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import geopandas
import streamlit as st
import pandas as pd
import numpy as np
import folium

from streamlit_folium import folium_static
from folium.plugins import MarkerCluster

st.set_page_config( layout='wide' )

@st.cache( allow_output_mutation=True )
def get_data( path ):
    data = pd.read_csv( path )

    return data

@st.cache( allow_output_mutation=True )
def get_geofile( url ):
    geofile = geopandas.read_file( url )

    return geofile

# get data
path = '../kc_house_data.csv'
data = get_data( path )

# get geofile
url = 'https://opendata.arcgis.com/datasets/83fc2e72903343aabbff6de8cb445b81c_2.geojson'
geofile = get_geofile( url )

# add new features
data['price_m2'] = data['price'] / data['sqft_lot']

# =====
# Data Overview
# =====
f_attributes = st.sidebar.multiselect( 'Enter columns',
data.columns )
f_zipcode = st.sidebar.multiselect(
    'Enter zipcode',
    data['zipcode'].unique() )

st.title( 'Data Overview' )

if ( f_zipcode != [] ) & ( f_attributes != [] ):
    data = data.loc[data['zipcode'].isin( f_zipcode ), f_attributes]

elif ( f_zipcode != [] ) & ( f_attributes == [] ):
    data = data.loc[data['zipcode'].isin( f_zipcode ), :]

elif ( f_zipcode == [] ) & ( f_attributes != [] ):

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        data = data.loc[:, f_attributes]

else:
    data = data.copy()

st.dataframe( data )

c1, c2 = st.beta_columns((1, 1) )

# Average metrics
df1 = data[['id',
'zipcode']].groupby( 'zipcode' ).count().reset_index()
df2 = data[['price',
'zipcode']].groupby( 'zipcode').mean().reset_index()
df3 = data[['sqft_living',
'zipcode']].groupby( 'zipcode').mean().reset_index()
df4 = data[['price_m2',
'zipcode']].groupby( 'zipcode').mean().reset_index()

# merge
m1 = pd.merge( df1, df2, on='zipcode', how='inner' )
m2 = pd.merge( m1, df3, on='zipcode', how='inner' )
df = pd.merge( m2, df4, on='zipcode', how='inner' )

df.columns = ['ZIPCODE', 'TOTAL HOUSES', 'PRICE', 'SQRT LIVING',
'PRICe/M2']

c1.header( 'Average Values' )
c1.dataframe( df, height=600 )

# Statistic Descriptive
num_attributes = data.select_dtypes( include=['int64', 'float64'] )
media = pd.DataFrame( num_attributes.apply( np.mean ) )
mediana = pd.DataFrame( num_attributes.apply( np.median ) )
std = pd.DataFrame( num_attributes.apply( np.std ) )

max_ = pd.DataFrame( num_attributes.apply( np.max ) )
min_ = pd.DataFrame( num_attributes.apply( np.min ) )

df1 = pd.concat([max_, min_, media, mediana, std],
axis=1 ).reset_index()

df1.columns = ['attributes', 'max', 'min', 'mean', 'median', 'std']

c2.header( 'Descriptive Analysis' )
c2.dataframe( df1, height=800 )

# =====
# Densidade de Portfolio
# =====
st.title( 'Region Overview' )

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c1, c2 = st.beta_columns( ( 1, 1 ) )
c1.header( 'Portfolio Density' )

df = data.sample( 10 )

# Base Map - Folium
density_map = folium.Map( location=[data['lat'].mean(),
                                data['long'].mean() ],
                            default_zoom_start=15 )

marker_cluster = MarkerCluster().add_to( density_map )
for name, row in df.iterrows():
    folium.Marker( [row['lat'], row['long']] ,
                    popup='Sold R${0} on: {1}. Features: {2} sqft, {3} bedrooms,
                        {4} bathrooms, year built: {5}'.format( row['price'],
                                                                row['date'],
                                                                row['sqft_living'],
                                                                row['bedrooms'],
                                                                row['bathrooms'],
                                                                row['yr_built'] ) ).add_to( marker_cluster )

with c1:
    folium_static( density_map )

# Region Price Map
c2.header( 'Price Density' )

df = data[['price',
            'zipcode']].groupby( 'zipcode' ).mean().reset_index()
df.columns = ['ZIP', 'PRICE']

#df = df.sample( 10 )

geofile = geofile[geofile['ZIP'].isin( df['ZIP'].tolist() )]

region_price_map = folium.Map( location=[data['lat'].mean(),
                                data['long'].mean() ],
                                default_zoom_start=15 )

region_price_map.choropleth( data = df,
                             geo_data = geofile,
                             columns=['ZIP', 'PRICE'],
                             key_on='feature.properties.ZIP',
                             fill_color='YlOrRd',
                             fill_opacity = 0.7,
                             line_opacity = 0.2,
                             legend_name='AVG PRICE' )

with c2:

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folium_static( region_price_map )
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