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]:
```python
# Parameters
random_seed = 42
disaster_kind = "recent_tweets_flood"
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_floc
        "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_flood.
}
```

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

Disaster kind: Flood

Load the sample of recent tweets

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

Out[5]:

	author_id	tweet_text	created_at	hashtags	users
23806	1150415456	@CharlieJGardner I have taken on a new nature reserve recently. All the old drainage ditches are designed to evacuate water. I am drawing up a plan to absolutely hold the water with LOTS of leaky dams and scrapes etc. I will see a significant increase in wildlife value and th...	2022-08-05 17:01:59+00:00	[]	['CharlieJGardner']
48702	229114225	"I had a lot of time to think about a lot of things and how quick life can go by you." Another tail of #survival during the #Kentucky #floods - listen to this Fire Chief explain how he had to shoot his way out of his truck as it filled up with flood water. https://t.co/pBiLgl...	2022-08-04 20:44:41+00:00	['survival', 'Kentucky', 'floods']	[]
85649	1369878909811105795	RT @CMShehbaz: Nation is deeply grieved on the martyrdom of Lt. General Sarfraz Ali & 5 other officers of Pakistan Army. They were doing a…	2022-08-03 10:16:37+00:00	[]	['CMShehbaz']
108402	1182892486672273409	RT @momentmemori: Something extraordinary, Jawans risked their own life to rescue flood victims in Balochistan. https://t.co/MiPIm7bedH	2022-08-02 13:40:56+00:00	[]	['momentmemori']
133109	36240076	Kentucky officials search for missing residents with flood death toll expected to rise - CNN https://t.co/CUh4rs63sh	2022-08-01 12:09:39+00:00	[]	[]

Extract the locations from the tweet sample

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

df_tweets.sample(5)
```

```
144000it [15:42, 152.74it/s]

CPU times: user 16min 39s, sys: 19.6 s, total: 16min 58s
Wall time: 17min 25s
```

Out[6]:

	author_id	tweet_text	created_at	hashtags	users	location
61285	1532408386247065601	RT @abdoshSham: The #GERD benefits Sudan by reducing flood damage. Managing sediment load (which enhances operation of 🇸🇩 's power plants),…	2022-08-04 07:55:06+00:00	['GERD']	['abdoshSham']	[Sudan]
54833	2754087252	No words to praise this old man who's son Major Saeed embraced SHAHADAT during flood relief operation. ARMY 🪖 IS OUR ONLY HOPE.\n#مجرم_عمران_کو_گرفتار_کرو\n#غلامو_پاکستان_کتنے_میں_بیچا\n#CommonwealthGames2022 \n#JunagadhIsPakistan \n#ApnaDrFarooqSattar @OfficialDGISPR https://…	2022-08-04 15:42:58+00:00	['مجرم_عمران_کو_گرفتار_کرو', 'غلامو_پاکستان_کتنے_میں_بیچا', 'CommonwealthGames2022', 'JunagadhIsPakistan', 'ApnaDrFarooqSattar']	['OfficialDGISPR']	[]
100373	780020227	RT @nytimes: Helicopter rescue teams evacuated people from rooftops during deadly floods in Kentucky's southeast. Hundreds of people are di…	2022-08-02 21:16:35+00:00	[]	['nytimes']	[Kentucky's]
143900	5439842	RT @KentuckyMBB: #BBN, we need you on Tuesday.\n\nJoin us for an open practice at Rupp Arena and the Kentucky Flood Relief Telethon with proc…	2022-07-31 22:37:07+00:00	['BBN']	['KentuckyMBB']	[Rupp Arena]
101098	1340414715726618631	RT @PsfMirshazad: Inna lillah e wa inna elaih e raajioon \nAllah bless their souls in jannah with higher ranks. \nEfforts of army during floo…	2022-08-02 20:13:22+00:00	[]	['PsfMirshazad']	[]

In [7]: `df_locs_most_common`

Out[7]:

	location	count
0	Balochistan	14825
1	Kentucky	10215
2	Pakistan	9684
3	Lasbela	6493
4	Sirsa	5560
5	Eastern Kentucky	2195
6	Punjab	1132
7	Rupp Arena	1073
8	South Punjab	926
9	Tank	807

Predict the class labels

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

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

In [10]:
```python
%%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 50.3 s, sys: 271 ms, total: 50.5 s
Wall time: 50.6 s
```

Out[10]:

	author_id	tweet_text	created_at	hashtags	users	location	
108473	1162050233372696576	RT @aamnaisani: Devastating news of the Pak Army helicopter that crashed in bad weather, on flood relief op in Balochistan. Six precious li…	2022-08-02 13:39:09+00:00	[]	['aamnaisani']	[bad weather, Balochistan]	rescue_vol
56459	44170811	"Ranking Member Capito said, 'In addition to addressing needs across the United States, this legislation advances important flood control projects for West Virginia, and delivers support for water and wastewater services in the state." https://t.co/XL0WGH5qmc	2022-08-04 16:00:02+00:00	[]	[]	[United States, West Virginia]	rescue_vol
61697	369337931	Consulate General of Israel to the Southeastern US partners with Project Friendship on relief efforts to eastern Kentucky flood victims https://t.co/xCRH2V057B via @JNS_org	2022-08-04 05:16:30+00:00	[]	['JNS_org']	[Israel, Southeastern US, Kentucky, https://t.co/xCRH2V057B]	rescue_vol
100248	36094443	RT @ryanhermens: For nearly 50 years, Gwen Christian has worked at the IGA in Isom, Ky. She began as a cashier in 1973.\n\nIn 1998, she and h…	2022-08-02 21:31:47+00:00	[]	['ryanhermens']	[Isom, Ky]	rescue_vol

	author_id	tweet_text	created_at	hashtags	users	location	
48602	2709986947	RT @KPC4me: Relief efforts in Letcher County for the Southeast Kentucky flood victims. @CintasCorp #WeAreKEDC #EKYStrong #RiseUp #606strong…	2022-08-04 21:27:09+00:00	['WeAreKEDC', 'EKYStrong', 'RiseUp', '606strong']	['KPC4me', 'CintasCorp']	[Letcher County, Southeast Kentucky, WeAreKEDC]	rescue_vol

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']).c
         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 16:00:00+00:00	caution_and_advice	37
1	2022-07-31 16:00:00+00:00	infrastructure_and_utility_damage	4
2	2022-07-31 16:00:00+00:00	injured_or_dead_people	135
3	2022-07-31 16:00:00+00:00	not_humanitarian	12
4	2022-07-31 16:00:00+00:00	other_relevant_information	122

Prepare the time series grouped by location label

In [12]:
```python
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
3	2022-07-31 16:00:00+00:00	Balochistan	9
12	2022-07-31 16:00:00+00:00	Eastern Kentucky	16
23	2022-07-31 16:00:00+00:00	Kentucky	127
33	2022-07-31 16:00:00+00:00	Pakistan	56
35	2022-07-31 16:00:00+00:00	Punjab	4

