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118CS0597
Soft Computing Lab – III
24th January 2022

Code:

```
import numpy as np
from sompy.sompy import SOMFactory
import pandas as pd
import glob
import os


if __name__ == '__main__':
    path = '.'
    all_files = glob.glob(os.path.join(path, "*.csv"))

    df_from_each_file = (pd.read_csv(f, skiprows = 31) for f in all_files)
    concatenated_df   = pd.concat(df_from_each_file, ignore_index=True)

    data = concatenated_df[['Lat', 'Long', 'Tm', 'Tx', 'Tn', 'P']]
    data = data.apply(pd.to_numeric,  errors='coerce')
    data = data.dropna(how='any')
    names = ['Latitude', "longitude", 'Monthly Median temperature (C)','Monthly Max temperature (C)',
'Monthly Min temperature (C)', 'Monthly total precipitation (mm)']

    print(data.head())

    sm = SOMFactory().build(data.values, normalization = 'var', initialization='pca',
component_names=names)
    sm.train(n_job=1, verbose=False, train_rough_len=2, train_finetune_len=5)

    topographic_error = sm.calculate_topographic_error()
    quantization_error = np.mean(sm._bmu[1])
    print ("Topographic error = %s; Quantization error = %s" % (topographic_error,
quantization_error))

    from sompy.visualization.mapview import View2D
    view2D  = View2D(10,10,"rand data",text_size=12)
    view2D.show(sm, col_sz=4, which_dim="all", desnormalize=True)

    from sompy.visualization.umatrix import UMatrixView

    umat  = UMatrixView(width=10,height=10,title='U-matrix')
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umat.show(sm)

from sompy.visualization.hitmap import HitMapView
K = 20
K_opt = 18
[labels, km, norm_data] = sm.cluster(K,K_opt)
hits  = HitMapView(20,20,"Clustering",text_size=12)
a=hits.show(sm)

import gmplot

gmap = gmplot.GoogleMapPlotter(54.2, -124.875224, 6)
j = 0
for i in km.cluster_centers_:
    gmap.marker(i[0],i[1],'red', title="Centroid " + str(j))
    j += 1

gmap.draw("centroids_map.html")


from bs4 import BeautifulSoup

def insertapikey(fname, apikey):
    def putkey(htmltxt, apikey, apistring=None):
        if not apistring:
            apistring = "https://maps.googleapis.com/maps/api/js?key=%s&callback=initMap"
        soup = BeautifulSoup(htmltxt, 'html.parser')
        body = soup.body
        src = apistring % (apikey, )
        tscript = soup.new_tag("script", src=src, async="defer")
        body.insert(-1, tscript)
        return soup
    htmltxt = open(fname, 'r').read()
    soup = putkey(htmltxt, apikey)
    newtxt = soup.prettify()
    open(fname, 'w').write(newtxt)
API_KEY= 'YOUR API KEY HERE'
insertapikey("centroids_map.html", API_KEY)


gmap = gmplot.GoogleMapPlotter(54.2, -124.875224, 6)
j = 0
for i in km.cluster_centers_:
    gmap.marker(i[0],i[1],'red', title="Centroid " + str(j))
```

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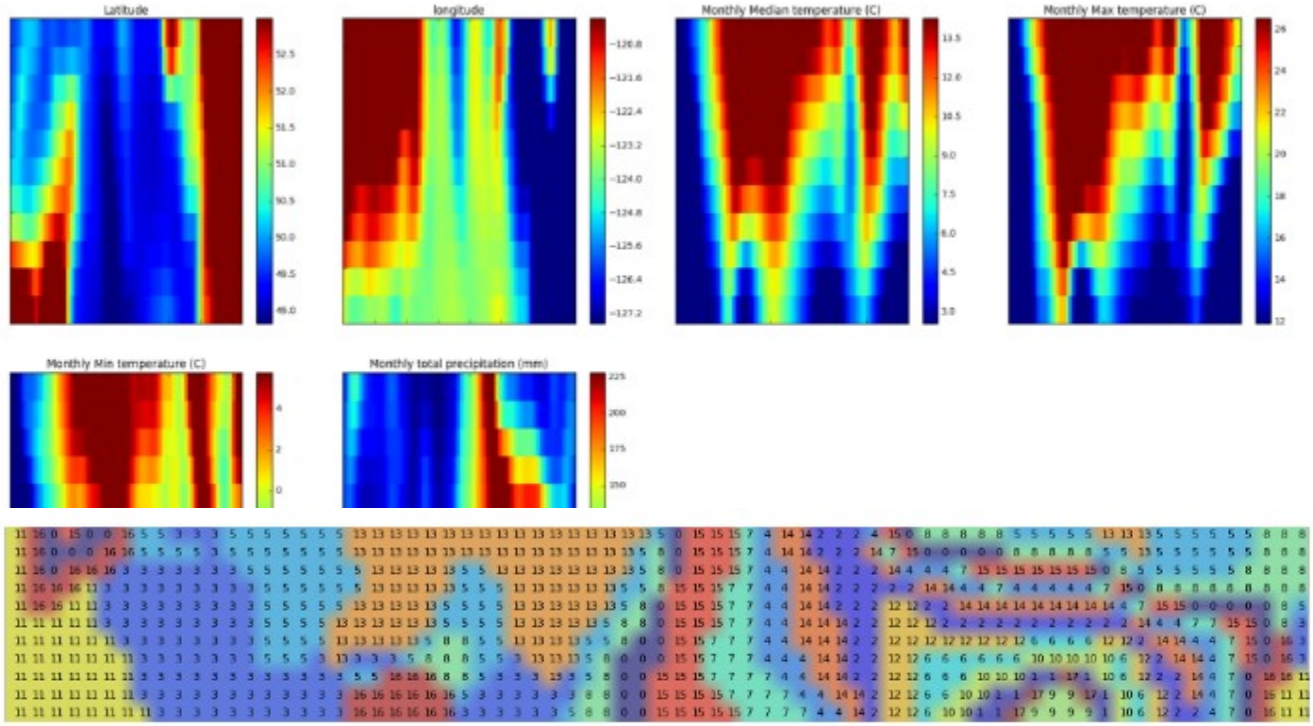
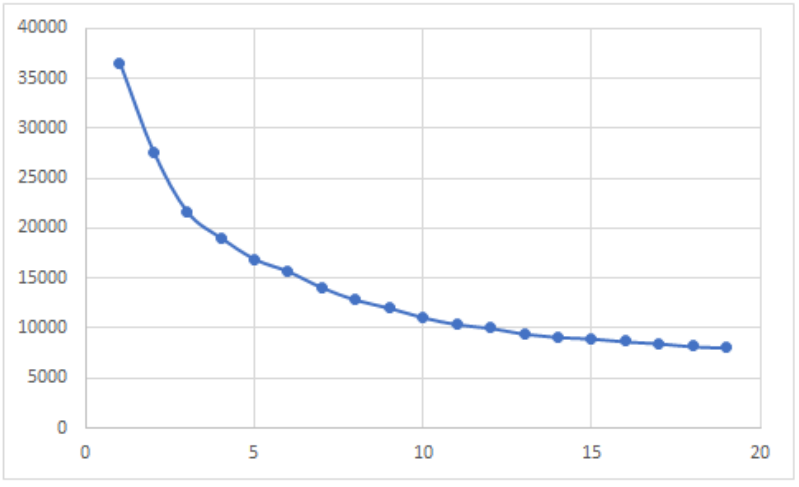
    j += 1

gmap.draw("centroids_map.html")
```

Output:





```
Centroid 0[ 51.38661738 -125.27254198 7.51493849 16.8132888 -1.17574106
67.95416645]
Centroid 1[ 50.61259827 -126.25917862 6.32184038 14.17993615 -1.63282112
340.64034668]
Centroid 2[ 50.42396495 -125.2544494 7.2744194 16.09718498 -1.19140013
222.65626168]
Centroid 3[ 50.42534148 -126.39001822 6.72726471 14.53652612 -1.31210139
507.65982791]
Centroid 4[ 49.89467361 -122.37195052 16.63158605 29.73554202 5.95873865
28.06162618]
Centroid 5[ 52.27917741 -121.73550782 -3.83946568 8.19646576 -19.93363911
45.30064963]
Centroid 6[ 50.2945556 -125.21241436 9.15306962 18.32174182 0.93638661
119.43331396]
Centroid 7[ 50.70282538 -125.32884059 8.00965749 17.614526 -0.77992491
151.77106456]
Centroid 8[ 50.31580334 -126.23307623 6.5871719 14.64225657 -1.44068436
660.70782628]
Centroid 9[ 50.28874072 -125.06866063 7.49467144 16.55379438 -0.84254229
251.73801799]
Centroid 10[ 50.4262205 -126.2629756 6.58541814 14.36302394 -1.36671652
399.90931304]
Centroid 11[ 50.35982435 -125.51021147 6.32659523 14.73932271 -
1.89873252
294.050496 ]
Centroid 12[ 51.24356927 -121.64231971 6.18712464 18.67948989 -
5.48058692
36.06758652]
Centroid 13[ 50.75675998 -125.60116426 7.48408728 16.37144962 -
0.95604598
190.18377378]
Centroid 14[ 51.1337961 -124.85444455 7.9966279 17.1295218 -0.56629512
94.65084155]
Centroid 15[ 50.12150383 -126.04955706 6.7603695 14.43437023 -1.13385479
461.59884165]
Centroid 16[ 50.72982522 -126.73419985 6.88866959 14.84315741 -
1.12018377
586.45036101]
Centroid 17[ 51.44904147 -122.37356247 12.74453517 26.10130055
1.58123601
50.9674971 ]
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