

## Doing an exploration on recent disaster tweets for a disaster category

```
In [1]: import pandas as pd
import pickle

import spacy
from spacy import displacy
import matplotlib.pyplot as plt
import seaborn as sns
import altair as alt
import networkx as nx
import nx_altair as nxa
from collections import Counter
import warnings

from tools import extract_assign_location, disaster_title, topNlocations, top_locations, \
    sampleNtweets, top_locations_tweets, show_top_locations, get_top_locations_flatten,
    get_location_graph_data, build_network, get_layout, plot_disaster_mentions, is_inter
    show_tweets_locations, top_location_pairs

warnings.filterwarnings('ignore')
pd.set_option('display.max_colwidth', 280)
```

## Define any upstream dependencies

```
In [2]: upstream = [
    'vectorizer',
    'category_classification_models',
    'recent_tweets_wildfire',
    'recent_tweets_earthquake',
    'recent_tweets_flood',
    'recent_tweets_hurricane'
]
random_seed = None
disaster_kind = None
```

```

In [3]: # Parameters
random_seed = 42
disaster_kind = "recent_tweets_earthquake"
upstream = {
    "recent_tweets_earthquake": {
        "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_eart
        "file": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_ea
    },
    "vectorizer": {
        "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/vectorizer.ipynb",
        "vectorizer": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/vectorizer
        "vocab": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/vocab.pkl",
    },
    "recent_tweets_wildfire": {
        "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_wild
        "file": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_wi
    },
    "recent_tweets_flood": {
        "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_flood
        "file": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_fl
    },
    "category_classification_models": {
        "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/category_classific
        "model_lr": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/model_lr.pkl
        "model_rf": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/model_rf.pkl
        "model_nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/model_nb.csv
        "model_votingc": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/model_v
    },
    "recent_tweets_hurricane": {
        "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_hurr
        "file": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/recent_tweets_hu
    },
}
product = {
    "nb": "/Users/mboussarov/_umsi/Capstone/umads_697_data_medics/pipeline/output/tweets_timeline_earthq
}

```

```
In [4]: print('Disaster kind: ', disaster_title(disaster_kind))
```

Disaster kind: Earthquake

## Load the sample of recent tweets

```
In [5]: df_tweets = pd.read_csv(upstream[disaster_kind]['file'])
df_tweets.sample(5)
```

Out[5]:

	author_id	tweet_text	created_at	hashtags	users
62698	1526974425010159619	RT @NCMS_media: A 4.0 Magnitude Earthquake on Richter scale is recorded in South of Iran at 02:45, 04/08/2022 "UAE time" According to the N...	2022-08-04 01:23:26+00:00	['NCMS_media']	
45265	3946211178	A team consisting of seven faculty and staff members from ICE has just concluded their post-disaster damage assessment in select heritage sites in Vigan, Ilocos Sur following the recent earthquake that occurred in Abra last July 27. #ServeThePeople #DRRM #HeritageSites https://...	2022-08-04 08:56:55+00:00	['ServeThePeople', 'DRRM', 'HeritageSites']	
27305	581146746	RT @QuakesToday: 1.8 magnitude #earthquake. 15 km from East Carbon City, UT, #UnitedStates https://t.co/luUEX4iq5c	2022-08-04 21:56:30+00:00	['earthquake', 'UnitedStates']	['QuakesToday']
123035	1516222716256337925	M 0.8 - 6km W of Cobb, CA \n \nTime of Earthquake: 2022-08-01 04:52:29.050000 \n \n0.84 Magnitude earthquake 6km W of Cobb, CA \n \nView details at: https://t.co/YPkRGVaw8e	2022-08-01 09:54:56+00:00		
77308	802064401	#EarthquakePH #EarthquakellocosNorte\nEarthquake Information No.1\nDate and Time: 03 August 2022 - 09:26 AM\nMagnitude = 3.3\nDepth = 004 km\nLocation = 18.18°N, 120.73°E - 002 km N 51° E of Piddig (Ilocos Norte)\n\nhttps://t.co/3DJ93YN8aH https://t.co/CnXU4QIGia	2022-08-03 01:39:43+00:00	['EarthquakePH', 'EarthquakellocosNorte']	

## Extract the locations from the tweet sample

```
In [6]: %%time
df_tweets, df_locs_most_common = extract_assign_location(df_tweets, number_most_common=10)

df_tweets.sample(5)
```

144000it [15:34, 154.16it/s]

CPU times: user 18min 38s, sys: 21.1 s, total: 18min 59s

Wall time: 19min 49s

Out[6]:

	author_id	tweet_text	created_at	hashtags	users	location
112074	1521015585576206337	RT @ABSCBNNews: LOOK: Japan donates disaster relief goods to communities affected by the magnitude 7 earthquake that struck Luzon last week...	2022-08-02 07:49:48+00:00	[] ['ABSCBNNews']		[Japan, Luzon]
59667	362523555	1.6 magnitude #earthquake. 7 km from Banning, CA, #UnitedStates <a href="https://t.co/sHCO98oeZd">https://t.co/sHCO98oeZd</a>	2022-08-03 14:02:04+00:00	['earthquake', 'UnitedStates']	[]	[Banning]
45181	257277393	RT @manilabulletin: The Commission on Elections (Comelec) has reset the Election Registration Board hearings in areas affected by the recen...	2022-08-04 09:53:41+00:00	[] ['manilabulletin']		[]
142978	1010897337361694720	ICYMI: The number of families affected by the magnitude 7 earthquake that struck Abra and nearby Northern Luzon areas on July 27 has climbed to 82,336 which is equivalent to 314,161 persons, the National Disaster Risk Reduction and Management... <a href="https://t.co/AnTtqqnteu">https://t.co/AnTtqqnteu</a>	2022-07-31 18:00:50+00:00	[]	[]	[Abra, Northern Luzon]
98312	1448853288573550597	RT @pnpbantay: August 2, 2022\nPersonnel of Bantay MPS led by PMAJ POL A AREOLA, OIC conducted visitation and inspection to the houses damag...	2022-08-02 19:27:42+00:00	[] ['pnpbantay']		[]

```
In [7]: df_locs_most_common
```

```
Out[7]:
```

	location	count
0	United States	26630
1	Japan	5661
2	HI	5116
3	Hawaii	4186
4	Alaska	2463
5	Izu Islands	2387
6	CA	2201
7	Nepal	1817
8	Honaunau-Napoopoo	1779
9	Indonesia	1750

## Predict the class labels

```
In [8]: # Get the vectorizer
with open(upstream["vectorizer"]["vectorizer"], 'rb') as f:
    vectorizer = pickle.load(f)
```

```
In [9]: # Get the classification model
with open(upstream["category_classification_models"]["model_lr"], 'rb') as f:
    classifier = pickle.load(f)
```

```
In [10]: %%time
# Predict the class labels
class_label = classifier.predict(vectorizer.transform(df_tweets['tweet_text']))
df_tweets['class_label'] = class_label

df_tweets.sample(5)
```