Find the top 10 locations in the tweets sample

```
In [13]:  top10_locs = list(df_group_explode['location'].unique())
          top10_locs
```
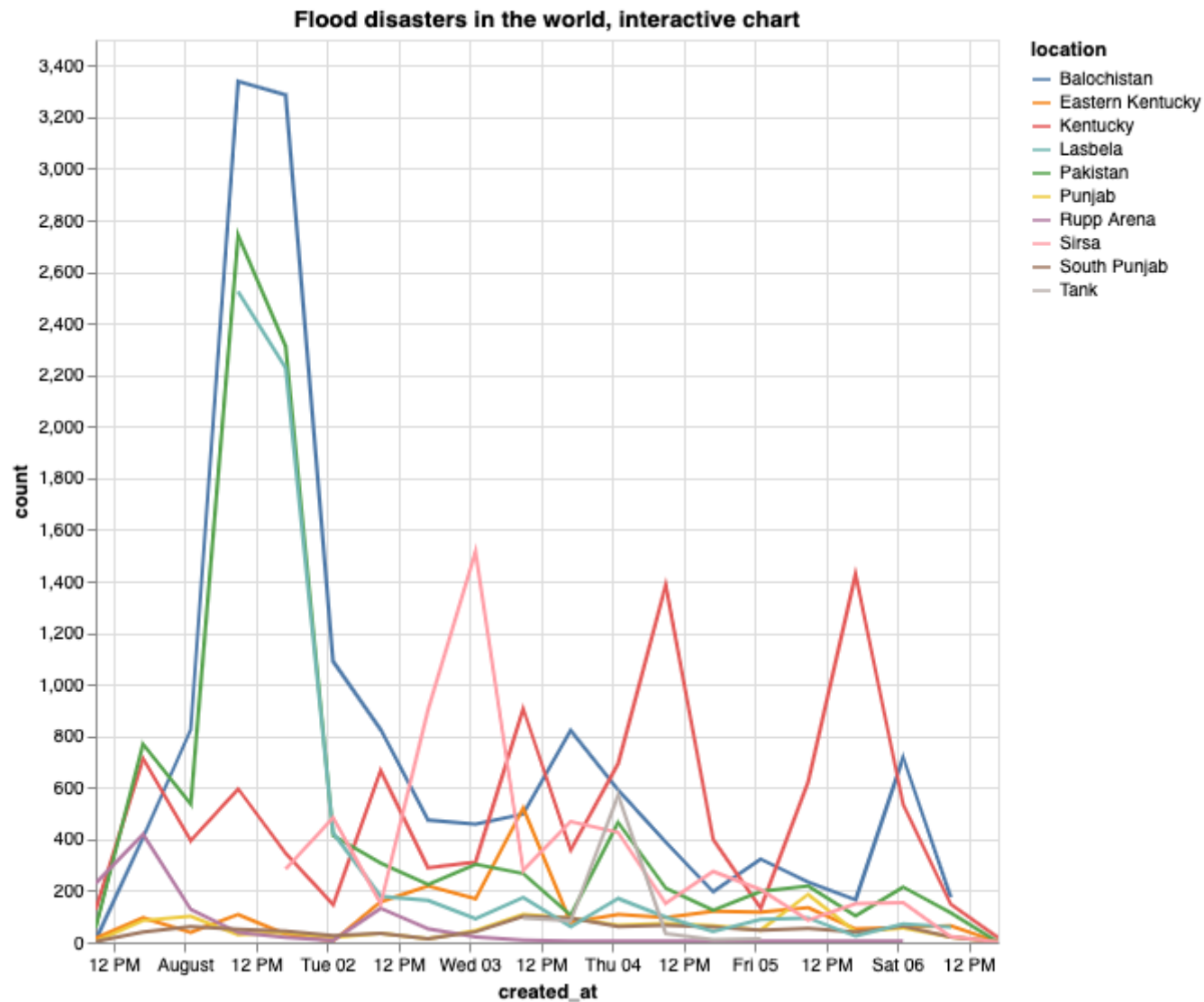
```
Out[13]:  ['Balochistan',
           'Eastern Kentucky',
           'Kentucky',
           'Pakistan',
           'Punjab',
           'Rupp Arena',
           'South Punjab',
           'Lasbela',
           'Sirsa',
           'Tank']
```

