each segment's slope are always zero or negative.
- The coordinates' order is such that the highest (and leftmost) point is the first one, and the lowest (and rightmost) is the last one.

surfaceCoords

Coordinates of the surface's vertices of the slope.

Type *numpy.ndarray*


15
10
5
0
0
5
10
15
20
25

Note: The class `NaturalSlope` requires NumPy and Matplotlib.

Examples

```
>>> from numpy import array
>>> surfaceCoords = array([[  0.        ,  16.57142857],
                           [ 10.        ,  16.57142857],
                           [ 18.        ,   4.57142857],
                           [ 28.        ,   4.57142857],
                           [ 28.        ,   0.        ]])
>>> slopeGeometry = NaturalSlope(surfaceCoords)
>>> slopeGeometry.__dict__.keys()
dict_keys(['surfaceCoords', 'slopeHeight', 'maxDepth', 'boundCoords'])
```

maxDepth()

Method to obtain the maximum depth of a slope where a circular slope failure analysis can be performed.

The maximum depth is such that the biggest circle satisfished the following conditions:

- It is tangent to the bottom.
- crosses both the extreme points at the crown and toe.
- It is orthogonal to the crown plane.

Returns Maximum depth of the slope measured vertically from the toe plane.

Return type maxDepth (*int* or *float*)

Examples

```
>>> from numpy import array
>>> surfaceCoords = array([[  0.        ,  16.57142857],
                           [ 10.        ,  16.57142857],
                           [ 18.        ,   4.57142857],
                           [ 28.        ,   4.57142857]])
>>> slopeGeometry = NaturalSlope(surfaceCoords)
>>> slopeGeometry.maxDepth()
4.571428571428573
```

defineBoundary()

Method to obtain the coordinates of the boundary vertices of the slope and plot it if it is wanted.

The origin of the coordinates is in the corner of the bottom with the back of the slope. The coordinates define a close polygon, ie, the first pair of coordinates is the same than the last one.

Returns Coordinates of the boundary vertices of the slope.

Return type (*numpy.ndarray*)

Examples

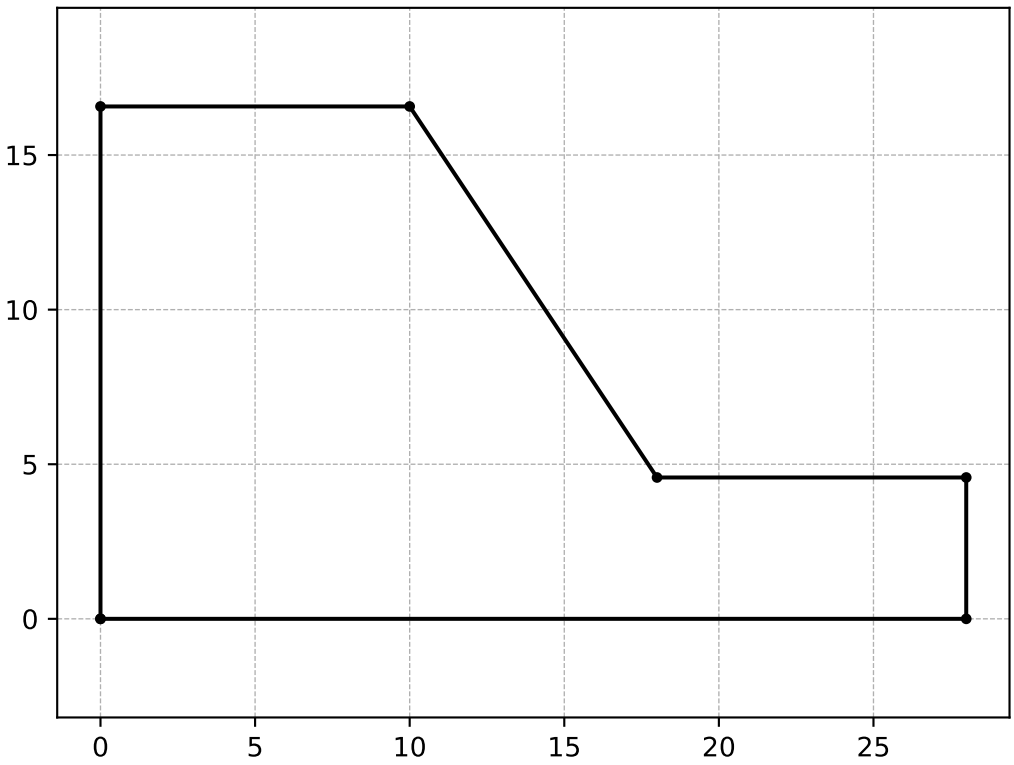
```
>>> from numpy import array
>>> surfaceCoords = array([[  0.        ,  16.57142857],
                           [ 10.        ,  16.57142857],
                           [ 18.        ,   4.57142857],
                           [ 28.        ,   4.57142857]])
>>> slopeGeometry = NaturalSlope(surfaceCoords)
>>> slopeGeometry.defineBoundary()
array([[  0.        ,   0.        ],
       [  0.        ,  16.57142857],
       [ 10.        ,  16.57142857],
       [ 18.        ,   4.57142857],
       [ 28.        ,   4.57142857],
       [ 28.        ,   0.        ],
       [  0.        ,   0.        ]])
```

```
>>> from numpy import array
>>> surfaceCoords = array([[-2.4900, 18.1614],
                           [0.1022, 17.8824],
                           [1.6975, 17.2845],
                           [3.8909, 15.7301],
                           [5.8963, 14.3090],
                           [8.1183, 13.5779],
                           [9.8663, 13.0027],
                           [13.2865, 3.6058],
                           [20.2865, 3.6058],
                           [21.4347, 3.3231],
                           [22.2823, 2.7114],
                           [23.4751, 2.2252],
                           [24.6522, 1.2056],
                           [25.1701, 0.2488]])
>>> slopeGeometry = NaturalSlope(surfaceCoords)
>>> slopeGeometry.defineBoundary()
array([[  0.00000000e+00,   0.00000000e+00],
       [  0.00000000e+00,   1.96301237e+01],
       [  2.59220000e+00,   1.93511237e+01],
       [  4.18750000e+00,   1.87532237e+01],
       [  6.38090000e+00,   1.71988237e+01],
       [  8.38630000e+00,   1.57777237e+01],
       [  1.06083000e+01,   1.50466237e+01],
       [  1.23563000e+01,   1.44714237e+01],
       [  1.57765000e+01,   5.07452373e+00],
       [  2.27765000e+01,   5.07452373e+00],
       [  2.39247000e+01,   4.79182373e+00],
       [  2.47723000e+01,   4.18012373e+00],
       [  2.59651000e+01,   3.69392373e+00],
       [  2.71422000e+01,   2.67432373e+00],
       [  2.76601000e+01,   1.71752373e+00],
       [  2.76601000e+01,   6.66133815e-16],
       [  0.00000000e+00,   0.00000000e+00]])
```