CPU times: user 1min 3s, sys: 366 ms, total: 1min 3s  
Wall time: 1min 13s

Out[10]:

	author_id	tweet_text	created_at	hashtags	users
4702	850613188076879872	phivolcs_dost: #EarthquakePH #EarthquakeOccidentalMindoro\nEarthquake Information No.1\nDate and Time: 06 August 2022 - 07:28 AM\nMagnitude = 2.3\nDepth = 028 km\nLocation = 13.24°N, 119.79°E - 073 km S 43° W of Looc (Occidental Mindoro)\n\n... https://t.co/Ycg9dwxAYu	2022-08-06 07:47:55+00:00	['EarthquakePH', 'EarthquakeOccidentalMindoro']	0
48604	1112896007774371840	0.86 magnitude earthquake occurred at Lakeview Rd, Cloverdale, CA 95425, United States on 2022-08-04 15:23:32 UTC\nMap: https://t.co/VEmxWp2U1w\n#earthb0t #earthquake #LakeviewRd #Cloverdale #CA95425 #UnitedStates #noaa #greatshakeout #LetsBeSafe #OpenData #data https://t.co...	2022-08-04 15:37:15+00:00	['earthb0t', 'earthquake', 'LakeviewRd', 'Cloverdale', 'CA95425', 'UnitedStates', 'noaa', 'greatshakeout', 'LetsBeSafe', 'OpenData', 'data']	1
111077	1516222716256337925	M 0.7 - 9km SSW of Idyllwild, CA \n \nTime of Earthquake: 2022-08-01 14:40:54.940000 \n\n0.66 Magnitude earthquake 9km SSW of Idyllwild, CA\n \nView details at: https://t.co/RJKve7Z29i	2022-08-01 19:44:56+00:00		
30006	45770236	3 main factors impact how hard you shake during an earthquake - 1) magnitude, 2) distance from the earthquake and 3) the local rock and soil conditions. \n\nLearn more --&gt; https://t.co/hljazE61YN https://t.co/8ONngn0i3r	2022-08-05 19:00:08+00:00		
5798	1380192649	RT @pcooglobalmedia: LOOK: The Embassy of Japan to the Philippines expressed its commitment to provide humanitarian assistance to the count...	2022-08-05 08:03:34+00:00	['pcooglobalmedia']	

## Plot the intensity for each catagory, and for a particular location

### Prepare the time series grouped by disaster class label

```
In [11]: df_tweets['created_at'] = pd.to_datetime(df_tweets['created_at'], errors='coerce')
df_plot = df_tweets.copy()

df_plot['created_at'] = df_plot['created_at'].dt.floor('8H') # Round to 8 hours
df_plot['count'] = 1
df_group_plot = df_plot[['created_at', 'class_label', 'count']].groupby(['created_at', 'class_label']).count()
df_group_plot['created_at'] = pd.to_datetime(df_group_plot['created_at'])
df_group_plot.head()
```

Out[11]:

	created_at	class_label	count
0	2022-07-31 08:00:00+00:00	caution_and_advice	232
1	2022-07-31 08:00:00+00:00	infrastructure_and_utility_damage	153
2	2022-07-31 08:00:00+00:00	injured_or_dead_people	30
3	2022-07-31 08:00:00+00:00	not_humanitarian	13
4	2022-07-31 08:00:00+00:00	other_relevant_information	1923

### Prepare the time series grouped by location label

```
In [12]: df_explode = df_tweets.copy()

most_common10 = df_locs_most_common.head(10)['location'].tolist()

df_explode = df_explode.explode('location').reset_index(drop=True)
df_explode.dropna(inplace=True)
df_explode['created_at'] = df_explode['created_at'].dt.floor('8H') # Round to 8 hours
df_explode['count'] = 1
df_group_explode = df_explode[['created_at', 'location', 'count']].groupby(
    ['created_at', 'location']
).count().reset_index()
df_group_explode = df_group_explode[df_group_explode['location'].isin(most_common10)]
df_group_explode.head()
```

Out[12]:

	created_at	location	count
7	2022-07-31 08:00:00+00:00	Alaska	2
29	2022-07-31 08:00:00+00:00	CA	21
70	2022-07-31 08:00:00+00:00	HI	25
71	2022-07-31 08:00:00+00:00	Hawaii	17
77	2022-07-31 08:00:00+00:00	Indonesia	2

**Find the top 10 locations in the tweets sample**



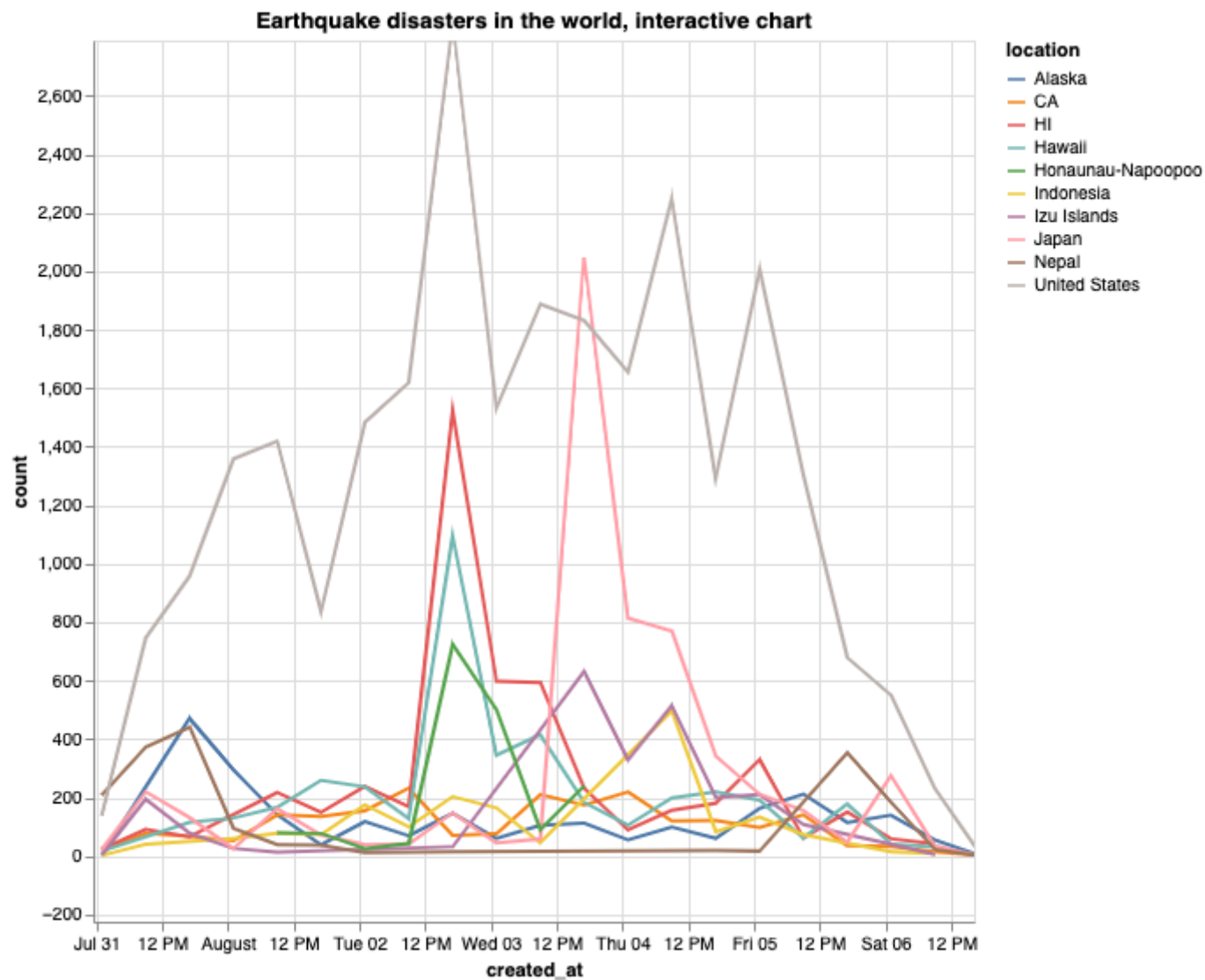
```
In [13]: top10_locs = list(df_group_explode['location'].unique())
top10_locs
```

```
Out[13]: ['Alaska',
          'CA',
          'HI',
          'Hawaii',
          'Indonesia',
          'Izu Islands',
          'Japan',
          'Nepal',
          'United States',
          'Honaunau-Napoopoo']
```

```
In [14]: chart = alt.Chart(df_group_explode[df_group_explode['location'].isin(top10_locs)]).mark_line(size=2).encode(
    x='created_at:T',
    y='count:Q',
    color='location:N',
    tooltip=['location', 'count']
)

chart.properties(
    width=500,
    height=500
).properties(
    title=disaster_title(disaster_kind) + ' disasters in the world, interactive chart'
).interactive()
```