In [14]:
```python
chart = alt.Chart(df_group_explode[df_group_explode['location'].isin(top10_locs)]).mark_line(size=2).enc
    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]:
```python
df_top_locations = top_locations(df_tweets, top10_locs)
df_top_locations.sample(5)
```

Out[15]:

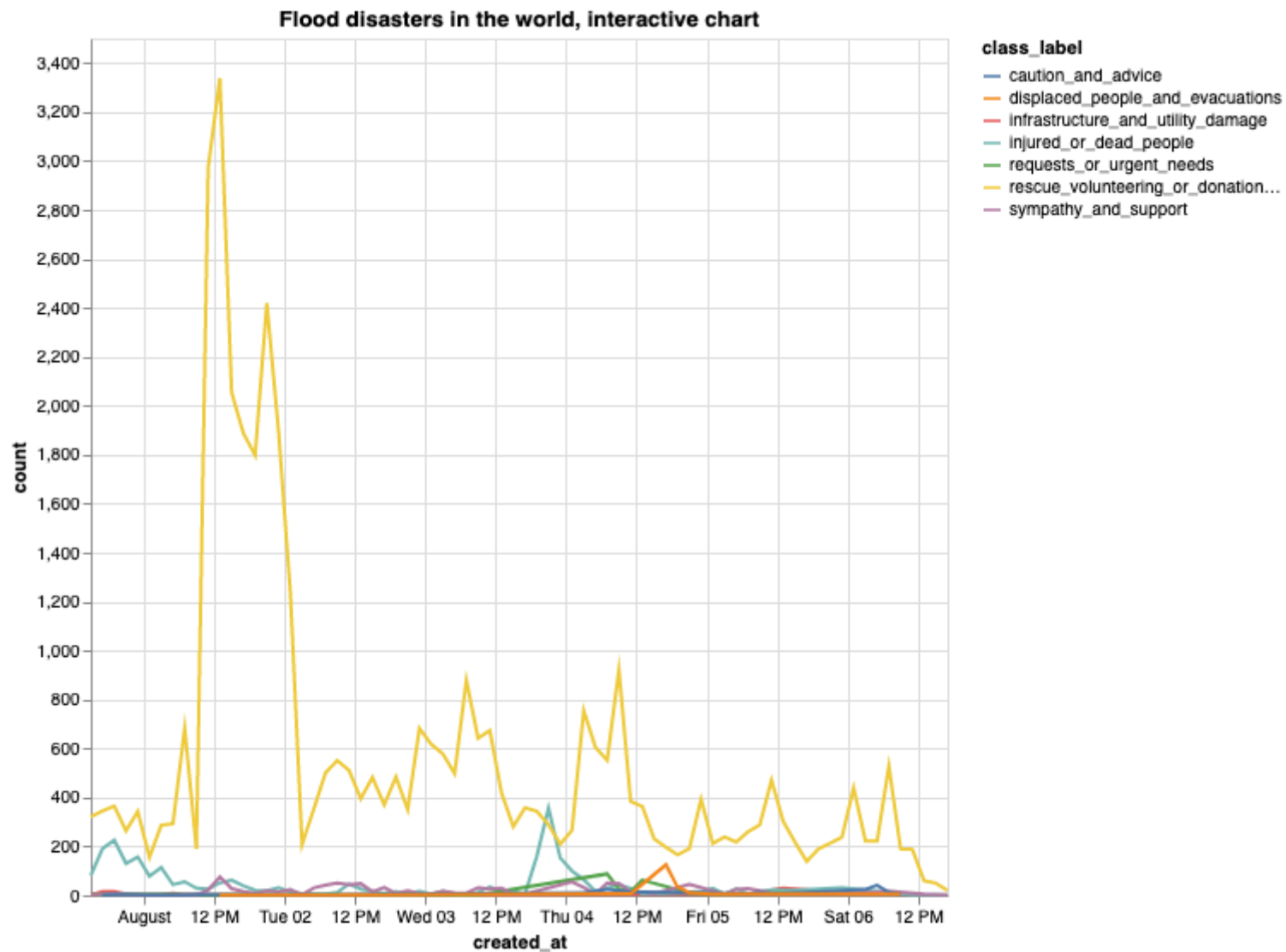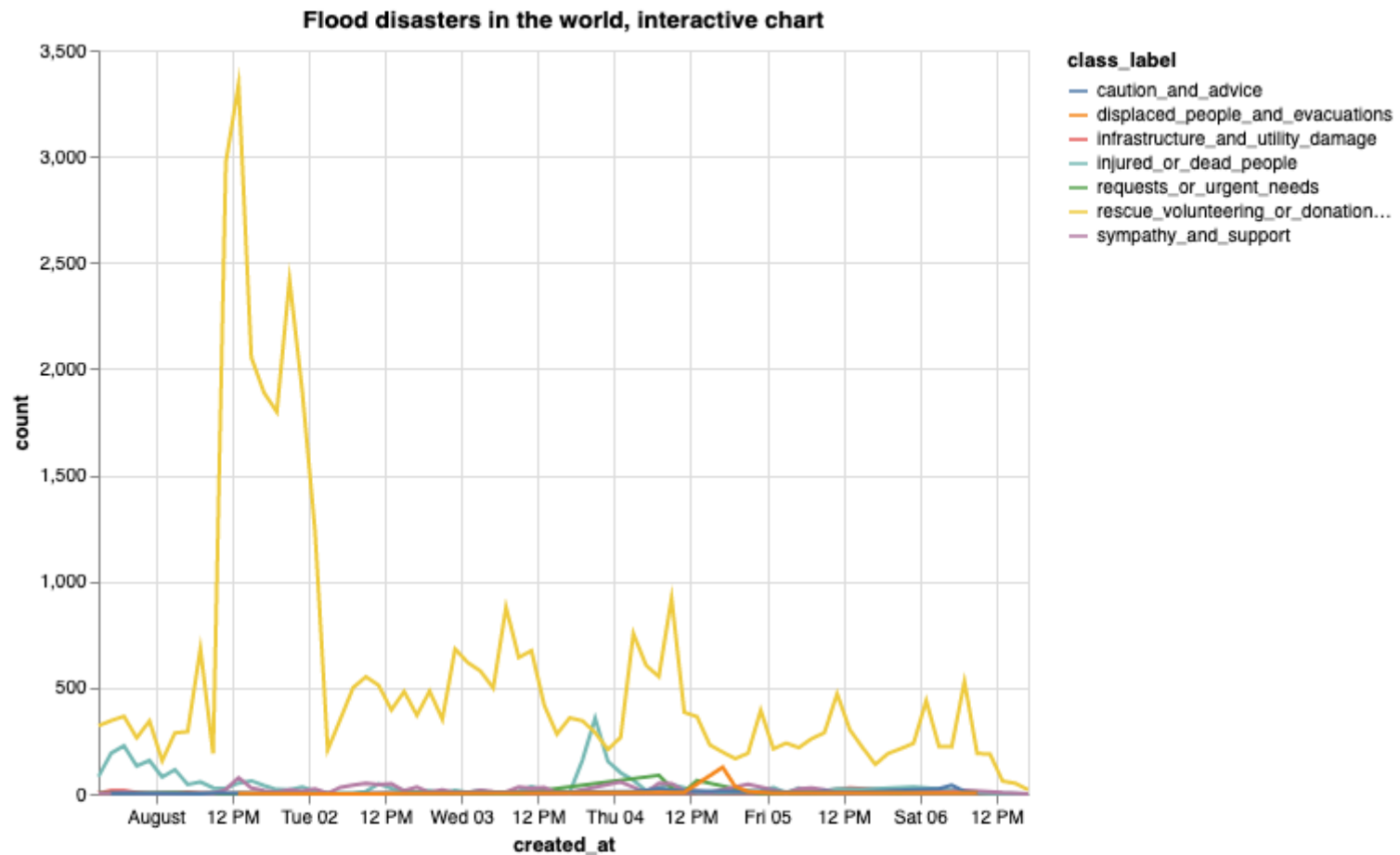|	created_at	class_label	locations	count
206	2022-08-03 20:00:00+00:00	injured_or_dead_people	[Balochistan, Pakistan]	18
247	2022-08-04 14:00:00+00:00	requests_or_urgent_needs	[Kentucky]	88
229	2022-08-04 08:00:00+00:00	injured_or_dead_people	[Balochistan, Kentucky]	100
66	2022-08-01 18:00:00+00:00	injured_or_dead_people	[Balochistan, Kentucky]	27
157	2022-08-03 00:00:00+00:00	other_relevant_information	[Balochistan, Eastern Kentucky, Kentucky]	77

Define the class labels we are interested in

In [16]:
```python
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]:
```python
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]:

Flood disasters in the world, interactive chart

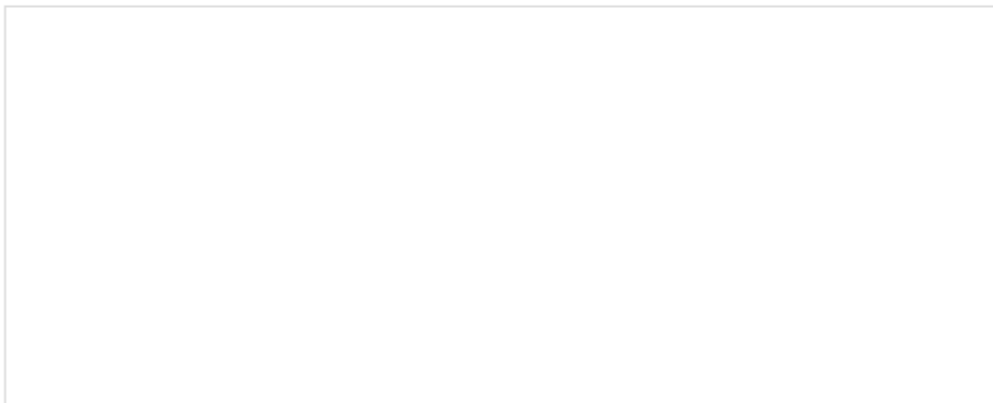## Show sample tweets per most important locations above

In [18]:
```python
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
362	2022-08-06 18:00:00+00:00	injured_or_dead_people	[RT @PostGraphics: Death toll up to 15 in Kentucky flood disaster. Number expected to climb.\nhttps://t.co/Q0mYaFHspw https://t.co/xyAAvSFUl3]	[Kentucky]	4