plotSlope()
Method for generating a graphic of the slope boundary.

Examples

```
>>> from numpy import array
>>> surfaceCoords = array([[  0.        ,  16.57142857],
                           [ 10.        ,  16.57142857],
                           [ 18.        ,   4.57142857],
                           [ 28.        ,   4.57142857]])
>>> slopeGeometry = NaturalSlope(surfaceCoords)
>>> slopeGeometry.plotSlope()
```




```
>>> from numpy import array
>>> surfaceCoords = array([[-2.4900, 18.1614],
                           [0.1022, 17.8824],
                           [1.6975, 17.2845],
                           [3.8909, 15.7301],
                           [5.8963, 14.3090],
                           [8.1183, 13.5779],
                           [9.8663, 13.0027],
                           [13.2865, 3.6058],
                           [20.2865, 3.6058],
                           [21.4347, 3.3231],
                           [22.2823, 2.7114],
                           [23.4751, 2.2252],
                           [24.6522, 1.2056],
```

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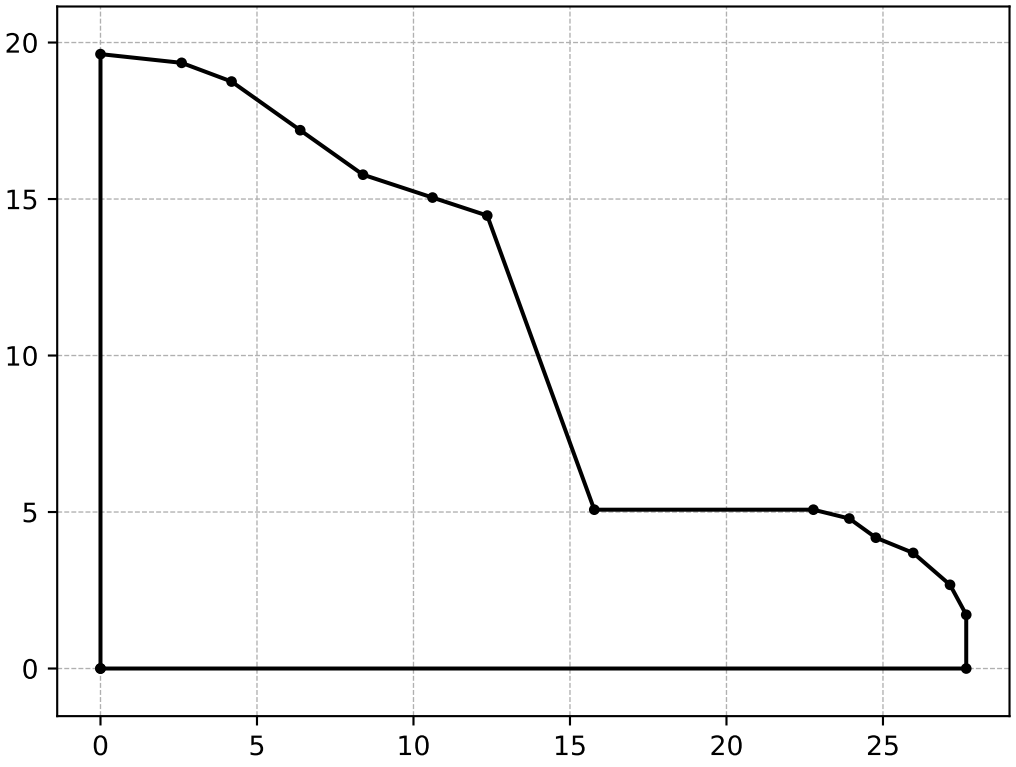
```
                            [25.1701, 0.2488]])
>>> slopeGeometry = NaturalSlope(surfaceCoords)
>>> slopeGeometry.plotSlope()
```



