extra_data

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0.1 ENVM1400 - I & A - Volta group - DGRE

made by: David Haasnoot

[1]:
```
import glob
import os

# data/plot management
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

# plotting/mapmaknig
import geopandas as gpd
from geospatial_functions import get_background_map
import rasterio
from rasterio.plot import show as rioshow
import folium
```

FAIR data was obtained from researchgate.net

[2]:
```
path = os.getcwd()
home_path = os.path.dirname(os.path.dirname(path))
main_folder = os.path.dirname(home_path)

gis_folder = f'{main_folder}\\QGIS project'
```

[3]:
```
lst_data = glob.glob("*.txt")
```

[4]:
```
file = lst_data[0]
```

[5]:
```
meta_data = []
for file in lst_data:
    data = []
    with open(file) as f:
         for line in f:
            if line.strip()[:11] == "# GRDC-No.:":
                data.append(line.strip()[-7:])
            if line.strip()[:8] == "# River:":
```

```
                data.append(line.strip()[-12:])
            if line.strip()[:10] == "# Station:":
                data.append(line.strip()[-15:])
            if line.strip()[:10] == "# Country:":
                data.append(line.strip()[-2:])
            if line.strip()[:16] == "# Latitude (DD):":
                data.append(line.strip()[-7:])
            if line.strip()[:17] == "# Longitude (DD):":
                data.append(line.strip()[-7:])
    meta_data.append(data)
```

[6]:
```
df_stations = pd.DataFrame(columns=["Station_id", "River", "Station_name",␣
 ↪"Country_code", "Lat", "Lon"],data=meta_data)
df_stations.tail(5)
```

[6]:

	Station_id	River	Station_name	Country_code	Lat	Lon
47	1931845	NAHAU	BITTOU	BF	11.18	-0.28
48	1931860	MOILABOUANGA	TAGOU	BF	11.15	0.62
49	1931880	SINGOU	SAMBOALI	BF	11.28	1.02
50	1931890	DOUDODO	ARLY	BF	11.53	1.42
51	1931905	PENDJARI	ARLY	BF	11.43	1.57

These files can be read in:

[7]:
```
lst_df_q = []
lst_len_df_q = []
for index, station_id in enumerate(df_stations.Station_id):
    # create indexes in the df_stations for later use
    df_stations.loc[index,"lst_id"] = int(len(lst_df_q))
    # load in the data
    df_Q_input = pd.read_csv(f"{station_id}_Q_Day.Cmd.txt",skiprows=36,encoding␣
 ↪= 'unicode_escape',delimiter=";",
                parse_dates=True,index_col=[0])
    # make some adjustments
    df_Q_input.rename(columns={' Value':'Value'},inplace=True)
    # remove no-data-values
    df_Q_input.mask(df_Q_input.Value < -99, inplace=True)

    # add to list
    lst_df_q.append(df_Q_input)
    lst_len_df_q.append(len(df_Q_input))


lst_len_df_q = np.array(lst_len_df_q)
df_stations.lst_id = df_stations.lst_id.astype(int)
```

[8]:
```
print(f'There are {np.count_nonzero(lst_len_df_q == 0)} stations with data')
```

There are 30 stations with data

The stations with data are:

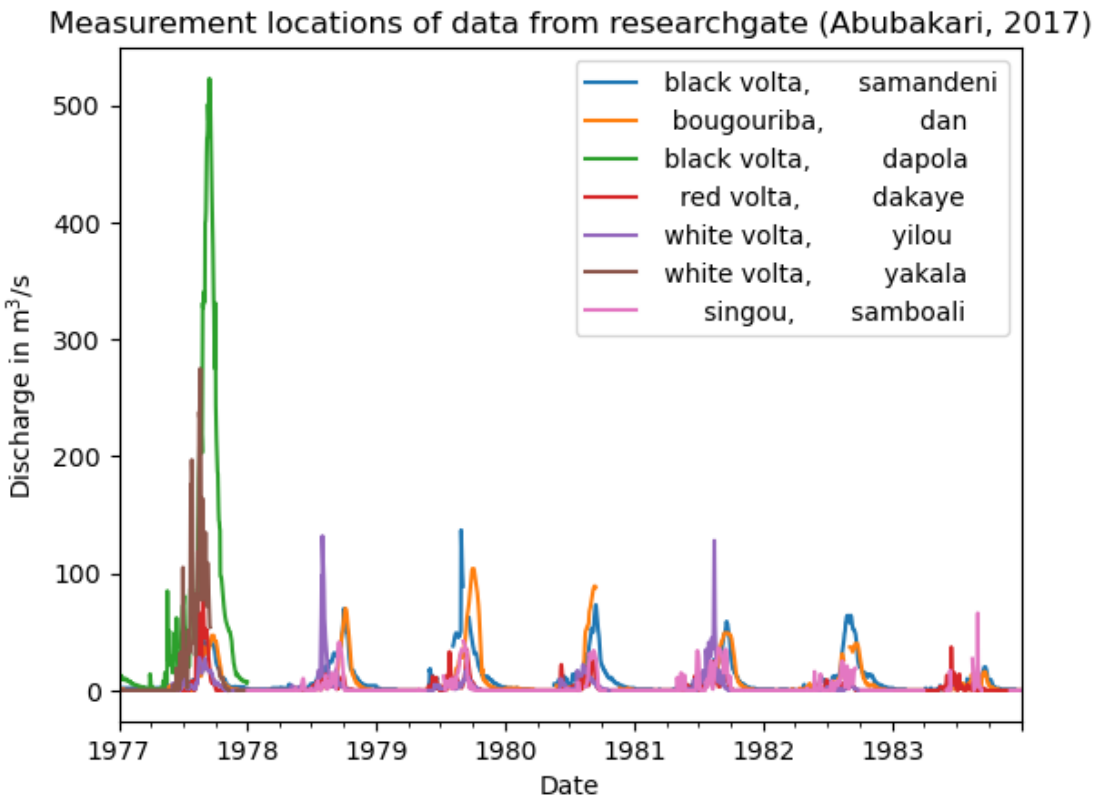
[9]:
```
df_stations_data = df_stations[~(lst_len_df_q == 0)]
df_stations_data.tail(5)
```

[9]:

	Station_id	River	Station_name	Country_code	Lat	Lon	\
30	1931400	BLACK VOLTA	DAPOLA	BF	10.57	-2.92	
38	1931565	RED VOLTA	DAKAYE	BF	11.78	-1.6	
39	1931580	WHITE VOLTA	YILOU	BF	13.0	-1.55	
44	1931785	WHITE VOLTA	YAKALA	BF	11.35	-0.7	
49	1931880	SINGOU	SAMBOALI	BF	11.28	1.02	

	lst_id
30	30
38	38
39	39
44	44
49	49

[10]:
```
fig, ax = plt.subplots()
for index_wanted_station in df_stations_data[df_stations_data.Country_code ==␣
 ↪"BF"].lst_id:
    lst_df_q[index_wanted_station].rename(columns = {"Value":
                                                     df_stations_data.
 ↪loc[index_wanted_station,'River'].lower() +','+ \
                                                     df_stations_data.
 ↪loc[index_wanted_station,'Station_name'].lower()})\
                                    .plot(ax=ax)
ax.get_xticks()
ax.legend()
ax.set_ylabel("Discharge in m$^3$/s")
ax.set_xlabel("Date")
ax.set_title("Measurement locations of data from researchgate (Abubakari,␣
 ↪2017)");
```



These 30 stations are more than provided by the client This can be spatially previewed bellow:

[11]:
```
district_outline = gpd.read_file(f"{gis_folder}\\region_boundary_burkina_faso.
↪geojson")
volta_outline = gpd.read_file(f"{gis_folder}\\volta_watershed_vector_32630.
↪gpkg",crs="epsg:32630")
main_rivers = gpd.read_file(f"{gis_folder}\\main_rivers_volta.gpkg",crs="epsg:
↪32630")

volta_outline = volta_outline.set_geometry(volta_outline.geometry.to_crs('EPSG:
↪4326'))
main_rivers = main_rivers.set_geometry(main_rivers.geometry.to_crs('EPSG:4326'))
```

[12]:
```
geometry = gpd.points_from_xy(df_stations_data.Lon, df_stations_data.Lat,␣
↪crs="EPSG:4326")
gdf_stations = gpd.GeoDataFrame(data=df_stations_data, geometry=geometry)
```

[13]:
```
# quick way to get the bounds
fig, ax = plt.subplots()
volta_outline.plot(ax=ax,edgecolor="k", facecolor='none')
```

```
main_rivers.plot(ax=ax, color="C0",zorder=1)
bounds_stations = (ax.get_xlim()[0], ax.get_ylim()[0], ax.get_xlim()[1], ax.
 ↪get_ylim()[1])

gdf_stations.plot(ax=ax,color="C3",markersize=15,zorder=5)
with rasterio.open(get_background_map("stations", bounds_stations)) as r:
    rioshow(r, ax=ax)

ax.set_title("Measurement locations of data from researchgate (Abubakari,␣
 ↪2017)")
ax.set_xlabel("Longditude$^{\circ}$");
ax.set_ylabel("Latitude$^{\circ}$");
```