Out[14]:



**Combine the most important locations per category**

```
In [15]: df_top_locations = top_locations(df_tweets, top10_locs)
df_top_locations.sample(5)
```

Out[15]:

	created_at	class_label	locations	count
145	2022-08-05 14:00:00+00:00	other_relevant_information	[Alaska, HI, United States]	472
80	2022-08-02 22:00:00+00:00	caution_and_advice	[Japan, United States]	43
118	2022-08-04 14:00:00+00:00	caution_and_advice	[Alaska, Izu Islands, Japan]	152
40	2022-08-01 16:00:00+00:00	injured_or_dead_people	[Japan]	12
9	2022-07-31 18:00:00+00:00	caution_and_advice	[Izu Islands, Japan, United States]	61

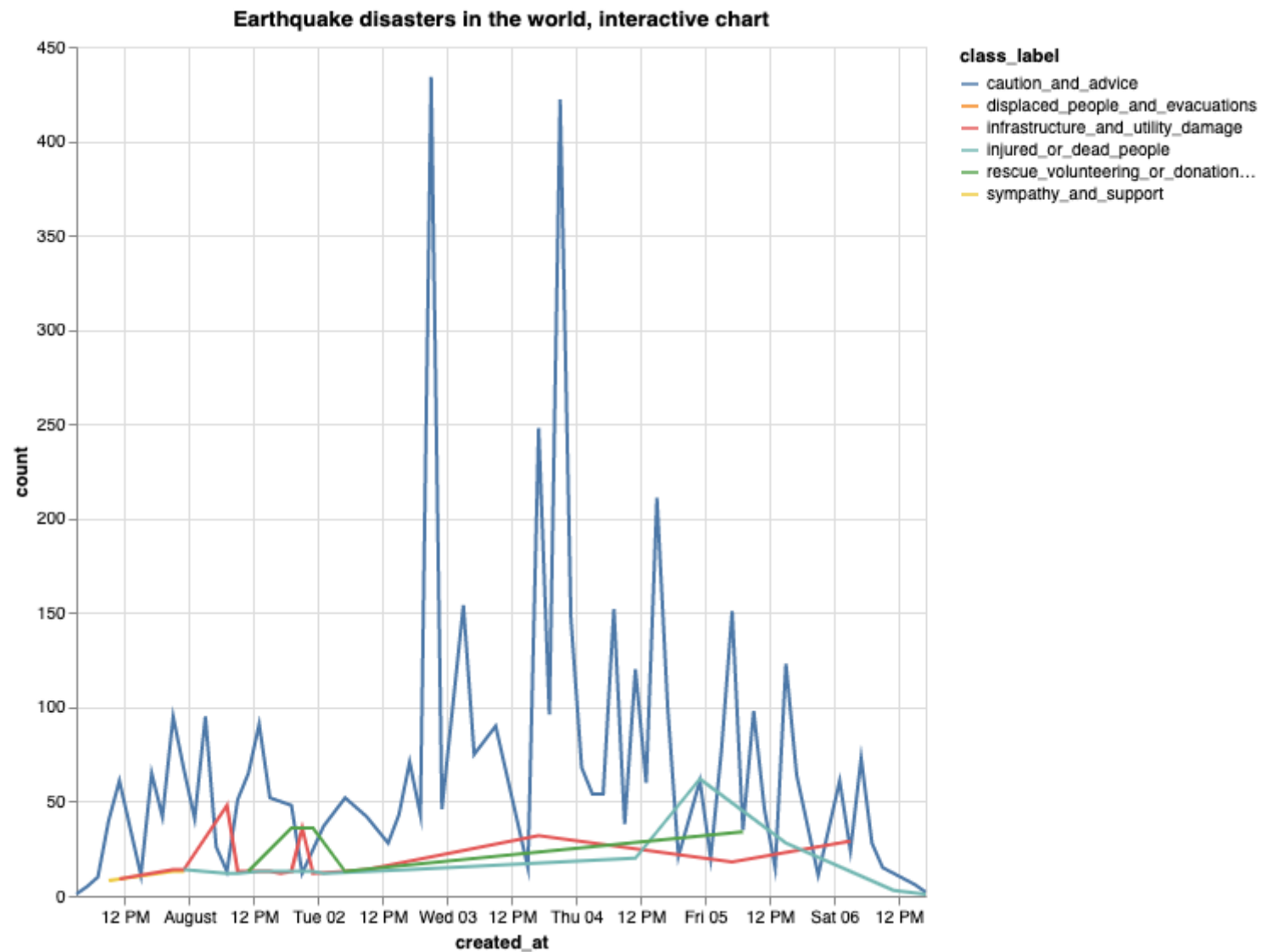
## Define the class labels we are interested in

```
In [16]: class_labels = [
    'displaced_people_and_evacuations',
    'injured_or_dead_people',
    'rescue_volunteering_or_donation_effort',
    'requests_or_urgent_needs',
    'sympathy_and_support',
    'infrastructure_and_utility_damage',
    'caution_and_advice'
]
```

```
In [17]: chart = alt.Chart(df_top_locations[df_top_locations['class_label'].isin(class_labels)]).mark_line(size=2,
    x='created_at:T',
    y='count:Q',
    color='class_label:N',
    tooltip=['class_label:N', 'locations', 'count']
)

chart.properties(
    width=500,
    height=500
).properties(
    title=disaster_title(disaster_kind) + ' disasters in the world, interactive chart'
)
```

Out[17]:



**Show sample tweets per most important locations above**

```
In [18]: df_top_location_tweets = top_locations_tweets(df_tweets, top10_locs)
df_top_location_tweets.sample(5)
```

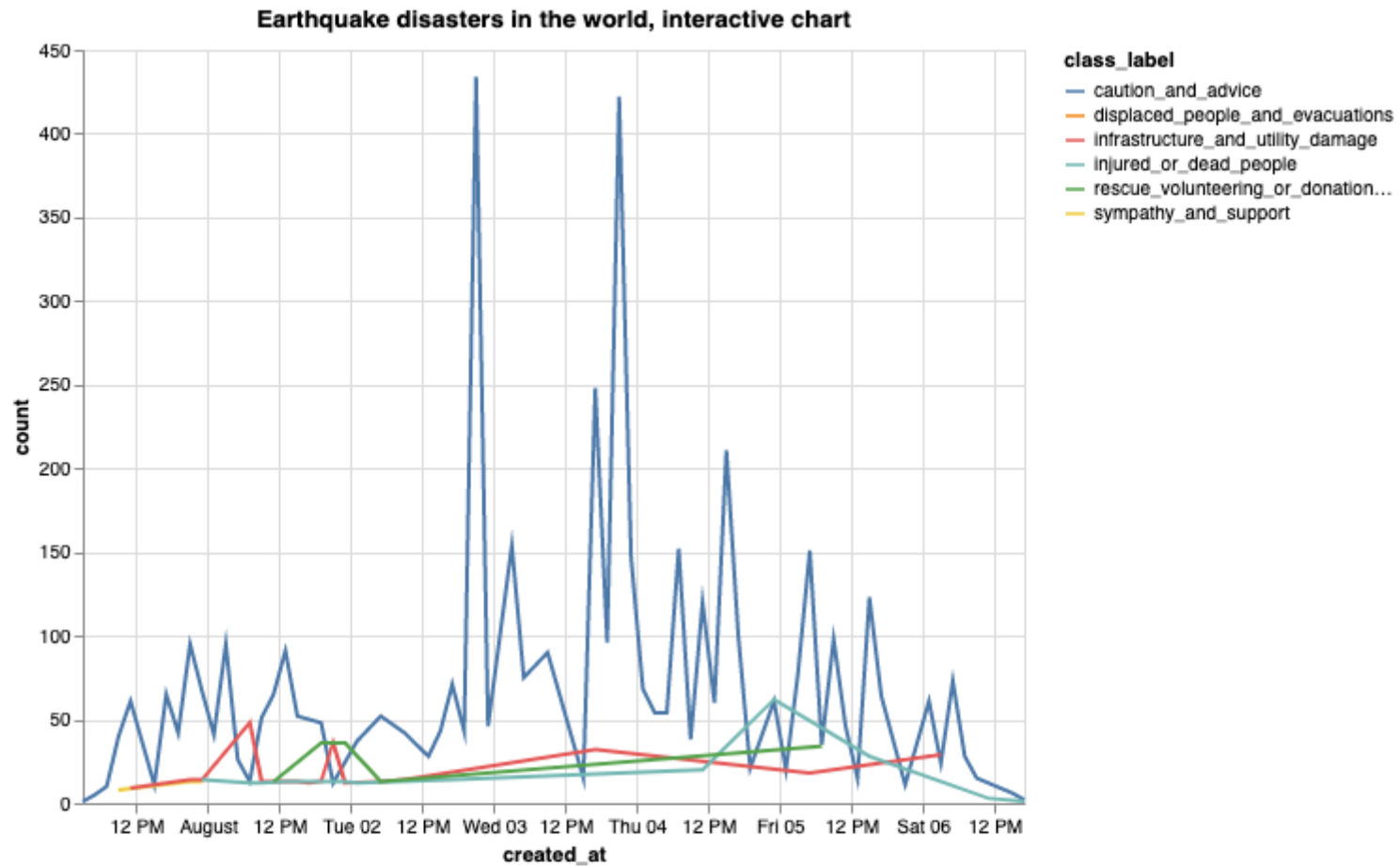
Out[18]:

