

Storm Surge KML, Warning and Notification Generation Documentation

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Chapter 1

Class Index

1.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

surgewarnings.MaxKmlGenerator	3
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Chapter 2

Class Documentation

2.1 `surgewarnings.MaxKmlGenerator` Class Reference

Public Member Functions

- `def __init__ (self, fort14, maxelev63, typhoonName, eventId, MaxSurgeld, outputDir, shapeFile, filt)`
- `def extractFieldnames (self, sf)`
- `def filterNodes (self, parts, geom, X, Y, paths, insides)`
- `def writeToKml (self)`

Public Attributes

- **fort14**
- **maxelev63**
- **typhoonName**
- **eventId**
- **MaxSurgeld**
- **outputDir**
- **shapeFile**
- **filt**

2.1.1 Detailed Description

Responsible for creating kml files for visualization in website.

2.1.2 Constructor & Destructor Documentation

2.1.2.1 `def surgewarnings.MaxKmlGenerator.__init__(self, fort14, maxelev63, typhoonName, eventId, MaxSurgeld, outputDir, shapeFile, filt)`

Warnings Initialization.

Initialized given arguments and performs preliminary procedures before warning generations.

Parameters

```
-----
shape_file : .shp file
             .shp file for towns/municipalities/cities.
shape2_file : .shp file
             .shp file for barangays.
shape3_file : .shp file
             .shp file for provinces.
```

```

filt : string
    scope of warnings(province level)
fort_14 : fort.14 file
    This file includes topography/bathymetry of a bounded area.
    It also includes the meshes and boundaries needed for the warning generations.
fort_15 : fort.15 file
    model parameter and boundary information file
maxelev63: maxele.63 file
    This file describes provides the maximum elevations at a particular node in the mesh provided by fort_14
fort_63 : fort.63 file
    This include time-series information on the nodes.
radiusOffset : integet/float
    (not needed for now)
neighborFilesDir : string(directory path)
    This path is needed the .neighbors file to be used for town notifications.
    .neighbor files are files that provides the neighbors of a town in a particular province(filt)

```

The documentation for this class was generated from the following file:

- C:/Users/user/Desktop/CreatedModules/surgewarnings/surgewarnings/___init___py

2.2 surgewarnings.Warnings Class Reference

Public Member Functions

- def `__init__` (self, shape_file, shape2_file, shape3_file, filt, fort_14, fort_15, maxelev63, fort_63, radiusOffset, neighborFilesDir)
- def `__str__` (self)
- def `getCenter` (self, arr)
- def `findMaxDist` (self, a, arr)
- def `extractFieldNames` (self, sf)
- def `findCandidatePoints` (self, center, maxDist, candidatePoints, candidatePoints_index)
- def `updateWarnings` (self, pointIndexInsideGeom, town_name)
- def `updateNotifications` (self)
- def `createNeighborFile` (self)
- def `filterNodes` (self, parts, geom, candidatePoints, paths, insides)
- def `getBarangayOfHighestSurge` (self, townFilter, xCoordOfMaxElev, yCoordOfMaxElev)
- def `getShoreline` (self, townGeom)
- def `updateShorelineWarnings` (self, shoreline, candidatePoints, candidatePoints_index)
- def `generateWarnings` (self)
- def `writeToFile` (self, directory)
- def `getEarliestSurge` (self)
- def `getBarangayOfEarliestSurge` (self, directory)

Public Attributes

- `shape_file`
- `shape2_file`
- `shape3_file`
- `filt`
- `fort_14`
- `fort_15`
- `maxelev63`
- `fort_63`
- `radiusOffset`
- `neighborFilesDir`
- `sf`

- **sf2**
- **sf3**
- **NM**
- **ETA**
- **warnings**
- **notifications**
- **earliestSurges**
- **X**
- **Y**

2.2.1 Detailed Description

Responsible for creating storm surge warnings and notification up to the town level of a given province.