83	2022-08-01 22:00:00+00:00	rescue_volunteering_or_donation_effort	[RT @sendrelief: 🛡️ #KentuckyFloods Update! 🛡️ \n\nYour gifts to our Kentucky flood response are providing 5,000 meals A WEEK to families who hav…, Deep saddened by the tragic helicopter crash and loss of precious lives of Pakistan army officers including Lieutenant General Sarf…	[Balochistan, Lasbela, Pakistan]	2054
275	2022-08-05 00:00:00+00:00	other_relevant_information	[Kentucky flood leaves residents searching for drinking water\nhttps://t.co/sphhpItx1L, RT @yoHatred: Actually if all of my friends could share this I'd appreciate it. We're being devastated by record level flooding. 29+ dead…., Governor Parson requests federal disaster relie…	[Kentucky, Pakistan]	18
366	2022-08-06 20:00:00+00:00	rescue_volunteering_or_donation_effort	[RT @HDAHOME1: Want to help with flood relief efforts in East Kentucky? Sign up to #volunteer here. #FloodRelief https://t.co/chkqTR75EF, A volunteer disaster relief organization in Bridgeton help flood victims clean up their homes after July's flash flooding. https://t.co/0A…	[Balochistan, Eastern Kentucky, Pakistan]	60
278	2022-08-05 02:00:00+00:00	not_humanitarian	[@BidenTour @ghostofsmitty @kim_because @Godfly__ @smetzger73 @MichaelSteidel @TheCOAPodcast @michellmybell1 @megafant1 @impeachqueen @Megavolt1 @dirk_fasshauer @Damien101a @MucusMucous @Skeptic_AA @wpcguy @JaTapps @MindfulDamage @naughtmai @PatricktheB @BrianNazarenus @malo_…	[Kentucky]	6