	created_at	class_label	tweet_text	locations	count
16	2022-08-01 00:00:00+00:00	other_relevant_information	[4.90 magnitude earthquake occurred at Aleutians West, AK, United States on 2022-08-01 00:36:41 UTC\nMap: https://t.co/HoKzH70JTG\n#earthb0t #earthquake #AleutiansWest #AK #UnitedStates #noaa #greatshakeout #LetsBeSafe #OpenData #data https://t.co/5JWZ3YkQAO, There was a 5.2...	[Alaska, Izu Islands, United States]	707
178	2022-08-07 00:00:00+00:00	caution_and_advice	[RT @QuakesToday: 3.1 magnitude #earthquake. 52 km from #Nikiski, AK, United States https://t.co/Adp7YlyoyL, #Earthquake of magnitude 3.1 at 2 km WNW of Beluga, #Alaska. Retweet if you felt it., RT @QuakesToday: 1.7 magnitude #earthquake. 7 km from Willow, AK, #UnitedStates h...	[Japan, United States]	2
78	2022-08-02 20:00:00+00:00	caution_and_advice	[RT @EQAlerts: Magnitude 5.2 #earthquake strikes near Manay, Davao Oriental, Davao, Philippines - info, user reports and updates\nhttps://t.c..., RT @QuakesToday: 2.7 magnitude #earthquake. 13 km from #Entiat, WA, United States https://t.co/IDtu8jm4ST, #Earthquake of magnitude ...	[United States]	28
85	2022-08-03 02:00:00+00:00	caution_and_advice	[1.9 magnitude #earthquake. 30 km from Honaunau-Napoopoo, #HI, United States https://t.co/jm94Y4Blbv, RT @EQAlerts: Moderate tremor of magnitude 4.2 just reported 55 km south of Keng Tung, Myanmar (Burma) - info, user reports and updates\nhtt..., Reports of a magnitude-5.6 #ear...	[Honaunau-Napoopoo, United States]	43
1	2022-07-31 10:00:00+00:00	other_relevant_information	[RT @BNNBreaking: JUST IN: A #earthquake of magnitude 4.7 struck #Cabugao, Ilocos Sur, Philippines at 1:49 p.m on Sunday, July 31. https://t..., RT @SCEMD: USGS reports a magnitude 1.8 #earthquake centered 3.8 miles ESE of Elgin. The tremor occurred at 7:41 this morning (7/30/2...	[Nepal, United States]	15

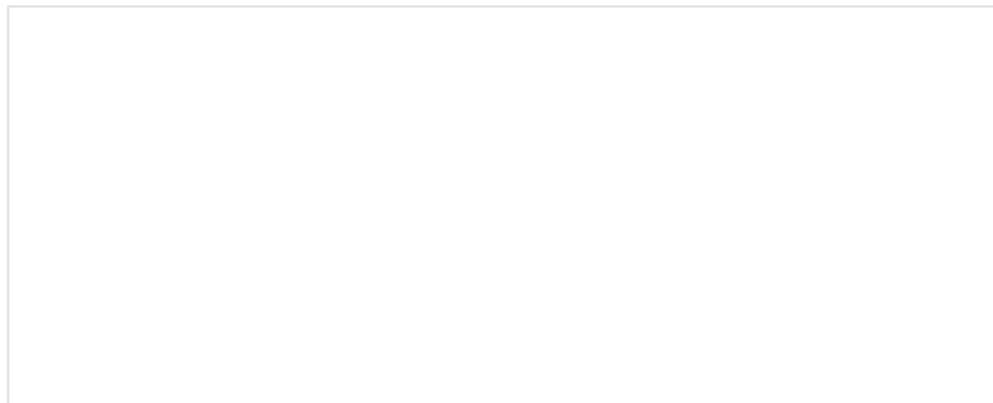
```
In [19]: show_top_locations(df_top_location_tweets, class_labels, disaster_kind)
```

```
Out[19]:
```





Tweets from the selected time period



## Visualize the locations and relationship between them as a network

### Select the top 20 locations for this disaster

```
In [20]: loc20 = get_top_locations_flatten(df_tweets, 20)
loc20
```

```
Out[20]: ['United States',
          'Japan',
          'HI',
          'Hawaii',
          'Alaska',
          'Izu Islands',
          'CA',
          'Nepal',
          'Honaunau-Napoopoo',
          'Indonesia',
          'Abra',
          'Ilocos Sur',
          'New',
          'Kudarat',
          'Lebak',
          'Luzon',
          'Balochistan',
          'Afghanistan',
          'Honduras',
          'Iceland']
```

