

# 06\_\_Orientation\_\_towards\_\_wind

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## 1 Measure orientation of seashore streets in relation to SW wind

Computational notebook 06 for *NAME* Dal Cin, Fleischmann.. - ADD Reference.

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This notebook computes deviation of seashore street orientation from SW wind direction (45 degrees).

Requires attribute `case` in `name_str` capturing which LineStrings form the seashore street itself. (1 - True) (already used in `03_Calculate_contextual_characters.ipynb`).

Structure of GeoPackages:

```
./data/
  atlantic.gpkg
    name_blg    - Polygon layers
    name_str    - LineString layers
    name_case   - Polygon layers
    name_tess   - Polygon layers
    name_blocks - Polygon layers
    ...
  preatl.gpkg
    name_blg
    name_str
    name_case
    ...
  premed.gpkg
    name_blg
    name_str
    name_case
    ...
  med.gpkg
    name_blg
    name_str
    name_case
    ...
```

CRS of the original data is EPSG:3763.

```
<Projected CRS: EPSG:3763>
Name: ETRS89 / Portugal TM06
Axis Info [cartesian]:
- X[east]: Easting (metre)
- Y[north]: Northing (metre)
Area of Use:
- name: Portugal - mainland - onshore
- bounds: (-9.56, 36.95, -6.19, 42.16)
Coordinate Operation:
- name: Portugual TM06
- method: Transverse Mercator
Datum: European Terrestrial Reference System 1989
- Ellipsoid: GRS 1980
- Prime Meridian: Greenwich
```

```
[1]: import fiona
import geopandas as gpd
import shapely
import numpy as np
import pandas as pd
```

```
[2]: fiona.__version__, gpd.__version__, shapely.__version__, np.__version__, pd.
    ↪ __version__
```

```
[2]: ('1.8.13', '0.7.0', '1.7.0', '1.18.1', '1.0.3')
```

```
[ ]: from shapely.ops import linemerge

def wind_issue(line, wind_angle=45):
    coords = line.coords
    angle = np.arctan2(coords[-1][0] - coords[0][0], coords[-1][1] -
    ↪ coords[0][1])
    az = np.degrees(angle)

    if az < wind_angle:
        az += 180
    az -= wind_angle
    if az < 0:
        az = az * -1
    if 90 < az <= 180:
        diff = az - 90
        az = az - 2 * diff
    return az / 90

wind = pd.DataFrame(columns=['place', 'winddev'])
```

```

ix = 0

parts = ['atlantic', 'preatl', 'premed', 'med']

for part in parts:
    path = folder + part + '.gpkg'
    layers = [x[:-4] for x in fiona.listlayers(path) if 'blg' in x]
    for l in layers:
        streets = gpd.read_file(path, layer=l + '_str')
        seashore = streets[streets.case == 1].geometry.to_list()
        merged = linemerge(seashore)
        if merged.type != 'LineString':
            dims = {}
            for i, seg in enumerate(merged):
                dims[i] = seg.length
            key = max(dims, key=dims.get)
            wind.loc[ix] = [l, wind_issue(merged[key])]
            ix += 1
        else:
            wind.loc[ix] = [l, wind_issue(merged)]
            ix += 1

```

```

[ ]: wind.to_csv(folder + 'wind_relation.csv')

```