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

Out[19]:

Flood disasters in the world, interactive chart

class_label
- caution_and_advice
- displaced_people_and_evacuations
- infrastructure_and_utility_damage
- injured_or_dead_people
- requests_or_urgent_needs
- rescue_volunteering_or_donation...
- sympathy_and_support

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]: ['Balochistan',
          'Kentucky',
          'Pakistan',
          'Lasbela',
          'Sirsa',
          'Eastern Kentucky',
          'Punjab',
          'Rupp Arena',
          'South Punjab',
          'Tank',
          'Sudan',
          'Kentucky's',
          '@GovernmentKP',
          'Floodwater',
          'Quetta',
          'Sindh',
          'Orangi Town 5',
          'Isom, Ky',
          'Helicopter',
          'UK']
```

Get the tweets for just the top 20 locations

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

Out[21]:

	class_label	location_x	location_y	count
4	not_humanitarian	UK	Pakistan	28
22	rescue_volunteering_or_donation_effort	Quetta	Balochistan	40
9	other_relevant_information	Pakistan	Lasbela	1
7	other_relevant_information	Lasbela	Balochistan	121
37	sympathy_and_support	Lasbela	Balochistan	169
30	rescue_volunteering_or_donation_effort	South Punjab	Punjab	814
36	sympathy_and_support	Helicopter	Balochistan	175
38	sympathy_and_support	Lasbela	Helicopter	168
33	rescue_volunteering_or_donation_effort	UK	Eastern Kentucky	10
19	rescue_volunteering_or_donation_effort	Pakistan	Balochistan	5968

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

Out[22]: 'No records found for class caution_and_advice'

Get the most frequent location pair

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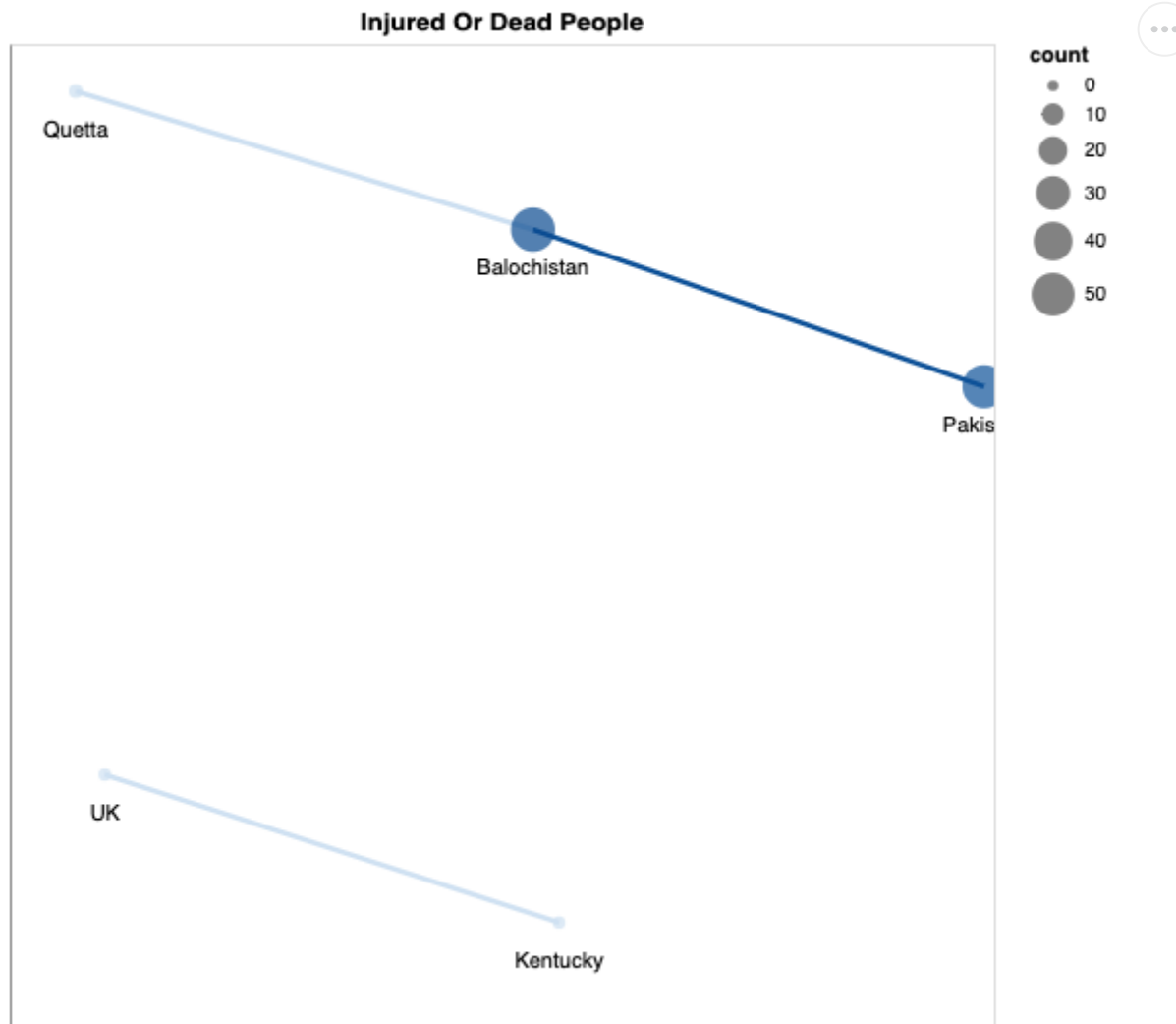
Out[23]: [[]]

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]: 'No location pairs provided'