2.2.2 Constructor & Destructor Documentation

2.2.2.1 `def surgewarnings.Warnings.__init__(self, shape_file, shape2_file, shape3_file, filt, fort_14, fort_15, maxelev63, fort_63, radiusOffset, neighborFilesDir)`

Warnings Initialization.

Initialized given arguments and performs preliminary procedures before warning generations.

Parameters

```

-----
shape_file : .shp file
            .shp file for towns/municipalities/cities.
shape2_file : .shp file
            .shp file for barangays.
shape3_file : .shp file
            .shp file for provinces.
filt : string
      scope of warnings(province level)
fort_14 : fort.14 file
      This file includes topography/bathymetry of a bounded area.
      It also includes the meshes and boundaries needed for the warning generations.
fort_15 : fort.15 file
      model parameter and boundary information file
maxelev63: maxele.63 file
      This file describes provides the maximum elevations at a particular node in the mesh provided by fort_14
fort_63 : fort.63 file
      This include time-series information on the nodes.
radiusOffset : integet/float
      (not needed for now)
neighborFilesDir : string(directory path)
      This path is needed the .neighbors file to be used for town notifications.
      .neighbor files are files that provides the neighbors of a town in a particular province(filt)

```

2.2.3 Member Function Documentation

2.2.3.1 `def surgewarnings.Warnings.createNeighborFile(self)`

Create a neighbor file for a given province.

For two town;town A and town B, if there exist a point from its polygons that are the same, then townA is a neighbor of townB.

Neighbor are in the format:

```

<Town> [Neighboring Towns]*
....
....
....

```

This neighbor file will be use to determine which are towns are beside a town with storm-surge warnings.

Parameters

Returns

2.2.3.2 def surgewarnings.Warnings.extractFieldNames(self, sf)

Gets the attributes of self.shape_file

Parameters

sf : shapefile.Reader instance
shapefile parser

Returns

list
returns the list of attributes of self.shape_file

2.2.3.3 def surgewarnings.Warnings.filterNodes(self, parts, geom, candidatePoints, paths, insides)

Finds all the points in a given list of points that are inside a polygon.
For all closed paths. Filter all the points in candidatePoints that are inside that closed paths.

Parameters

Returns

2.2.3.4 def surgewarnings.Warnings.findCandidatePoints(self, center, maxDist, candidatePoints, candidatePoints_index)

Finds all the points that is within a specific range relative to a certain point.
It measures all the distances of each the points in self.fort_14 and appended it to a list.
if its less than or equal to a certain distance. Index of appeded points is also appended to another list.
This function filters all the points that could be included in the generation of warnings and thus minimized the search area later on for determining if certain points are inside a polygon.

Parameters

center : 2-tuple
the reference point in which to measure the distance to all the points in (self.X,self.Y)
maxDist : float
the maximum distance from a point in self.X,self.Y to center to be included in candidatePoints
candidatePoints: list
stores all the included points
candidatePoints_index : list
stores all the indexes of all the included points in candidatePoints

Returns

(results are returned in candidatePoints and candidatePoints_index)

2.2.3.5 def surgewarnings.Warnings.findMaxDist(self, a, arr)

Gets the distance of the farthest point from the center of a list of points.
findMaxDist helps in optimizing the search process in determining the points that are inside a polygon.

Parameters

a : 2-tuple
center of all the points in arr
arr: list
list of points

Returns

float

returns the distance of the farthest point included in arr relative to a

2.2.3.6 def surgewarnings.Warnings.generateWarnings(self)

Generates and provides warnings/notifications to affected areas/towns of a certain province.

This function consolidates all the warnings, notifications and shoreline warnings and serves as a main umbrella functions for the different methods in this class.

The function work as follow:

For each town, it will search for all candidatePoints for warnings, notifications etc.

If there are candidatePoints, it filters the nodes, and finds if there are points inside

the towns geometry. If there are points inside geomtry, it updates the warnings and notifications array.

If there are no points inside the town's geomtetry, then it will update warnings for the shoreline.

If there are no candidatePoints, do nothing.