### Get the tweets for just the top 20 locations

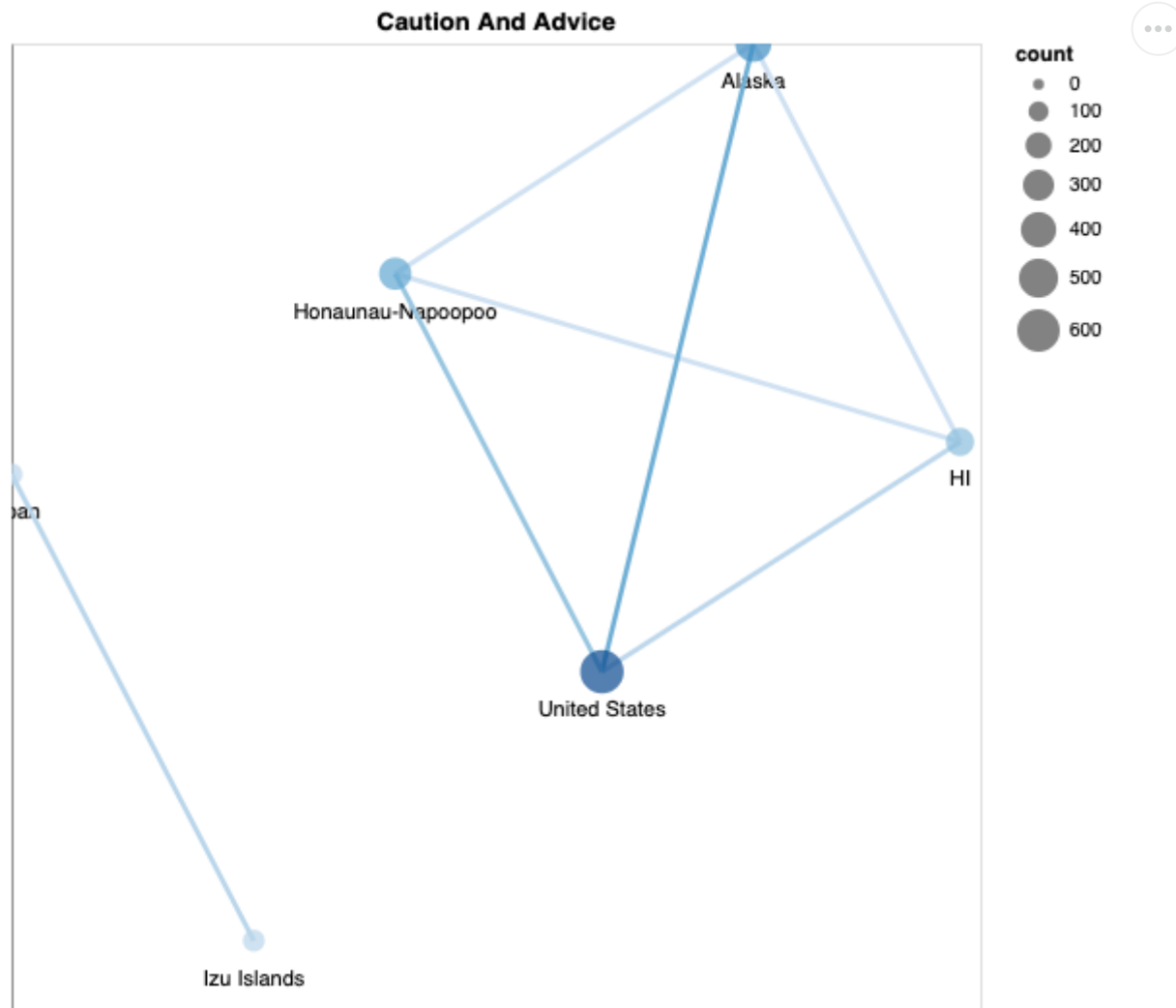
```
In [21]: df_loc_graph = get_location_graph_data(df_tweets, loc20)
df_loc_graph.sample(10)
```

Out[21]:

	class_label	location_x	location_y	count
22	other_relevant_information	New	Japan	377
31	sympathy_and_support	Nepal	Balochistan	8
29	rescue_volunteering_or_donation_effort	Luzon	Abra	14
27	other_relevant_information	United States	Honaunau-Napoopoo	1234
4	caution_and_advice	United States	Alaska	298
2	caution_and_advice	Honaunau-Napoopoo	HI	60
10	injured_or_dead_people	Luzon	Abra	8
18	other_relevant_information	Japan	Izu Islands	1796
26	other_relevant_information	United States	Hawaii	3489
19	other_relevant_information	Lebak	Kudarat	1511

```
In [22]: plot_disaster_mentions(df_loc_graph, 'caution_and_advice', 'Caution And Advice')
```

Out[22]:



## Get the most frequent location pair

```
In [23]: loc_pairs = top_location_pairs(df_loc_graph, 'caution_and_advice', top_pairs_count=1)
loc_pairs
```

```
Out[23]: [['United States', 'Alaska']]
```

## Show a sample for this location pair

```
In [24]: show_tweets_locations(df_tweets, class_label='caution_and_advice' , locations=loc_pairs[0], sample=5)
```

```
Out[24]:
```

	tweet_text	location
0	1.9 magnitude #earthquake. 32 km from #Honaunau-Napoopoo, HI, United States https://t.co/M7Ax2Z4Wmt\n1.8 magnitude #earthquake. 9 km from Truckee, #CA, United States https://t.co/iENGLgtO6N\n2.9 magnitude #earthquake. 43 km SW of Skwentna, Alaska https://t.co/12AkxeQS9Z\n.....	[Honaunau-Napoopoo, HI, United States, Truckee, United States, Skwentna, Alaska]
1	1.9 magnitude #earthquake. 32 km from #Honaunau-Napoopoo, HI, United States https://t.co/M7Ax2Z4Wmt\n1.8 magnitude #earthquake. 9 km from Truckee, #CA, United States https://t.co/iENGLgtO6N\n2.9 magnitude #earthquake. 43 km SW of Skwentna, Alaska https://t.co/12AkxeQS9Z\n.....	[Honaunau-Napoopoo, HI, United States, Truckee, United States, Skwentna, Alaska]
2	RT @EQAlerts: Moderate magnitude 4.4 #earthquake 21 miles northeast of Dutch Harbor, Alaska, United States - info, user reports and updates...	[Dutch Harbor, Alaska, United States]
3	RT @EQAlerts: Significant magnitude 5.1 #earthquake 50 miles southeast of Nikolski, Alaska, United States - info, user reports and updates...	[Nikolski, Alaska, United States]
4	RT @EQAlerts: Significant magnitude 5.1 #earthquake 50 miles southeast of Nikolski, Alaska, United States - info, user reports and updates...	[Nikolski, Alaska, United States]

```
In [25]: plot_disaster_mentions(df_loc_graph, 'displaced_people_and_evacuations', 'Displaced People And Evacuatio')
Out[25]: 'No records found for class displaced_people_and_evacuations'
```

### Get the most frequent location pair

```
In [26]: loc_pairs = top_location_pairs(df_loc_graph, 'displaced_people_and_evacuations', top_pairs_count=1)
          loc_pairs
```

```
Out[26]: [[]]
```