CHAPTER 3

Usage

To use CircPacker in a project:

```
import circpacker
```

CHAPTER 4

Credits

4.1 Development Lead

- Andres Ariza-Triana (@*aarizatr*)

4.2 Contributors

None yet. Why not be the first?

CHAPTER 5

History

5.1 1.0.0 (2019-05-18)

- First release on PyPI.

CHAPTER 6

Contributing

Contributions are welcome, and they are greatly appreciated! Every little bit helps, and credit will always be given.

You can contribute in many ways:

6.1 Types of Contributions

6.1.1 Report Bugs

Report bugs at https://github.com/aarizatr/circpacker/issues.

If you are reporting a bug, please include:

- Your operating system name and version.
- Any details about your local setup that might be helpful in troubleshooting.
- Detailed steps to reproduce the bug.

6.1.2 Fix Bugs

Look through the GitHub issues for bugs. Anything tagged with "bug" and "help wanted" is open to whoever wants to implement it.

6.1.3 Implement Features

Look through the GitHub issues for features. Anything tagged with "enhancement" and "help wanted" is open to whoever wants to implement it.

6.1.4 Write Documentation

CircPacker could always use more documentation, whether as part of the official CircPacker docs, in docstrings, or even on the web in blog posts, articles, and such.

6.1.5 Submit Feedback

The best way to send feedback is to file an issue at https://github.com/aarizatr/circpacker/issues.

If you are proposing a feature:

- Explain in detail how it would work.
- Keep the scope as narrow as possible, to make it easier to implement.
- Remember that this is a volunteer-driven project, and that contributions are welcome :)

6.2 Get Started!

Ready to contribute? Here's how to set up *circpacker* for local development.

1. Fork the *circpacker* repo on GitHub.
2. Clone your fork locally:

```
$ git clone git@github.com:your_name_here/circpacker.git
```

3. Install your local copy into a virtualenv. Assuming you have virtualenvwrapper installed, this is how you set up your fork for local development:

```
$ mkvirtualenv circpacker
$ cd circpacker/
$ python setup.py develop
```

4. Create a branch for local development:

```
$ git checkout -b name-of-your-bugfix-or-feature
```

   Now you can make your changes locally.

5. When you're done making changes, check that your changes pass flake8 and the tests, including testing other Python versions with tox:

```
$ flake8 circpacker tests
$ python setup.py test or py.test
$ tox
```

   To get flake8 and tox, just pip install them into your virtualenv.

6. Commit your changes and push your branch to GitHub:

```
$ git add .
$ git commit -m "Your detailed description of your changes."
$ git push origin name-of-your-bugfix-or-feature
```

7. Submit a pull request through the GitHub website.

6.3 Pull Request Guidelines

Before you submit a pull request, check that it meets these guidelines:

1. The pull request should include tests.
2. If the pull request adds functionality, the docs should be updated. Put your new functionality into a function with a docstring, and add the feature to the list in README.rst.
3. The pull request should work for Python 2.7, 3.4, 3.5 and 3.6, and for PyPy. Check https://travis-ci.org/aarizatr/circpacker/pull_requests and make sure that the tests pass for all supported Python versions.

6.4 Tips

To run a subset of tests:

```
$ py.test tests.test_circpacker
```

6.5 Deploying

A reminder for the maintainers on how to deploy. Make sure all your changes are committed (including an entry in HISTORY.rst). Then run:

```
$ bumpversion patch # possible: major / minor / patch
$ git push
$ git push --tags
```

Travis will then deploy to PyPI if tests pass.

CHAPTER 7

Links

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- GitHub

CHAPTER 8

Indices and tables

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CHAPTER 9

License and Copyright

Python Module Index

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