```
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]:

Injured Or Dead People

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]: `[['Pakistan', 'Balochistan']]`

Show a sample for this location pair
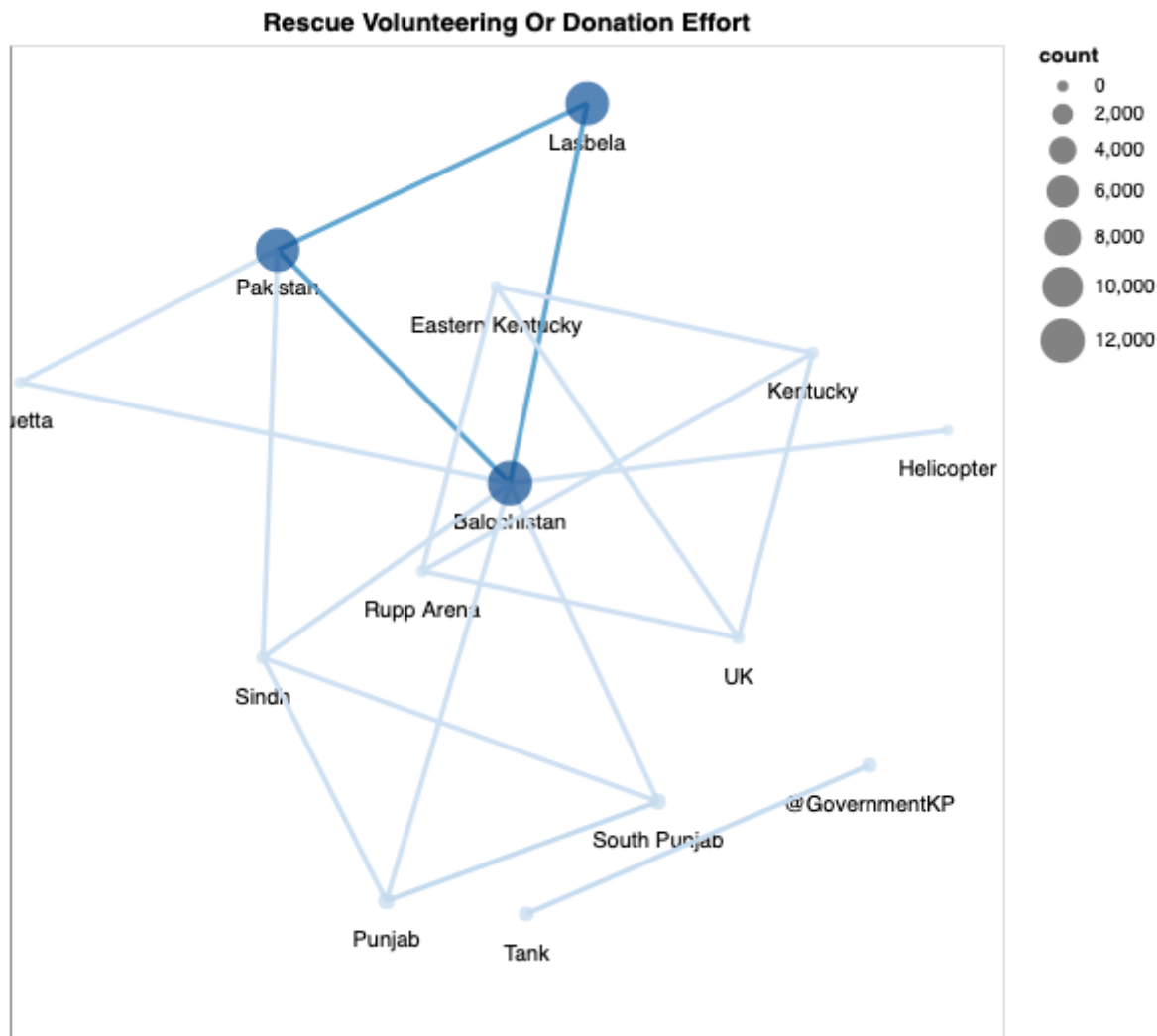
```
In [30]: show_tweets_locations(df_tweets, class_label='injured_or_dead_people' , locations=loc_pairs[0], sample=5
```