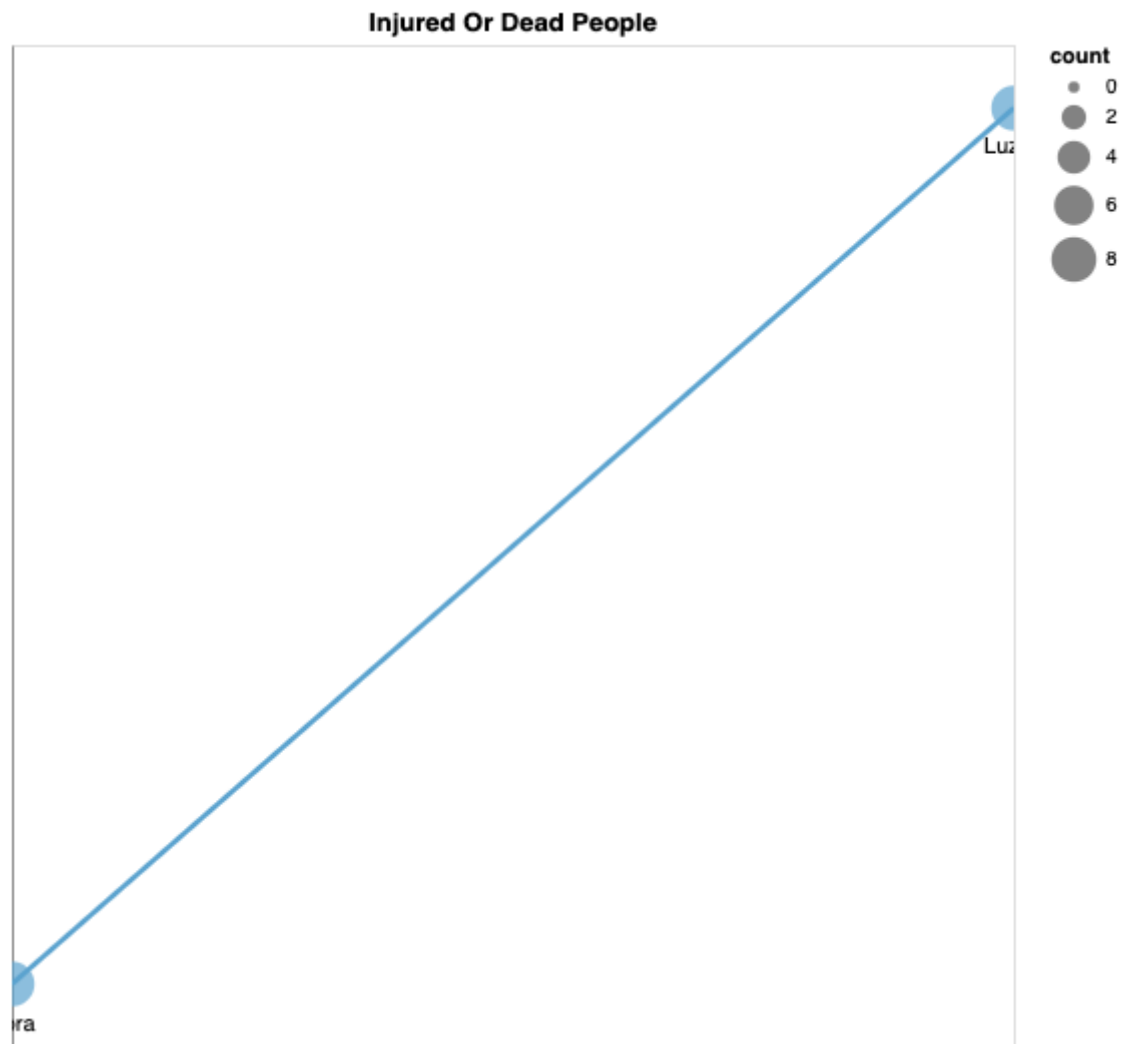
### Show a sample for this location pair

```
In [27]: show_tweets_locations(df_tweets, class_label='displaced_people_and_evacuations' , locations=loc_pairs[0])
```

```
Out[27]: 'No location pairs provided'
```

```
In [28]: plot_disaster_mentions(df_loc_graph, 'injured_or_dead_people', 'Injured Or Dead People')
```

Out[28]:



### Get the most frequent location pair

```
In [29]: loc_pairs = top_location_pairs(df_loc_graph, 'injured_or_dead_people', top_pairs_count=1)
loc_pairs
```

```
Out[29]: [['Luzon', 'Abra']]
```

### Show a sample for this location pair



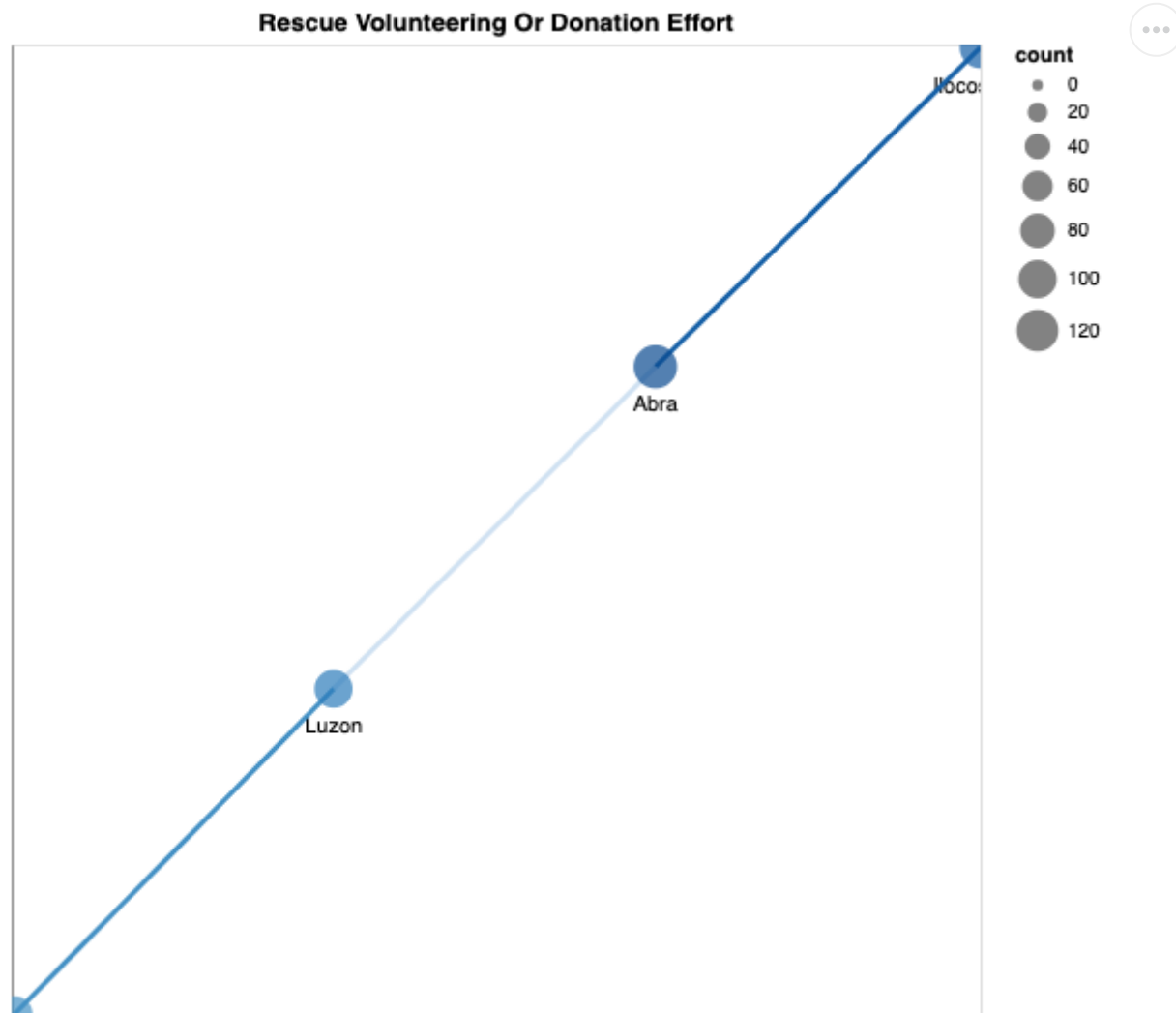
```
In [30]: show_tweets_locations(df_tweets, class_label='injured_or_dead_people' , locations=loc_pairs[0], sample=5)
```

Out[30]:

		tweet_text	location
0	The 7-magnitude earthquake hit the northern #Philippine provinces of Abra, Luzon, and Metropolitan Manila on July 27. The NDRRMC report says a total of 314,161 people have been affected by the earthquake, with a total of 10 people killed, and 375 others wounded.	<a href="https://t.co/...">https://t.co/...</a>	[Philippine, Abra, Luzon]
1	The 7-magnitude earthquake hit the northern #Philippine provinces of Abra, Luzon, and Metropolitan Manila on July 27. The NDRRMC report says a total of 314,161 people have been affected by the earthquake, with a total of 10 people killed, and 375 others wounded.	<a href="https://t.co/...">https://t.co/...</a>	[Philippine, Abra, Luzon]
2	The 7-magnitude earthquake hit the northern #Philippine provinces of Abra, Luzon, and Metropolitan Manila on July 27. The NDRRMC report says a total of 314,161 people have been affected by the earthquake, with a total of 10 people killed, and 375 others wounded.	<a href="https://t.co/...">https://t.co/...</a>	[Philippine, Abra, Luzon]
3	The 7-magnitude earthquake hit the northern #Philippine provinces of Abra, Luzon, and Metropolitan Manila on July 27. The NDRRMC report says a total of 314,161 people have been affected by the earthquake, with a total of 10 people killed, and 375 others wounded.	<a href="https://t.co/...">https://t.co/...</a>	[Philippine, Abra, Luzon]
4	The 7-magnitude earthquake hit the northern #Philippine provinces of Abra, Luzon, and Metropolitan Manila on July 27. The NDRRMC report says a total of 314,161 people have been affected by the earthquake, with a total of 10 people killed, and 375 others wounded.	<a href="https://t.co/...">https://t.co/...</a>	[Philippine, Abra, Luzon]

```
In [31]: plot_disaster_mentions(df_loc_graph, 'rescue_volunteering_or_donation_effort',  
                                'Rescue Volunteering Or Donation Effort')
```