Parameters

Returns

2.2.3.7 def surgewarnings.Warnings.getBarangayOfEarliestSurge(self, directory)

Gets the the barangay location of the earliest surge

Parameters

Returns

2.2.3.8 def surgewarnings.Warnings.getBarangayOfHighestSurge(self, townFilter, xCoordOfMaxElev, yCoordOfMaxElev)

Finds the location of the highest surge in specific town.

Parameters

parts : list

list of index of points that divides a certain geometry. (Shapes in a certain town can have multiple Geomet

townFilter : string

town/city of interest

xCoordOfMaxElev : float

x coordinate of highest surge

yCoordOfMaxElev : float

y coordinate of highest surge

Returns

barangay_name : string

returns the barangay_name of the point (xCoordOfMaxElev.yCoordOfMaxElev) is located.

2.2.3.9 def surgewarnings.Warnings.getCenter(self, arr)

Gets the center of a list of points.

Parameters

arr : list

list of points

Returns

```

-----
    2-tuple
returns the center of all points in arr

```

2.2.3.10 def surgewarnings.Warnings.getEarliestSurge (self)

Get the earliest surge found in a town.

Parameters

Returns

2.2.3.11 def surgewarnings.Warnings.getShoreline (self, townGeom)

Finds the shoreline of a specific town. It finds all the list of points in a town's geometry that is beside the province. This would be achieved by getting the intersection of points, between the town and the province.

Note : This code works for provinces, beside the sea. This assumption would be reasonable because of the underlying physics of storm surge.

Parameters

townGeom : list

list of points that bounds a specific town.

Returns

returns the shoreline of that town. To be specific, the set containing the intersection of the town and the province.

2.2.3.12 def surgewarnings.Warnings.updateNotifications (self)

Finds all the neighbors of all the towns with storm surge warnings within a given province.

First it will find if there is .neighbor file for the given province.

If none, it will create .neighbor file for that province.

Creation of .neighbor file is as follow:

For two town; town A and town B, if there exist a point from its polygons that are the same, then townA is a neighbor of townB.

This neighbor file will be used to determine which towns are beside a town with storm-surge warnings.

*add more documentation, this is still not complete

Parameters

Returns

2.2.3.13 def surgewarnings.Warnings.updateShorelineWarnings (self, shoreline, candidatePoints, candidatePoints_index)

Finds the best and most accurate predicted water elevation measure within 1 km of a town's shoreline.

It works as follow:

For each candidate point, if there exist a point in shoreline such that the distance

between the candidate point and that point is the shoreline is within 1000 meters,

append the water elevation of that candidate point to the list of water elevation near shoreline.

Find the maximum value of the list and return.

Parameters

shoreline : list

list of points corresponding to the shoreline of a specific town.

candidatePoints : list

list of points which a specific town that is a potential water elevation near shoreline warning.

candidatePoints_index: list

list of integers that will be used to access the water elevation measurement of a certain point in candidatePoints

Returns

This function returns the maximum elevation in a list of potential water elevation near shoreline warnings

2.2.3.14 def surgewarnings.Warnings.updateWarnings (self, pointIndexInsideGeom, town_name)

Adds a town, its maximum predicted water elevation measure and its barangay of origin to self.warnings. Given all the points inside a given town, it finds the maximum water elevation measure among this points. It gets the coordinate of the founded maximum water elevation measure. All points inside a given town are then removed from self.X, self.Y (to minimized search areas for next iterations). With the founded coordinates, it will find which barangay the coordinates are in. The town name, the maximum water elevation measure and its barangay of origin are now then included in the list of warnings.

Parameters

pointIndexInsideGeom : list

Index of all the points included in the polygon of town_name

town_name : string

name of the given town

Returns

2.2.3.15 def surgewarnings.Warnings.writeToFile (self, directory)

Writes warning to a file with filename <province>.warnings, <province>.notifications.

Parameters

directory : string

path to where to place the output file.

Returns

The documentation for this class was generated from the following file:

- C:/Users/user/Desktop/CreatedModules/surgewarnings/surgewarnings/__init__.py

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