Out[30]:

	tweet_text	location
0	RT @BNNPK: BREAKING: Death toll hit to 170 as four more people died due to rains and floods in Balochistan, According to Pakistan Disaster…	[Balochistan, Pakistan]
1	RT @ThePakDaily: The death toll in flood-affected districts of Balochistan has risen to 136 while 70 persons have been injured.\n#Pakistan #…	[Balochistan, Pakistan]
2	RT @BNNPK: BREAKING: Death toll hit to 170 as four more people died due to rains and floods in Balochistan, According to Pakistan Disaster…	[Balochistan, Pakistan]
3	The death toll in flood-affected districts of Balochistan has risen to 136 while 70 persons have been injured.\n#Pakistan #Balochistan #balochistanfloods #floods https://t.co/2BtsCoUZSU	[Balochistan, Pakistan, Balochistan]
4	RT @ThePakDaily: The death toll in flood-affected districts of Balochistan has risen to 136 while 70 persons have been injured.\n#Pakistan #…	[Balochistan, Pakistan]

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]: `[['Pakistan', 'Balochistan']]`

## 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 @OfficialDGISPR: A Pakistan army aviation helicopter which was on flood relief operations in Lasbela, Balochistan lost contact with ATC…	[Pakistan, Lasbela, Balochistan]
1	RT @OfficialDGISPR: A Pakistan army aviation helicopter which was on flood relief operations in Lasbela, Balochistan lost contact with ATC…	[Pakistan, Lasbela, Balochistan]
2	RT @OfficialDGISPR: A Pakistan army aviation helicopter which was on flood relief operations in Lasbela, Balochistan lost contact with ATC…	[Pakistan, Lasbela, Balochistan]
3	RT @OfficialDGISPR: A Pakistan army aviation helicopter which was on flood relief operations in Lasbela, Balochistan lost contact with ATC…	[Pakistan, Lasbela, Balochistan]
4	RT @OfficialDGISPR: A Pakistan army aviation helicopter which was on flood relief operations in Lasbela, Balochistan lost contact with ATC…	[Pakistan, Lasbela, Balochistan]