Out[31]:



## Get the most frequent location pair

```
In [32]: loc_pairs = top_location_pairs(df_loc_graph, 'rescue_volunteering_or_donation_effort', top_pairs_count=1)
loc_pairs
```

```
Out[32]: [['Ilocos Sur', 'Abra']]
```

## Show a sample for this location pair

```
In [33]: show_tweets_locations(df_tweets, class_label='rescue_volunteering_or_donation_effort',
                                locations=loc_pairs[0], sample=5)
```

```
Out[33]:
```

		tweet_text	location
0	RT @manilabulletin: The Philippine Red Cross (PRC) has distributed 201,427 liters of water to 2,212 families in Abra and Ilocos Sur to aid...		[Abra, Ilocos Sur]
1	#Cryptocommunity maybe you can share a little amount of your port. to the victims of Earthquake at Abra and Ilocos Sur, Philippines. As of now 2000+ aftershocks recorded after the 7.3 magnitude Earthquake in Abra. #NFTCommunity #CryptoNews @TheMoonCarl @binance @cz_binance h...		[Abra, Ilocos Sur, Philippines, Abra]
2	RT @manilabulletin: The Philippine Red Cross (PRC) has distributed 201,427 liters of water to 2,212 families in Abra and Ilocos Sur to aid...		[Abra, Ilocos Sur]
3	RT @manilabulletin: The Philippine Red Cross (PRC) has distributed 201,427 liters of water to 2,212 families in Abra and Ilocos Sur to aid...		[Abra, Ilocos Sur]
4	RT @manilabulletin: The Philippine Red Cross (PRC) has distributed 201,427 liters of water to 2,212 families in Abra and Ilocos Sur to aid...		[Abra, Ilocos Sur]

```
In [34]: plot_disaster_mentions(df_loc_graph, 'requests_or_urgent_needs',  
                                'requests_or_urgent_needs')
```

```
Out[34]: 'No records found for class requests_or_urgent_needs'
```

### Get the most frequent location pair

```
In [35]: loc_pairs = top_location_pairs(df_loc_graph, 'requests_or_urgent_needs', top_pairs_count=1)  
loc_pairs
```

```
Out[35]: [[]]
```

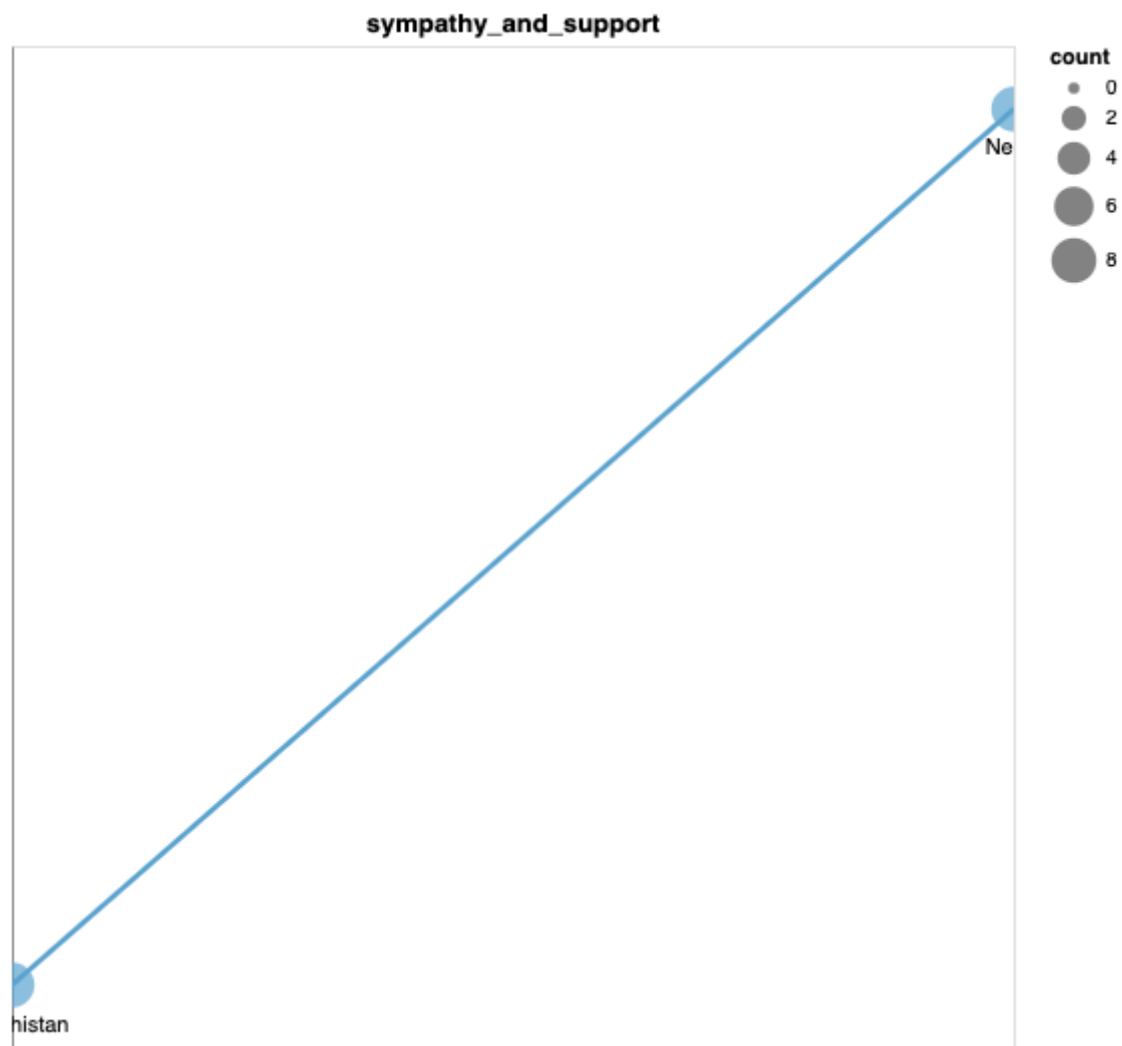
### Show a sample for this location pair

```
In [36]: show_tweets_locations(df_tweets, class_label='requests_or_urgent_needs',  
                                locations=loc_pairs[0], sample=5)
```

```
Out[36]: 'No location pairs provided'
```

```
In [37]: plot_disaster_mentions(df_loc_graph, 'sympathy_and_support',  
                                'sympathy_and_support')
```

Out[37]:



## Get the most frequent location pair

```
In [38]: loc_pairs = top_location_pairs(df_loc_graph, 'sympathy_and_support', top_pairs_count=1)
loc_pairs
```

```
Out[38]: [['Nepal', 'Balochistan']]
```

## Show a sample for this location pair

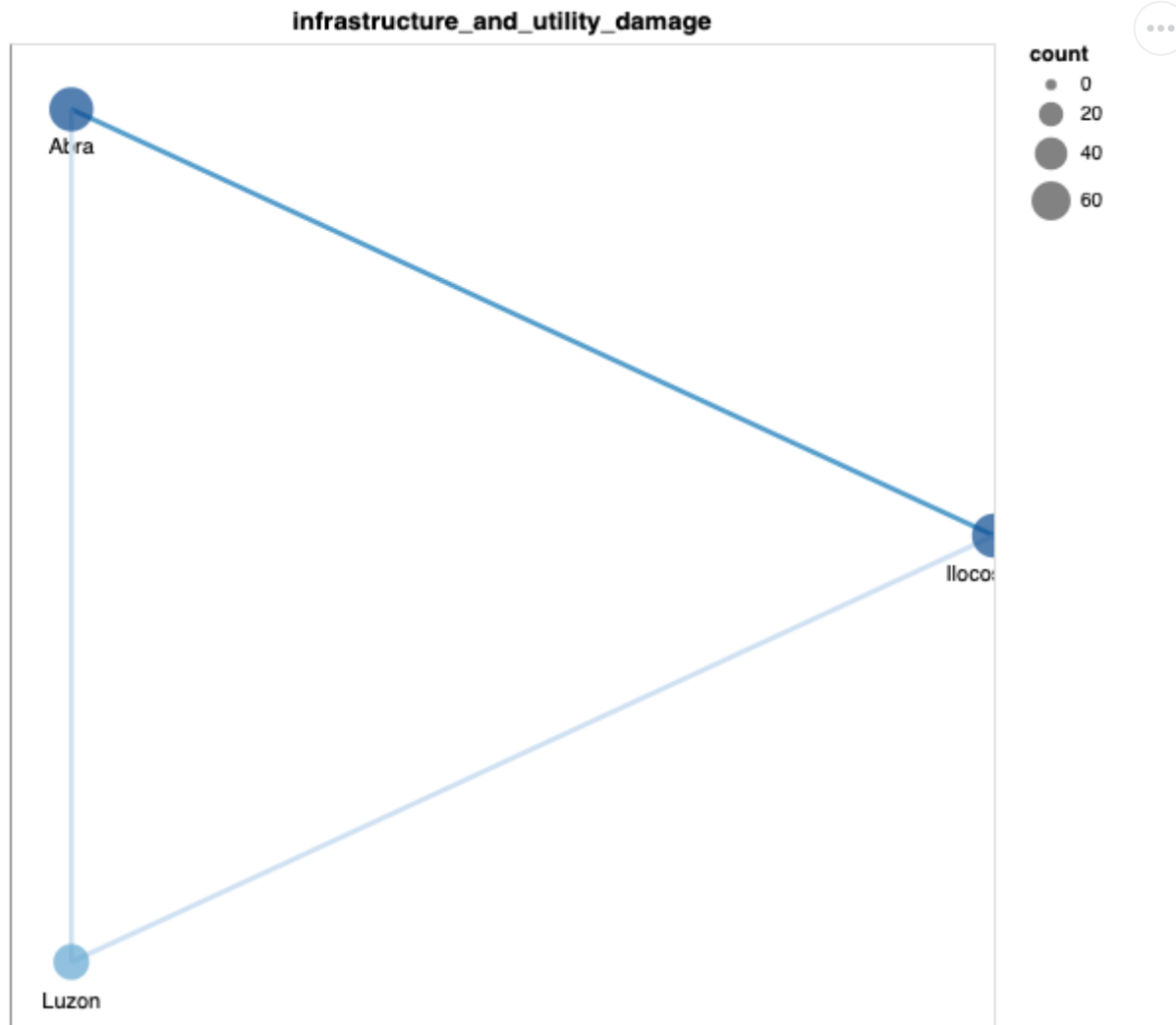
```
In [39]: show_tweets_locations(df_tweets, class_label='sympathy_and_support',
                                locations=loc_pairs[0], sample=5)
```

```
Out[39]:
```

		tweet_text	location
0	5.6 Magnitude earthquake jolts coastal parts of Balochistan...!! \nMay Allah protect our country! Ameen..\n#earthquake #Balochistan #Nepal https://t.co/Sgv0JaAwaZ	[Balochistan, Nepal]	
1	5.6 Magnitude earthquake jolts coastal parts of Balochistan...!! \nMay Allah protect our country! Ameen..\n#earthquake #Balochistan #Nepal https://t.co/Sgv0JaAwaZ	[Balochistan, Nepal]	
2	5.6 Magnitude earthquake jolts coastal parts of Balochistan...!! \nMay Allah protect our country! Ameen..\n#earthquake #Balochistan #Nepal https://t.co/Sgv0JaAwaZ	[Balochistan, Nepal]	
3	5.6 Magnitude earthquake jolts coastal parts of Balochistan...!! \nMay Allah protect our country! Ameen..\n#earthquake #Balochistan #Nepal https://t.co/Sgv0JaAwaZ	[Balochistan, Nepal]	
4	5.6 Magnitude earthquake jolts coastal parts of Balochistan...!! \nMay Allah protect our country! Ameen..\n#earthquake #Balochistan #Nepal https://t.co/Sgv0JaAwaZ	[Balochistan, Nepal]	

```
In [40]: plot_disaster_mentions(df_loc_graph, 'infrastructure_and_utility_damage',  
                                'infrastructure_and_utility_damage')
```

Out[40]:



**Get the most frequent location pair**

```
In [41]: loc_pairs = top_location_pairs(df_loc_graph, 'infrastructure_and_utility_damage', top_pairs_count=1)
loc_pairs
```

```
Out[41]: [['Ilocos Sur', 'Abra']]
```

## Show a sample for this location pair

```
In [42]: show_tweets_locations(df_tweets, class_label='infrastructure_and_utility_damage',
locations=loc_pairs[0], sample=5)
```

```
Out[42]:
```

	tweet_text	location
0	ICYMI: A total of 20,533 houses in northern Luzon were heavily damaged by the magnitude 7 earthquake that jolted the provinces of Abra, Ilocos Sur, La Union, Pangasinan, Kalinga Apayao, Benguet, Ifugao, and Mountain Province on July 27. <a href="https://t.co/LF19bOztui">https://t.co/LF19bOztui</a>	[Luzon, Abra, Ilocos Sur, La Union, Pangasinan, Kalinga Apayao, Benguet, Ifugao, Mountain Province]
1	A team consisting of seven faculty and staff members from ICE has just concluded their post-disaster damage assessment in select heritage sites in Vigan, Ilocos Sur following the recent earthquake that occurred in Abra last July 27. #ServeThePeople #DRRM #HeritageSites <a href="https://t.co/LF19bOztui">https://t.co/LF19bOztui</a>	[Vigan, Ilocos Sur, Abra]
2	ICYMI: A total of 20,533 houses in northern Luzon were heavily damaged by the magnitude 7 earthquake that jolted the provinces of Abra, Ilocos Sur, La Union, Pangasinan, Kalinga Apayao, Benguet, Ifugao, and Mountain Province on July 27. <a href="https://t.co/LF19bOztui">https://t.co/LF19bOztui</a>	[Luzon, Abra, Ilocos Sur, La Union, Pangasinan, Kalinga Apayao, Benguet, Ifugao, Mountain Province]
3	A team consisting of seven faculty and staff members from ICE has just concluded their post-disaster damage assessment in select heritage sites in Vigan, Ilocos Sur following the recent earthquake that occurred in Abra last July 27. #ServeThePeople #DRRM #HeritageSites <a href="https://t.co/LF19bOztui">https://t.co/LF19bOztui</a>	[Vigan, Ilocos Sur, Abra]
4	A team consisting of seven faculty and staff members from ICE has just concluded their post-disaster damage assessment in select heritage sites in Vigan, Ilocos Sur following the recent earthquake that occurred in Abra last July 27. #ServeThePeople #DRRM #HeritageSites <a href="https://t.co/LF19bOztui">https://t.co/LF19bOztui</a>	[Vigan, Ilocos Sur, Abra]

```
In [ ]:
```