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
```

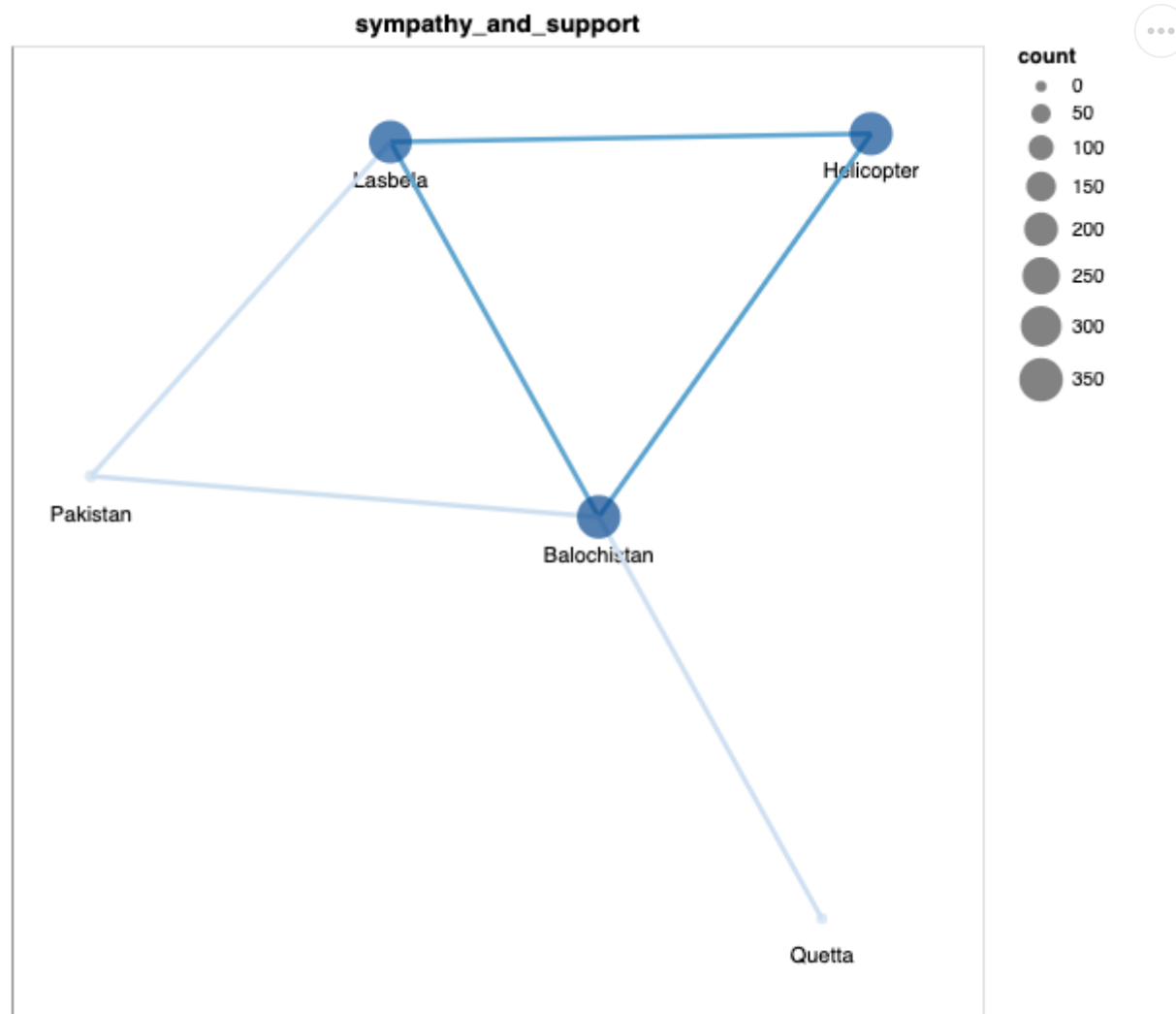Out[35]: `[[]]`

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]:

sympathy_and_support

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]: [['Helicopter', 'Balochistan']]
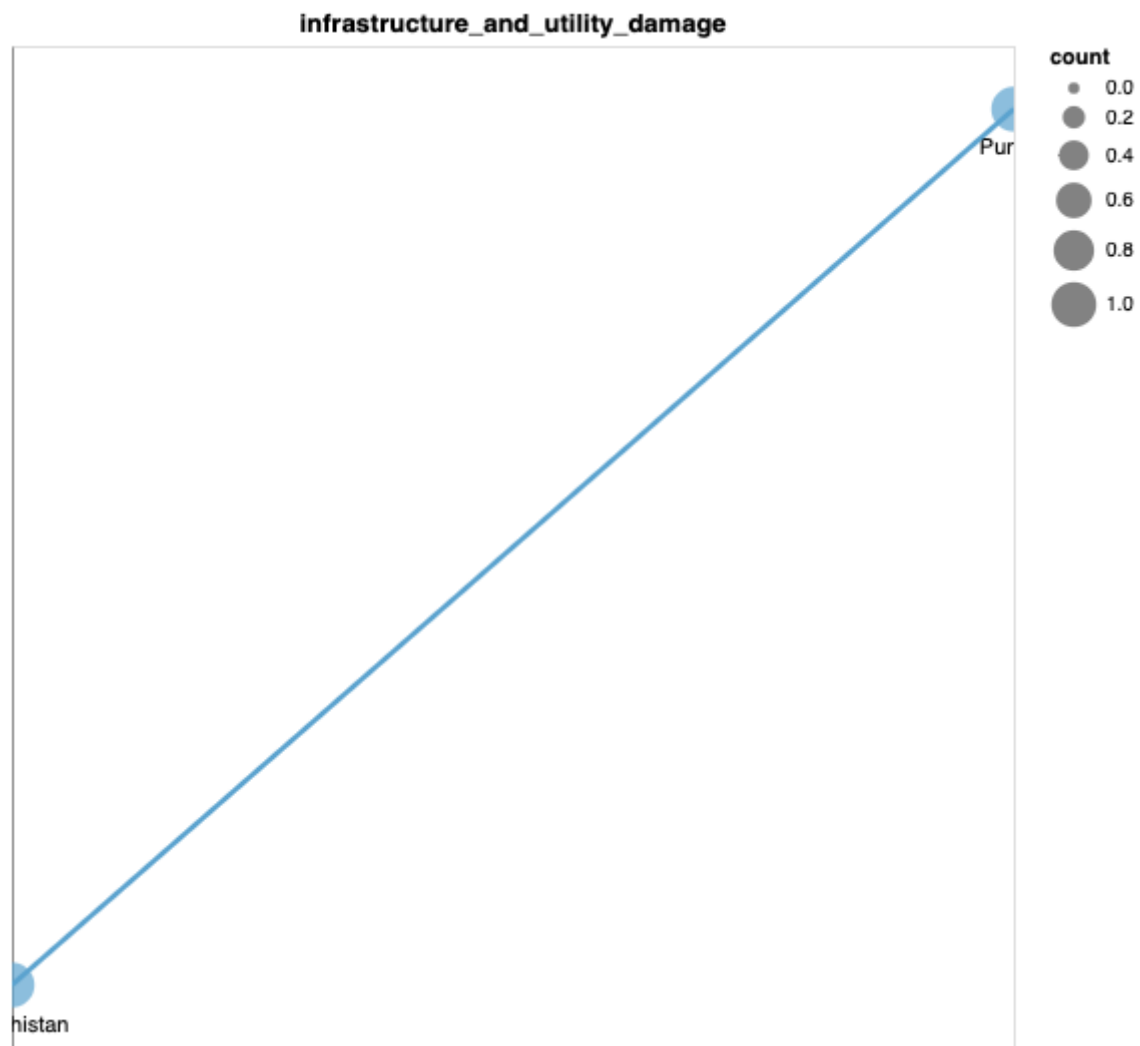
Show a sample for this location pair

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

Out[39]:

	tweet_text	location
0	A great loss of nation !!\n\nMay Allah elevate the status of our martyrs lost in a Helicopter crash during a flood relief operation in Balochistan near Lasbela.\n\n #WeSaluteOurHeroes	[Helicopter, Balochistan, Lasbela]
1	A great loss of nation !!\nMay Allah elevate the status of our martyrs lost in a Helicopter crash during a flood relief operation in Balochistan near Lasbela.\n\n #WeSaluteOurHeroes	[Helicopter, Balochistan, Lasbela]
2	A great loss of nation !!\nMay Allah elevate the status of our martyrs lost in a Helicopter crash during a flood relief operation in Balochistan near Lasbela. \n #WeSaluteOurHeroes https://t.co/qBTmQ2m6m2	[Helicopter, Balochistan, Lasbela]
3	A great loss of nation !!\nMay Allah elevate the status of our martyrs lost in a Helicopter crash during a flood relief operation in Balochistan near Lasbela. \n #WeSaluteOurHeroes https://t.co/6snLQVdRQZ	[Helicopter, Balochistan, Lasbela]
4	A great loss of nation !!\nMay Allah elevate the status of our martyrs lost in a Helicopter crash during a flood relief operation in Balochistan near Lasbela.\n#WeSaluteOurHeroes	[Helicopter, Balochistan, Lasbela]

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

Out[40]:

infrastructure_and_utility_damage

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]: [['Punjab', 'Balochistan']]

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	RT @SaadUrR11747632: Flood has destroyed Balochistan and south Punjab very badly\nOver 300 people had lost their lives\n@AlkhidmatOrg and its…	[Balochistan, Punjab]

In [ ]: