

PS2_AndrewYu

July 8, 2023

```
[17]: from google.colab import drive

drive.mount('/content/drive')
FOLDERNAME = "Stanford Summer Session/SOC 128D"

#Packages for working with data
# Modin is a drop-in replacement for pandas, with multiple advantages
!pip install "modin[dask]"
import modin.pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb
import numpy as np
```

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

Requirement already satisfied: modin[dask] in /usr/local/lib/python3.10/dist-packages (0.23.0)

Requirement already satisfied: pandas<2.1,>=2 in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (2.0.3)

Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (23.1)

Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (1.22.4)

Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (2023.6.0)

Requirement already satisfied: psutil in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (5.9.5)

Requirement already satisfied: dask>=2.22.0 in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (2022.12.1)

Requirement already satisfied: distributed>=2.22.0 in /usr/local/lib/python3.10/dist-packages (from modin[dask]) (2022.12.1)

Requirement already satisfied: click>=7.0 in /usr/local/lib/python3.10/dist-packages (from dask>=2.22.0->modin[dask]) (8.1.3)

Requirement already satisfied: cloudpickle>=1.1.1 in /usr/local/lib/python3.10/dist-packages (from dask>=2.22.0->modin[dask]) (2.2.1)

Requirement already satisfied: partd>=0.3.10 in /usr/local/lib/python3.10/dist-packages (from dask>=2.22.0->modin[dask]) (1.4.0)

Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.10/dist-

```

packages (from dask>=2.22.0->modin[dask]) (6.0)
Requirement already satisfied: toolz>=0.8.2 in /usr/local/lib/python3.10/dist-
packages (from dask>=2.22.0->modin[dask]) (0.12.0)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages
(from distributed>=2.22.0->modin[dask]) (3.1.2)
Requirement already satisfied: locket>=1.0.0 in /usr/local/lib/python3.10/dist-
packages (from distributed>=2.22.0->modin[dask]) (1.0.0)
Requirement already satisfied: msgpack>=0.6.0 in /usr/local/lib/python3.10/dist-
packages (from distributed>=2.22.0->modin[dask]) (1.0.5)
Requirement already satisfied: sortedcontainers!=2.0.0,!=2.0.1 in
/usr/local/lib/python3.10/dist-packages (from distributed>=2.22.0->modin[dask])
(2.4.0)
Requirement already satisfied: tblib>=1.6.0 in /usr/local/lib/python3.10/dist-
packages (from distributed>=2.22.0->modin[dask]) (2.0.0)
Requirement already satisfied: tornado>=6.0.3 in /usr/local/lib/python3.10/dist-
packages (from distributed>=2.22.0->modin[dask]) (6.3.1)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.10/dist-
packages (from distributed>=2.22.0->modin[dask]) (1.26.16)
Requirement already satisfied: zict>=0.1.3 in /usr/local/lib/python3.10/dist-
packages (from distributed>=2.22.0->modin[dask]) (3.0.0)
Requirement already satisfied: python-dateutil>=2.8.2 in
/usr/local/lib/python3.10/dist-packages (from pandas<2.1,>=2->modin[dask])
(2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-
packages (from pandas<2.1,>=2->modin[dask]) (2022.7.1)
Requirement already satisfied: tzdata>=2022.1 in /usr/local/lib/python3.10/dist-
packages (from pandas<2.1,>=2->modin[dask]) (2023.3)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-
packages (from python-dateutil>=2.8.2->pandas<2.1,>=2->modin[dask]) (1.16.0)
Requirement already satisfied: MarkupSafe>=2.0 in
/usr/local/lib/python3.10/dist-packages (from
jinja2->distributed>=2.22.0->modin[dask]) (2.1.3)

```

1. Load the temps.csv dataframe into your environment. Write a function that transforms the Fahrenheit temperatures to Celsius, and create a new variable for the Celsius temperatures.

```

[2]: def f_to_celsius(f):
      return round((f - 32) * 5/9, 1)

temps_df = pd.read_csv(f"drive/My Drive/{FOLDERNAME}/temps.csv")
temps_df.insert(len(temps_df.columns), "Annual Average Temperature (C)",
    ↪f_to_celsius(temps_df["Annual Average Temperature (F)"]))
temps_df

```

UserWarning: Dask execution environment not yet initialized. Initializing...
 To remove this warning, run the following python code before doing dataframe operations:

```
from distributed import Client
```

```
client = Client()
```

```
INFO:distributed.http.proxy:To route to workers diagnostics web server please
install jupyter-server-proxy: python -m pip install jupyter-server-proxy
INFO:distributed.scheduler:State start
INFO:distributed.scheduler: Scheduler at:      tcp://127.0.0.1:36987
INFO:distributed.scheduler: dashboard at:      127.0.0.1:8787
INFO:distributed.nanny:      Start Nanny at: 'tcp://127.0.0.1:43467'
INFO:distributed.nanny:      Start Nanny at: 'tcp://127.0.0.1:43289'
INFO:distributed.scheduler:Register worker <WorkerState 'tcp://127.0.0.1:38535',
name: 0, status: init, memory: 0, processing: 0>
INFO:distributed.scheduler:Starting worker compute stream, tcp://127.0.0.1:38535
INFO:distributed.core:Starting established connection to tcp://127.0.0.1:37030
INFO:distributed.scheduler:Register worker <WorkerState 'tcp://127.0.0.1:37791',
name: 1, status: init, memory: 0, processing: 0>
INFO:distributed.scheduler:Starting worker compute stream, tcp://127.0.0.1:37791
INFO:distributed.core:Starting established connection to tcp://127.0.0.1:37024
INFO:distributed.scheduler:Receive client connection:
Client-d6018536-1d2c-11ee-91b0-0242ac1c000c
INFO:distributed.core:Starting established connection to tcp://127.0.0.1:37042
UserWarning: `read_*` implementation has mismatches with pandas:
Data types of partitions are different! Please refer to the troubleshooting
section of the Modin documentation to fix this issue.
```

```
[2]:
```

	Year	Annual Average Temperature (F)	\
0	1875	52.5	
1	1876	51.5	
2	1877	52.0	
3	1878	52.5	
4	1879	52.7	
..	
144	2019	53.6	
145	2020	55.7	
146	2021	56.3	
147	2022	55.9	
148	Average Annual Temperature	52.2	

	Annual Average Temperature (C)
0	11.4
1	10.8
2	11.1
3	11.4
4	11.5
..	...
144	12.0

145	13.2
146	13.5
147	13.3
148	11.2

[149 rows x 3 columns]

2. Try out the gtrendsR package! Load it into your machine, library it, and try searching for one or more environmental keywords of your choosing (e.g. “carbon sequestration”, “hurricane harvey”, “fossil fuels”, “climate justice”, etc.). Plot these keywords over time, and see if you can explain the spikes and dips in searches.

```
[3]: # Pytrends implements Google Trends
!pip install pytrends
from pytrends.request import TrendReq

requests_args = {
    "headers": {
        "Host": "trends.google.com",
        "User-Agent": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10.15; rv:109.0)
↳ Gecko/20100101 Firefox/111.0",
        "Accept": "application/json, text/plain, */*",
        "Accept-Language": "en-US,en;q=0.5",
        "Accept-Encoding": "gzip, deflate, br",
        "Alt-Used": "trends.google.com",
        "Connection": "keep-alive",
        "Referer": "https://trends.google.com/",
    }
}
```

```

        "Cookie": "SEARCH_SAMESITE=CgQIwpgB;␣
        ↪SID=YQjWN9CuJ4HHrF4EjGCaG1Z2Jyifbv600nDQg76fPKWONo1Q0koI8yLaaDxrRq-hrqZj8g.;␣
        ↪__Secure-1PSID=YQjWN9CuJ4HHrF4EjGCaG1Z2Jyifbv600nDQg76fPKWONo1Q10722kWgQrBA9t_Z61hQHg.
        ↪;␣
        ↪__Secure-3PSID=YQjWN9CuJ4HHrF4EjGCaG1Z2Jyifbv600nDQg76fPKWONo1QwCWQe-Yg3nZqExCcJxMX4w.
        ↪; HSID=ArfC73QuVgagF6Bb8; SSID=Ar_qh6MVuR8HVi34Z; APISID=V4GiVlhTGZd_D4MH/
        ↪AjzHHd1Ey1b_0xe5F; SAPISID=moZ4P5STyHEKb_Zw/AtXyzW8ZV_50xzc0t;␣
        ↪__Secure-1PAPISID=moZ4P5STyHEKb_Zw/AtXyzW8ZV_50xzc0t;␣
        ↪__Secure-3PAPISID=moZ4P5STyHEKb_Zw/AtXyzW8ZV_50xzc0t;␣
        ↪OTZ=7098857_84_88_104280_84_446940;␣
        ↪AEC=Ad49MVF1wPsW37x137C2BzWe31XgETK49wwUWyE5l1FHlicOxsnK9gL1uwE;␣
        ↪1P_JAR=2023-07-06-21;␣
        ↪NID=511=pb9naHpUo_9JuK_OyWlszFlI589kbePM9Iu1ZwMPnTarriX9mzxsGQgqzkW9-O-RbfKvAux5BMrmUZeZSm2
        ↪␣
        ↪__Secure-1PSIDTS=sidts-CjIBPu3jIeZliCFtYEhVHpZaib3BH3mAr45zSskcUH_RJBZXWkk7cREE7ZcYoApMggRO
        ↪␣
        ↪__Secure-3PSIDTS=sidts-CjIBPu3jIeZliCFtYEhVHpZaib3BH3mAr45zSskcUH_RJBZXWkk7cREE7ZcYoApMggRO
        ↪␣
        ↪SIDCC=AP8dLtxZZNQPKyiXJbia80M5tceQEF_FylwvDPBTiZRxJj8LP1oXU6C-gQuv6-qOWZ_tUHxsUG8;
        ↪␣
        ↪__Secure-1PSIDCC=AP8dLtztLL4P6cbDpcYkESgnEgOinrozUre7jOGJe2DNC-mzD-OSOLPFDDgN7IGFaFMildb-Ry
        ↪␣
        ↪__Secure-3PSIDCC=AP8dLtwuWzi2xPrDb75UAn0ks8ABhBlYmpBljQ11jxM4JzxaYgJXDLUkp8L3XKjOgDpLAoNsT
        "Sec-Fetch-Dest": "empty",
        "Sec-Fetch-Mode": "cors",
        "Sec-Fetch-Site": "same-origin",
        "TE": "trailers"
    }
}

pytrends = TrendReq(hl='en-US', tz=360, requests_args=requests_args)
kw_list = ["Hurricane Katrina"]
geo_codes = ["US-FL", "US-LA", "US-MS", "US-KY"]
fig, ax = plt.subplots(figsize=(20,10))
for geo_code in geo_codes:
    pytrends.build_payload(kw_list, timeframe='2005-01-01 2023-07-01',␣
        ↪geo=geo_code)
    hk_df = pytrends.interest_over_time()

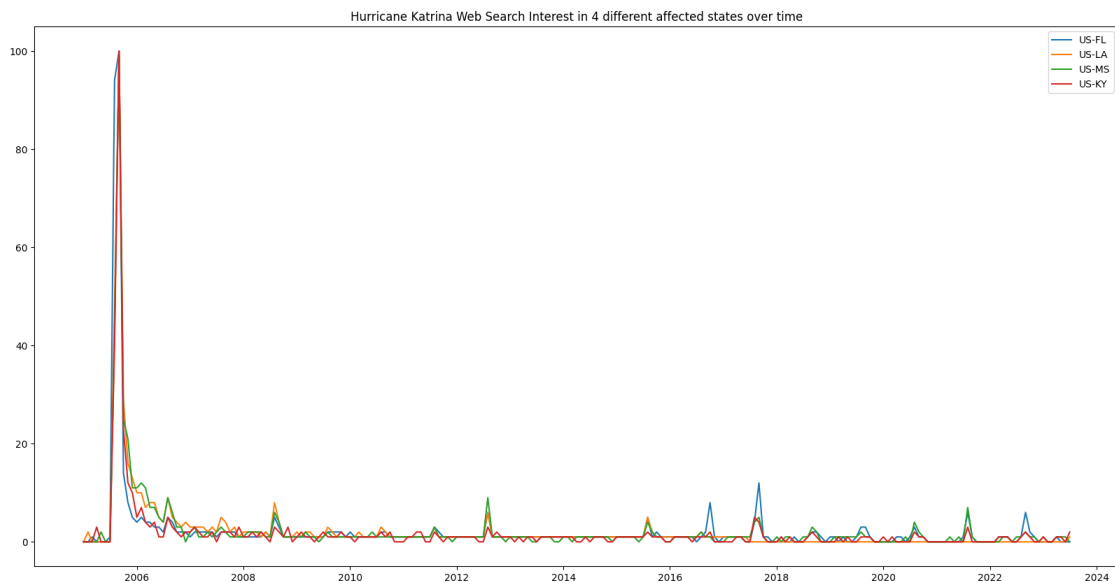
    for kw in kw_list:
        ax.plot(hk_df.index, hk_df[kw])

ax.set_title('Hurricane Katrina Web Search Interest in 4 different affected␣
        ↪states over time')
ax.legend(geo_codes)
plt.show()

```

Collecting pytrends

Downloading pytrends-4.9.2-py3-none-any.whl (15 kB)
Requirement already satisfied: requests>=2.0 in /usr/local/lib/python3.10/dist-packages (from pytrends) (2.27.1)
Requirement already satisfied: pandas>=0.25 in /usr/local/lib/python3.10/dist-packages (from pytrends) (2.0.3)
Requirement already satisfied: lxml in /usr/local/lib/python3.10/dist-packages (from pytrends) (4.9.2)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.25->pytrends) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.25->pytrends) (2022.7.1)
Requirement already satisfied: tzdata>=2022.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.25->pytrends) (2023.3)
Requirement already satisfied: numpy>=1.21.0 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.25->pytrends) (1.22.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.0->pytrends) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.0->pytrends) (2023.5.7)
Requirement already satisfied: charset-normalizer~=2.0.0 in /usr/local/lib/python3.10/dist-packages (from requests>=2.0->pytrends) (2.0.12)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.0->pytrends) (3.4)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.8.2->pandas>=0.25->pytrends) (1.16.0)
Installing collected packages: pytrends
Successfully installed pytrends-4.9.2



I plotted Hurricane Katrina over time from 2005 to 2023 for 4 different states as described in the [wikipedia page](#) which records the states of Florida, Louisiana (specifically New Orleans), Mississippi and Alabama.

This looks mostly accurate, as the wikipedia page describes the hurricane only starting in Florida and therefore not with the full potential to cause damage. This is reflected by the relatively low searches in Florida during the period of Hurricane Katrina. However, there was a huge spike around end-of-year in 2017, which corresponds to the 2017 Hurricane Irma (Aug 30, 2017 – Sep 12, 2017), that heavily impacted Florida. This makes sense, as people would naturally look to past events of similar magnitude and intensity to seek advice on survival, or the media to make comparisons and draw people's attention to the issue. This is reflected by the small spikes in the same time for all other states as well.

For the other 3 states, they were in the path of a mostly/fully developed hurricane and thus wrecked the most damage. This corresponds to large spikes during its reign (August 23, 2005 – August 31, 2005). These searches could have been conducted in times of great distress, by people living in the state constantly searching if they were in the forecasted path of the hurricane, and making necessary preparations. After which, it makes sense that the searches dwindled.

```
[4]: # Uses same timeframe from pytrends.build_payload above
hk_by_region_df = pytrends.interest_by_region(resolution='COUNTRY',
↪inc_geo_code=False)
hk_by_region_df.nlargest(20, ["Hurricane Katrina"], keep="all")
```

```
[4]:
```

	Hurricane Katrina
geoName	
Paducah KY-Cape Girardeau MO-Harrisburg-Mount V...	100
Evansville IN	93
Lexington KY	92
Charleston-Huntington WV	87
Bowling Green KY	85
Cincinnati OH	82
Nashville TN	82
Louisville KY	81
Knoxville TN	79
Tri-Cities TN-VA	78

Here, I just wanted to explore the search interests by regions for the specified timeframe above, and as expected, KY does appear quite a fair bit. However, IN, OH and TN also appear quite a lot.

This could be because these states are located in the vicinity of KY, which seems to be the heaviest impacted. Indiana (IN) is located northeast of Kentucky (KY) and is adjacent to Ohio (OH). Ohio (OH) is situated north of Kentucky (KY) and is adjacent to Indiana (IN) and Kentucky while Tennessee (TN) is located south of Kentucky (KY).

```
[5]: pytrends.build_payload(kw_list, cat=0, timeframe='today 5-y')
recent_hk_df = pytrends.interest_over_time()
recent_hk_peaks_df = recent_hk_df[recent_hk_df[kw_list[0]] > 30]
```

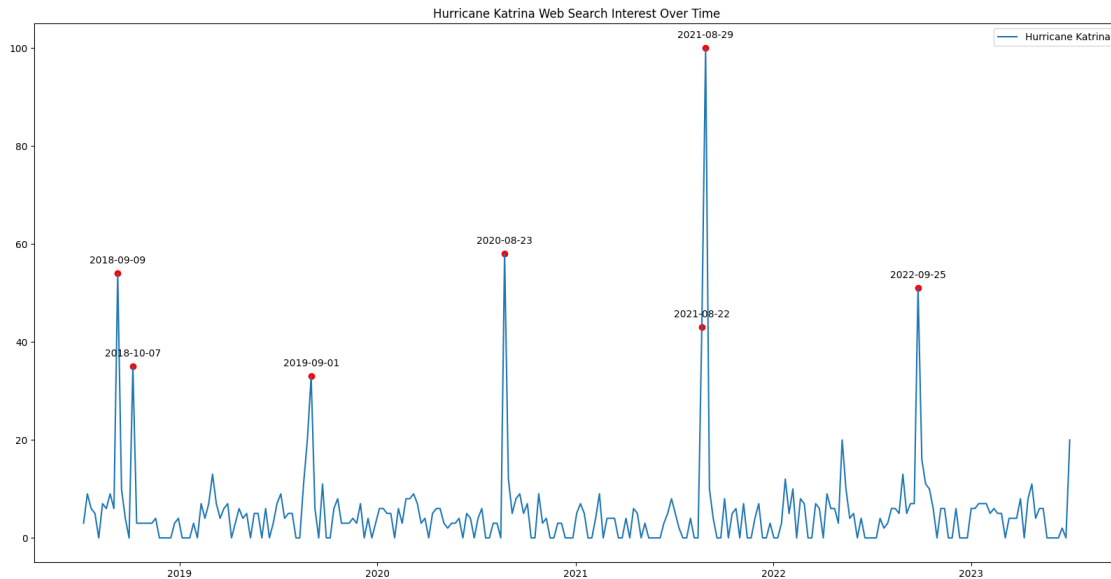
```

fig, ax = plt.subplots(figsize=(20,10))
for kw in kw_list:
    ax.plot(recent_hk_df.index, recent_hk_df[kw])
    ax.scatter(recent_hk_peaks_df.index, recent_hk_peaks_df[kw], color='red',
    ↪label=recent_hk_peaks_df[kw])

for i, row in recent_hk_peaks_df.iterrows():
    ax.annotate(text=i.strftime('%Y-%m-%d'), xy=(i, row[kw_list[0]]),
    ↪textcoords="offset points", xytext=(0, 10), ha='center')

ax.set_title('Hurricane Katrina Web Search Interest Over Time')
ax.legend(kw_list)
plt.show()

```



Here, I was curious if and how often Hurricane Katrina was still searched recently, and did not expect these findings.

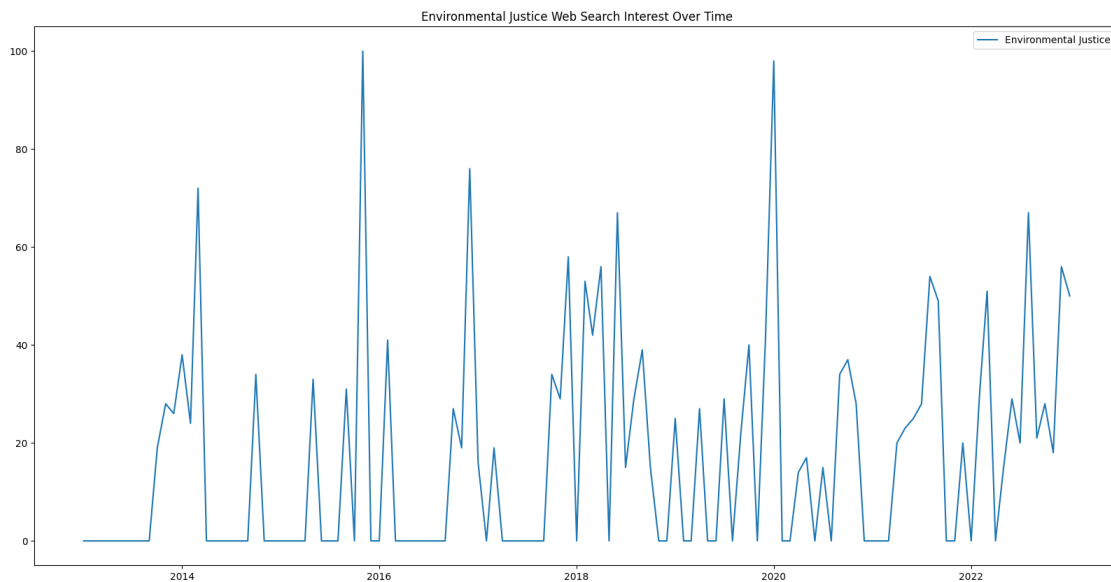
I filtered the data such that only the peaks (roughly >30) had points labelled with dates.

There is an obvious pattern that search interests spike globally around every August to September. This could be because

- 1) There is a global effort to remember those lost in Hurricane Katrina, and her devastating effects on the community.
- 2) Every year around this time, it is hurricane/extreme weather season and Hurricane Katrina, notable for her devastation, is suggested by Google, helping many prepare for such situations


```
[6]: kw_list = ["Environmental Justice"]
pytrends.build_payload(kw_list, cat=0, timeframe='2013-01-01 2023-01-01')
ej_df = pytrends.interest_over_time()

fig, ax = plt.subplots(figsize=(20,10))
for kw in kw_list:
    ax.plot(ej_df.index, ej_df[kw])
ax.set_title('Environmental Justice Web Search Interest Over Time')
ax.legend(kw_list)
plt.show()
```



This is interesting, in that I expected Environmental Justice to be a hot theme more recently now than ever, yet it seems it has mostly been stagnant. However, it is gaining more traction compared to the past, as evident by the lack of horizontal lines at 0. This also points to a greater internal awareness of what Environmental Justice is, such that it sees regularity in usage and search.

Perhaps there was a hit piece article on Environmental Justice around the end of 2013 to explain the spike.

3. Download `us_disasters_table.csv` from Canvas. Create a new variable (you may want to use the `mutate` function) called `new_cost`, which takes `Damage.cost.US` and converts it to numeric values. You can use the `money_numeric` function below to do so.

```
library(stringr)
# function to conver "X billion" or "Y million" into numeric values
money_numeric <- function(money){
  # get numeric amount (we will use the first cost provided, although this may cause issues)
  num <- str_extract(money, "\\$([0-9,.]+)")
  # remove the dollar sign
  num %<>%
```

```

    str_remove_all("\\$")

# get the million/billion value
order <- str_extract(money, "million|billion")
# replace these with appropriate number of zeros
order %<>%
  str_replace("million", "1000000") %>%
  str_replace("billion", "1000000000")

# create value
val = as.numeric(num)*as.numeric(order)

return(val)
}

```

Examine the new cost variable using the View() function. Do you feel that the function did a reasonable job of converting the damage costs into numeric values? Why or why not?

```

[7]: import re

def money_numeric(money: object):
    money = str(money)

    # get numeric amount (Using first cost provided, although this may cause
    ↪ issues)
    matched = re.search(r'\$([0-9,.]+)', money)
    if matched is None:
        return None
    # removing the dollar sign
    num = matched.group(1).replace('$', '')

    # get the million/billion value
    order_matched = re.search(r'million|billion', money)
    if order_matched is None:
        return None
    order = order_matched.group()
    # replace these with appropriate number of zeros
    if order == 'million':
        order = '1000000'
    elif order == 'billion':
        order = '1000000000'

    # create value
    val = float(num) * float(order)
    return val

disasters_df = pd.read_csv(f"drive/My Drive/{FOLDERNAME}/us_disasters_table.
    ↪ csv")

```

```
disasters_df.insert(4, "Damage.costUS.Numeric", disasters_df["Damage.costUS."] .
↳apply(money_numeric))
disasters_df
```

```
[7]:
```

	Year	Disaster	Death.toll \
0	2023	Tornado outbreak	33
1	2023	Tornado outbreak	25
2	2023	Flooding and Tornado outbreak	13
3	2023	Derecho, Tornado outbreak and Winter storm	14
4	2022	Winter storm	106
..
168	1888	Blizzard	400
169	1888	Cold wave	Unknown
170	1871	Wildfire	1,500 - 2,500
171	1862	Flood	>5,000
172	1816	Famine (caused by volcano)	100,000+

	Damage.costUS.	Damage.costUS.Numeric \
0	\$4.3 billion	4.300000e+09
1	\$1.9 billion	1.900000e+09
2	\$4.5 billion	4.500000e+09
3	NaN	NaN
4	\$5.4 billion	5.400000e+09
..
168	NaN	NaN
169	NaN	NaN
170	NaN	NaN
171	\$100 million (1862 USD); \$262.2 billion (2020 ...	1.000000e+08
172	NaN	NaN

	Main.article \
0	Tornado outbreak of March 31 - April 1, 2023
1	Tornado outbreak of March 24-27, 2023
2	Early-March 2023 North American storm complex
3	February 2023 North American storm complex
4	December 2022 North American winter storm
..	...
168	Great Blizzard of 1888
169	1888 Northwest Cold Wave
170	Peshtigo fire
171	Great Flood of 1862
172	Year Without a Summer

	Location \
0	Southern United States, Midwestern United States
1	Southern United States
2	Southwestern United States, Southeastern Unite...

```

3    Western United States, Southern United States ...
4    Western United States, Midwestern United State...
..
168                                     Northeast
169                                     Northwest
170                                     Wisconsin
171    California, Oregon, Utah, and the territories ...
172                                     NaN

Notes
0    NaN
1    NaN
2    NaN
3    NaN
4    NaN
..
168    Fatalities estimated
169    NaN
170    Deadliest firestorm in United States history
171    An atmospheric river led to 43 continuous days...
172    Volcanic dust from a massive eruption by Mount...

```

[173 rows x 8 columns]

No, the function did not do the numeric conversion justice. Textual “million” or “billion” is much easier to read in a glance than many 0s, especially if the 0s were not shortened via scientific notation. Furthermore, as seen in row 171, there is an unrecoverable loss of information - currency and segmented costs due to the nature of disasters that convey critical information. If this column were indeed to be removed, we must be careful to note parts of the information that could not be represented elsewhere.

However, the numeric values certainly have their merit, in that now it is easier to manipulate for further data processing since they are just floating point numbers.

4. Using the same data, with the new cost variable, plot damage costs alongside one of the other variables. What type of relationship do you see? Are there reasons we should trust, or not trust, this apparent relationship?

```

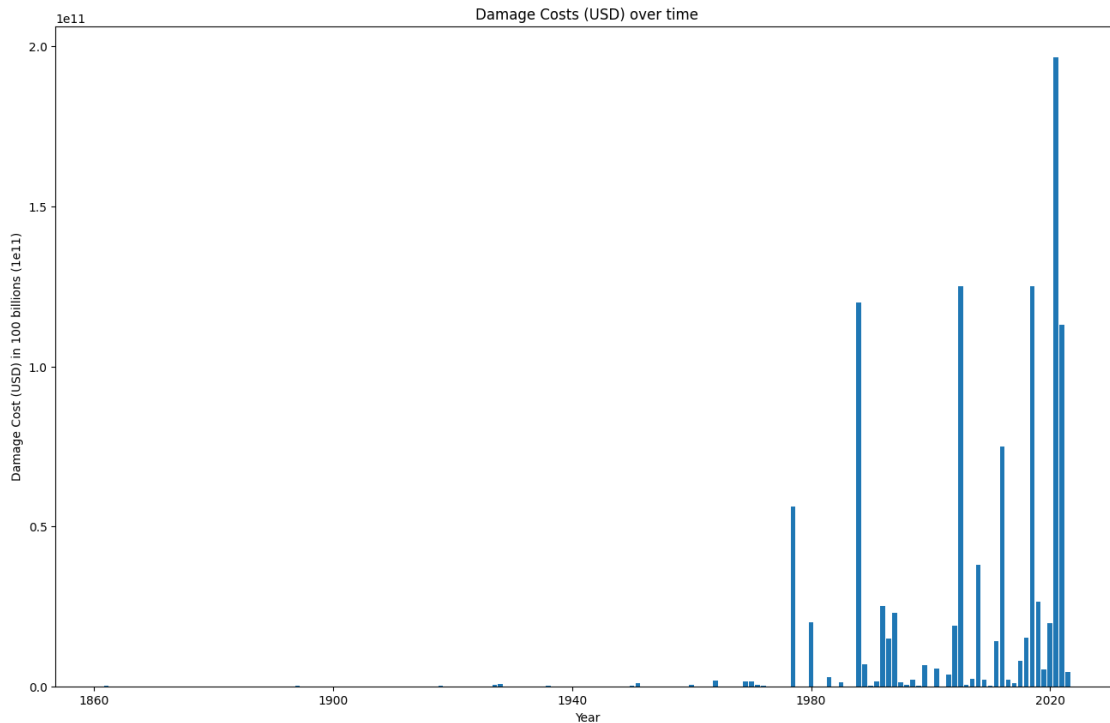
[8]: def format_year(year):
      if type(year) is not int:
          if "to" in year:
              # 1931 to 1939
              return int(year.split(" to ")[0])
          else:
              # 2013 / 2014
              return int(year.split(" / ")[0])
      return year
disasters_df["Year"] = disasters_df["Year"].apply(format_year)

```

```

mpl.figure(figsize=(16,10))
mpl.bar(disasters_df["Year"], disasters_df["Damage.costUS.Numeric"])
mpl.xlabel("Year")
mpl.ylabel("Damage Cost (USD) in 100 billions (1e11)")
mpl.xticks(ticks=np.arange(1860, 2025, step=40))
mpl.yticks(ticks=np.arange(0, 2.1e11, step=0.5e11))
mpl.title("Damage Costs (USD) over time")
mpl.show()

```



A plot of the cost over time shows a general upward trend of damage costs.

We may trust this relationship, as over time, our technology advances and our buildings and infrastructure become more valuable and thus destruction incurs much higher costs.

However, at the same time, this is also true of the global population's wealth, which has been increasing exponentially. It is difficult to find an estimate of the global wealth back in 1860, but as of 2022, it stands at [USD 463.6 trillion](#) (2022, Credit Suisse).

Additionally factoring in inflation (3,564.18% since 1860), damage costs could not have been that minor as represented on the graph. Therefore, this relationship can only be said to be partially true.

```

[9]: def format_death_toll(death_toll):
      # Remove 'Unknown'
      if death_toll == 'Unknown':

```

```

        return None

    # Remove commas from numbers and convert to integer
    death_toll = re.sub(r',', '', death_toll)
    if death_toll.isdigit():
        return int(death_toll)

    # 1,500 - 2,500
    if '-' in death_toll:
        range_values = death_toll.split('-')
        start_value = int(range_values[0])
        end_value = int(range_values[1])
        average_value = (start_value + end_value) / 2
        return int(average_value)

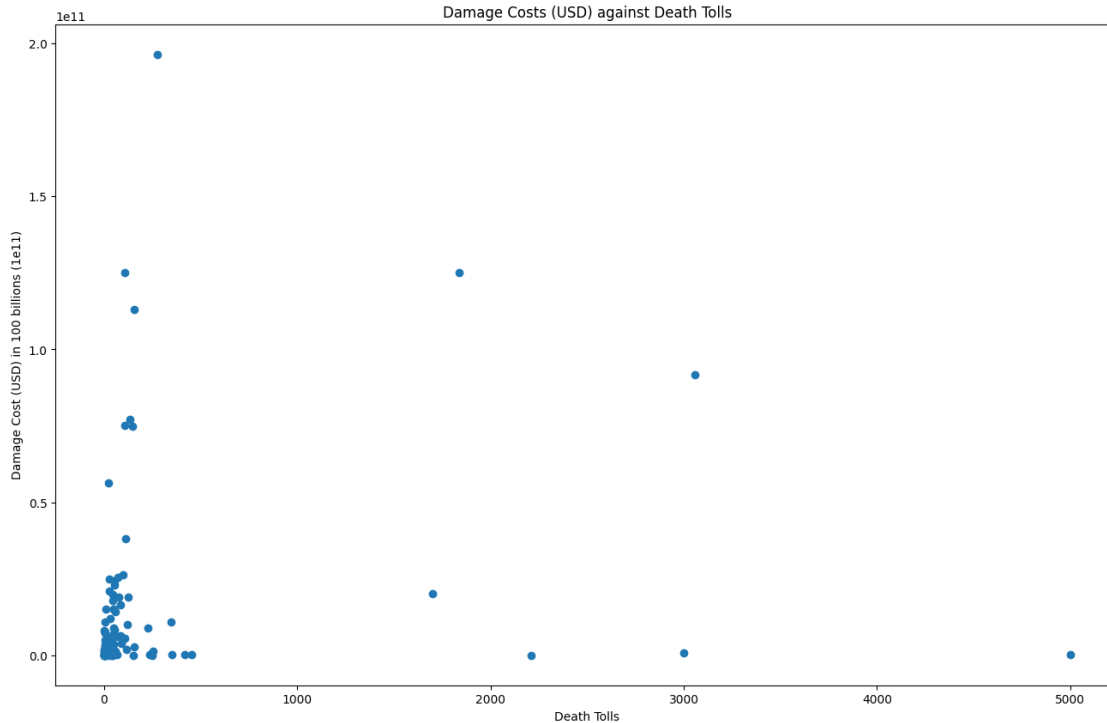
    # >5,000 or 100,000+
    if '>' in death_toll or '+' in death_toll:
        death_toll = re.sub(r'^\d', '', death_toll)
        return int(death_toll)

    return None

disasters_df["Death.toll"] = disasters_df["Death.toll"].apply(format_death_toll)

plt.figure(figsize=(16,10))
plt.scatter(disasters_df["Death.toll"], disasters_df["Damage.costUS.Numeric"])
plt.xlabel("Death Tolls")
plt.ylabel("Damage Cost (USD) in 100 billions (1e11)")
# plt.xticks(ticks=np.arange(1860, 2025, step=40))
plt.yticks(ticks=np.arange(0, 2.1e11, step=0.5e11))
plt.title("Damage Costs (USD) against Death Tolls")
plt.show()

```



A plot of the cost against death tolls does not show a clear trend. A high death toll can have minimal damage costs, or vice versa.

This could be because damage cost is evaluated as infrastructural cost. Expensive infrastructures may not necessarily be located only in urban settings where the general population is most likely to reside. For example, nuclear power plants are prone to damage during disasters and incur high damage costs, but are built far away from civilization in rural areas, thus incurring low death tolls.

5. Choose an API from one of the lists above, such as The Guardian API, or one that you find on your own. Try to download some data! Show a snippet of this data (for example, using the `head()` function), and comment on the types of questions that you might answer with it. You don't need to do any data cleaning or analysis yourself for this question.

```
[39]: import requests

API_KEY = ""
URL = "https://content.guardianapis.com/search"
PARAMS = {
    "q": "hurricane",
    "api-key": API_KEY
}

response = requests.get(URL, params=PARAMS)
data = response.json()
```

```

articles = data["response"]["results"]
# 100 results
for i in range(2, 50):
    response = requests.get(URL, params=PARAMS)
    data = response.json()
    articles.extend(data["response"]["results"])

articles_df = pd.DataFrame(articles, columns=["type", "sectionName", "webPublicationDate", "webTitle", "webUrl"])

articles_df["webPublicationDate"] = pd.to_datetime(articles_df["webPublicationDate"])
articles_df = articles_df.sort_values(by="webPublicationDate", ascending=False)
articles_df.drop_duplicates(subset=["webTitle"], keep="first", inplace=True)

articles_df.head(20)

```

```

[39]:
      type  sectionName  webPublicationDate \
0   article  World news  2023-06-20 15:11:17+00:00
191  article  World news  2023-05-25 17:54:17+00:00
143  article   Business  2023-03-23 08:37:16+00:00
325  article    US news  2022-11-09 22:57:56+00:00
384  article    US news  2022-11-09 13:22:29+00:00
318  article    US news  2022-11-07 18:00:19+00:00
6   article  Environment  2022-11-04 12:28:48+00:00
57  article  World news  2022-10-21 10:00:21+00:00
432  article  World news  2022-10-14 09:58:17+00:00
9   article    US news  2022-10-07 06:00:50+00:00

      webTitle \
0   Tropical Storm Bret forecast to strengthen int...
191  Hurricane season 2023: average number of storm...
143  Lloyd's of London swings to loss after £21bn o...
325  Florida buckles down for direct hit from rare ...
384  Late-season hurricane expected to make landfal...
318  Florida braced for arrival of Storm Nicole, wh...
6   Weather tracker: hurricane activity in Atlanti...
57  Florida's immigrants face barriers in hurrican...
432  Weather tracker: following the path of Hurrica...
9   Will Hurricane Ian force Ron DeSantis to confr...

      webUrl
0   https://www.theguardian.com/world/2023/jun/20/...
191 https://www.theguardian.com/world/2023/may/25/...
143 https://www.theguardian.com/business/2023/mar/...
325 https://www.theguardian.com/us-news/2022/nov/0...

```



```

384 https://www.theguardian.com/us-news/2022/nov/0...
318 https://www.theguardian.com/us-news/2022/nov/0...
6 https://www.theguardian.com/environment/2022/n...
57 https://www.theguardian.com/world/2022/oct/21/...
432 https://www.theguardian.com/world/2022/oct/14/...
9 https://www.theguardian.com/us-news/2022/oct/0...

```

I used The Guardian API

What emotions does the media portray experiences related to hurricanes?

How does the media politically charge perceptions on hurricanes?

Which regions does the media like to report hurricanes on?

```

[ ]: # If it contains spaces, use '\ ' to represent each space E.g. 'Summer\ PSet\ 1.
      ↳ipynb'
FILENAME = "PS2_AndrewYu.ipynb"

%cd drive/My\ Drive
%cd $FOLDERNAME
!sudo apt-get install texlive-xetex texlive-fonts-recommended_
      ↳texlive-plain-generic
!pip install PyPDF2
!jupyter nbconvert --log-level CRITICAL --to pdf $FILENAME

```

```

[Errno 2] No such file or directory: 'drive/My Drive'
/content/drive/My Drive/Stanford Summer Session/SOC 128D
[Errno 2] No such file or directory: 'Stanford Summer Session/SOC 128D'
/content/drive/My Drive/Stanford Summer Session/SOC 128D
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 javascript-common libapache-pom-java
  libcommons-logging-java libcommons-parent-java libfontbox-java libfontenc1
  libgs9 libgs9-common libharfbuzz-icu0 libidn11 libijs-0.35 libjbig2dec0
  libjs-jquery libkpathsea6 libpdfbox-java libptexenc1 libruby2.7 libsynchronet2
  libteckit0 libtexlua53 libtexluajit2 libwoff1 libzip-0-13 lmodern
  poppler-data preview-latex-style rake ruby ruby-minitest ruby-net-telnet
  ruby-power-assert ruby-test-unit ruby-xmlrpc ruby2.7 rubygems-integration
  t1utils teckit tex-common tex-gyre texlive-base texlive-binaries
  texlive-latex-base texlive-latex-extra texlive-latex-recommended
  texlive-pictures tipa xfonts-encodings xfonts-utils
Suggested packages:
  fonts-noto fonts-freefont-otf | fonts-freefont-ttf apache2 | lighttpd
  | httpd libavalon-framework-java libcommons-logging-java-doc
  libexcalibur-logkit-java liblog4j1.2-java poppler-utils ghostscript

```

```

fonts-japanese-mincho | fonts-ipafont-mincho fonts-japanese-gothic
| fonts-ipafont-gothic fonts-arphic-ukai fonts-arphic-uming fonts-nanum ri
ruby-dev bundler debhelper gv | postscript-viewer perl-tk xpdf | pdf-viewer
xzdec texlive-fonts-recommended-doc texlive-latex-base-doc python3-pygments
icc-profiles libfile-which-perl libspreadsheet-parseexcel-perl
texlive-latex-extra-doc texlive-latex-recommended-doc texlive-luatex
texlive-pstricks dot2tex prerex ruby-tcltk | libtcltk-ruby
texlive-pictures-doc vprerex default-jre-headless

```

The following NEW packages will be installed:

```

dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
fonts-texgyre fonts-urw-base35 javascript-common libapache-pom-java
libcommons-logging-java libcommons-parent-java libfontbox-java libfontenc1
libgs9 libgs9-common libharfbuzz-icu0 libidn11 libijs-0.35 libjbig2dec0
libjs-jquery libkpathsea6 libpdfbox-java libptexenc1 libruby2.7 libsynchronet2
libteckit0 libtexlua53 libtexluajit2 libwoff1 libzzip-0-13 lmodern
poppler-data preview-latex-style rake ruby ruby-minitest ruby-net-telnet
ruby-power-assert ruby-test-unit ruby-xmlrpc ruby2.7 rubygems-integration
tlutils teckit tex-common tex-gyre texlive-base texlive-binaries
texlive-fonts-recommended texlive-latex-base texlive-latex-extra
texlive-latex-recommended texlive-pictures texlive-plain-generic
texlive-xetex tipa xfonts-encodings xfonts-utils

```

0 upgraded, 58 newly installed, 0 to remove and 15 not upgraded.

Need to get 169 MB of archives.

After this operation, 537 MB of additional disk space will be used.

Get:1 <http://archive.ubuntu.com/ubuntu> focal/main amd64 fonts-droid-fallback all 1:6.0.1r16-1.1 [1,805 kB]

Get:2 <http://archive.ubuntu.com/ubuntu> focal/main amd64 fonts-lato all 2.0-2 [2,698 kB]

Get:3 <http://archive.ubuntu.com/ubuntu> focal/main amd64 poppler-data all 0.4.9-2 [1,475 kB]

Get:4 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 tex-common all 6.13 [32.7 kB]

Get:5 <http://archive.ubuntu.com/ubuntu> focal/main amd64 fonts-urw-base35 all 20170801.1-3 [6,333 kB]

Get:6 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libgs9-common all 9.50~dfsg-5ubuntu4.7 [681 kB]

Get:7 <http://archive.ubuntu.com/ubuntu> focal/main amd64 libidn11 amd64 1.33-2.2ubuntu2 [46.2 kB]

Get:8 <http://archive.ubuntu.com/ubuntu> focal/main amd64 libijs-0.35 amd64 0.35-15 [15.7 kB]

Get:9 <http://archive.ubuntu.com/ubuntu> focal/main amd64 libjbig2dec0 amd64 0.18-1ubuntu1 [60.0 kB]

Get:10 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libgs9 amd64 9.50~dfsg-5ubuntu4.7 [2,173 kB]

Get:11 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libkpathsea6 amd64 2019.20190605.51237-3ubuntu0.1 [57.0 kB]

Get:12 <http://archive.ubuntu.com/ubuntu> focal/main amd64 libwoff1 amd64 1.0.2-1build2 [42.0 kB]

Get:13 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 dvisvgm amd64 2.8.1-1build1 [1,048 kB]
Get:14 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 fonts-lmodern all 2.004.5-6 [4,532 kB]
Get:15 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 fonts-noto-mono all 20200323-1build1~ubuntu20.04.1 [80.6 kB]
Get:16 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 fonts-texgyre all 20180621-3 [10.2 MB]
Get:17 <http://archive.ubuntu.com/ubuntu> focal/main amd64 javascript-common all 11 [6,066 B]
Get:18 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 libapache-pom-java all 18-1 [4,720 B]
Get:19 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 libcommons-parent-java all 43-1 [10.8 kB]
Get:20 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 libcommons-logging-java all 1.2-2 [60.3 kB]
Get:21 <http://archive.ubuntu.com/ubuntu> focal/main amd64 libfontenc1 amd64 1:1.1.4-0ubuntu1 [14.0 kB]
Get:22 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libharfbuzz-icu0 amd64 2.6.4-1ubuntu4.2 [5,580 B]
Get:23 <http://archive.ubuntu.com/ubuntu> focal/main amd64 libjs-jquery all 3.3.1~dfsg-3 [329 kB]
Get:24 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libptexenc1 amd64 2019.20190605.51237-3ubuntu0.1 [35.5 kB]
Get:25 <http://archive.ubuntu.com/ubuntu> focal/main amd64 rubygems-integration all 1.16 [5,092 B]
Get:26 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 ruby2.7 amd64 2.7.0-5ubuntu1.11 [95.6 kB]
Get:27 <http://archive.ubuntu.com/ubuntu> focal/main amd64 ruby amd64 1:2.7+1 [5,412 B]
Get:28 <http://archive.ubuntu.com/ubuntu> focal/main amd64 rake all 13.0.1-4 [61.6 kB]
Get:29 <http://archive.ubuntu.com/ubuntu> focal/main amd64 ruby-minitest all 5.13.0-1 [40.9 kB]
Get:30 <http://archive.ubuntu.com/ubuntu> focal/main amd64 ruby-net-telnet all 0.1.1-2 [12.6 kB]
Get:31 <http://archive.ubuntu.com/ubuntu> focal/main amd64 ruby-power-assert all 1.1.7-1 [11.4 kB]
Get:32 <http://archive.ubuntu.com/ubuntu> focal/main amd64 ruby-test-unit all 3.3.5-1 [73.2 kB]
Get:33 <http://archive.ubuntu.com/ubuntu> focal/main amd64 ruby-xmlrpc all 0.3.0-2 [23.8 kB]
Get:34 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libruby2.7 amd64 2.7.0-5ubuntu1.11 [3,533 kB]
Get:35 <http://archive.ubuntu.com/ubuntu> focal-updates/main amd64 libsynchronet2 amd64 2019.20190605.51237-3ubuntu0.1 [55.0 kB]
Get:36 <http://archive.ubuntu.com/ubuntu> focal/universe amd64 libteckit0 amd64 2.5.8+ds2-5ubuntu2 [320 kB]

Get:37 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libtexlua53
amd64 2019.20190605.51237-3ubuntu0.1 [105 kB]
Get:38 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libtexluajit2
amd64 2019.20190605.51237-3ubuntu0.1 [235 kB]
Get:39 http://archive.ubuntu.com/ubuntu focal/universe amd64 libzip-0-13 amd64
0.13.62-3.2ubuntu1 [26.2 kB]
Get:40 http://archive.ubuntu.com/ubuntu focal/main amd64 xfonts-encodings all
1:1.0.5-0ubuntu1 [573 kB]
Get:41 http://archive.ubuntu.com/ubuntu focal/main amd64 xfonts-utils amd64
1:7.7+6 [91.5 kB]
Get:42 http://archive.ubuntu.com/ubuntu focal/universe amd64 lmodern all
2.004.5-6 [9,474 kB]
Get:43 http://archive.ubuntu.com/ubuntu focal/universe amd64 preview-latex-style
all 11.91-2ubuntu2 [184 kB]
Get:44 http://archive.ubuntu.com/ubuntu focal/main amd64 t1utils amd64 1.41-3
[56.1 kB]
Get:45 http://archive.ubuntu.com/ubuntu focal/universe amd64 teckit amd64
2.5.8+ds2-5ubuntu2 [687 kB]
Get:46 http://archive.ubuntu.com/ubuntu focal/universe amd64 tex-gyre all
20180621-3 [6,209 kB]
Get:47 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 texlive-
binaries amd64 2019.20190605.51237-3ubuntu0.1 [8,041 kB]
Get:48 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-base all
2019.20200218-1 [20.8 MB]
Get:49 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-fonts-
recommended all 2019.20200218-1 [4,972 kB]
Get:50 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-latex-base
all 2019.20200218-1 [990 kB]
Get:51 http://archive.ubuntu.com/ubuntu focal/universe amd64 libfontbox-java all
1:1.8.16-2 [207 kB]
Get:52 http://archive.ubuntu.com/ubuntu focal/universe amd64 libpdfbox-java all
1:1.8.16-2 [5,199 kB]
Get:53 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-latex-
recommended all 2019.20200218-1 [15.7 MB]
Get:54 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-pictures
all 2019.20200218-1 [4,492 kB]
Get:55 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-latex-extra
all 2019.202000218-1 [12.5 MB]
Get:56 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-plain-
generic all 2019.202000218-1 [24.6 MB]
Get:57 http://archive.ubuntu.com/ubuntu focal/universe amd64 tipa all 2:1.3-20
[2,978 kB]
Get:58 http://archive.ubuntu.com/ubuntu focal/universe amd64 texlive-xetex all
2019.20200218-1 [14.6 MB]
Fetched 169 MB in 16s (10.5 MB/s)
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 76,

```

<> line 58.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (This frontend requires a controlling tty.)
debconf: falling back to frontend: Teletype
dpkg-preconfigure: unable to re-open stdin:
Selecting previously unselected package fonts-droid-fallback.
(Reading database ... 123105 files and directories currently installed.)
Preparing to unpack .../00-fonts-droid-fallback_1%3a6.0.1r16-1.1_all.deb ...
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1) ...
Selecting previously unselected package fonts-lato.
Preparing to unpack .../01-fonts-lato_2.0-2_all.deb ...
Unpacking fonts-lato (2.0-2) ...
Selecting previously unselected package poppler-data.
Preparing to unpack .../02-poppler-data_0.4.9-2_all.deb ...
Unpacking poppler-data (0.4.9-2) ...
Selecting previously unselected package tex-common.
Preparing to unpack .../03-tex-common_6.13_all.deb ...
Unpacking tex-common (6.13) ...
Selecting previously unselected package fonts-urw-base35.
Preparing to unpack .../04-fonts-urw-base35_20170801.1-3_all.deb ...
Unpacking fonts-urw-base35 (20170801.1-3) ...
Selecting previously unselected package libgs9-common.
Preparing to unpack .../05-libgs9-common_9.50~dfsg-5ubuntu4.7_all.deb ...
Unpacking libgs9-common (9.50~dfsg-5ubuntu4.7) ...
Selecting previously unselected package libidn11:amd64.
Preparing to unpack .../06-libidn11_1.33-2.2ubuntu2_amd64.deb ...
Unpacking libidn11:amd64 (1.33-2.2ubuntu2) ...
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack .../07-libijs-0.35_0.35-15_amd64.deb ...
Unpacking libijs-0.35:amd64 (0.35-15) ...
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack .../08-libjbig2dec0_0.18-1ubuntu1_amd64.deb ...
Unpacking libjbig2dec0:amd64 (0.18-1ubuntu1) ...
Selecting previously unselected package libgs9:amd64.
Preparing to unpack .../09-libgs9_9.50~dfsg-5ubuntu4.7_amd64.deb ...
Unpacking libgs9:amd64 (9.50~dfsg-5ubuntu4.7) ...
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack .../10-libkpathsea6_2019.20190605.51237-3ubuntu0.1_amd64.deb
...
Unpacking libkpathsea6:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Selecting previously unselected package libwoff1:amd64.
Preparing to unpack .../11-libwoff1_1.0.2-1build2_amd64.deb ...
Unpacking libwoff1:amd64 (1.0.2-1build2) ...
Selecting previously unselected package dvisvgm.
Preparing to unpack .../12-dvisvgm_2.8.1-1build1_amd64.deb ...
Unpacking dvisvgm (2.8.1-1build1) ...
Selecting previously unselected package fonts-lmodern.

```

```

Preparing to unpack .../13-fonts-lmodern_2.004.5-6_all.deb ...
Unpacking fonts-lmodern (2.004.5-6) ...
Selecting previously unselected package fonts-noto-mono.
Preparing to unpack .../14-fonts-noto-mono_20200323-1build1~ubuntu20.04.1_all.deb ...
Unpacking fonts-noto-mono (20200323-1build1~ubuntu20.04.1) ...
Selecting previously unselected package fonts-texgyre.
Preparing to unpack .../15-fonts-texgyre_20180621-3_all.deb ...
Unpacking fonts-texgyre (20180621-3) ...
Selecting previously unselected package javascript-common.
Preparing to unpack .../16-javascript-common_11_all.deb ...
Unpacking javascript-common (11) ...
Selecting previously unselected package libapache-pom-java.
Preparing to unpack .../17-libapache-pom-java_18-1_all.deb ...
Unpacking libapache-pom-java (18-1) ...
Selecting previously unselected package libcommons-parent-java.
Preparing to unpack .../18-libcommons-parent-java_43-1_all.deb ...
Unpacking libcommons-parent-java (43-1) ...
Selecting previously unselected package libcommons-logging-java.
Preparing to unpack .../19-libcommons-logging-java_1.2-2_all.deb ...
Unpacking libcommons-logging-java (1.2-2) ...
Selecting previously unselected package libfontenc1:amd64.
Preparing to unpack .../20-libfontenc1_1%3a1.1.4-0ubuntu1_amd64.deb ...
Unpacking libfontenc1:amd64 (1:1.1.4-0ubuntu1) ...
Selecting previously unselected package libharfbuzz-icu0:amd64.
Preparing to unpack .../21-libharfbuzz-icu0_2.6.4-1ubuntu4.2_amd64.deb ...
Unpacking libharfbuzz-icu0:amd64 (2.6.4-1ubuntu4.2) ...
Selecting previously unselected package libjs-jquery.
Preparing to unpack .../22-libjs-jquery_3.3.1~dfsg-3_all.deb ...
Unpacking libjs-jquery (3.3.1~dfsg-3) ...
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack .../23-libptexenc1_2019.20190605.51237-3ubuntu0.1_amd64.deb
...
Unpacking libptexenc1:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Selecting previously unselected package rubygems-integration.
Preparing to unpack .../24-rubygems-integration_1.16_all.deb ...
Unpacking rubygems-integration (1.16) ...
Selecting previously unselected package ruby2.7.
Preparing to unpack .../25-ruby2.7_2.7.0-5ubuntu1.11_amd64.deb ...
Unpacking ruby2.7 (2.7.0-5ubuntu1.11) ...
Selecting previously unselected package ruby.
Preparing to unpack .../26-ruby_1%3a2.7+1_amd64.deb ...
Unpacking ruby (1:2.7+1) ...
Selecting previously unselected package rake.
Preparing to unpack .../27-rake_13.0.1-4_all.deb ...
Unpacking rake (13.0.1-4) ...
Selecting previously unselected package ruby-minitest.
Preparing to unpack .../28-ruby-minitest_5.13.0-1_all.deb ...

```

```

Unpacking ruby-minitest (5.13.0-1) ...
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack .../29-ruby-net-telnet_0.1.1-2_all.deb ...
Unpacking ruby-net-telnet (0.1.1-2) ...
Selecting previously unselected package ruby-power-assert.
Preparing to unpack .../30-ruby-power-assert_1.1.7-1_all.deb ...
Unpacking ruby-power-assert (1.1.7-1) ...
Selecting previously unselected package ruby-test-unit.
Preparing to unpack .../31-ruby-test-unit_3.3.5-1_all.deb ...
Unpacking ruby-test-unit (3.3.5-1) ...
Selecting previously unselected package ruby-xmlrpc.
Preparing to unpack .../32-ruby-xmlrpc_0.3.0-2_all.deb ...
Unpacking ruby-xmlrpc (0.3.0-2) ...
Selecting previously unselected package libruby2.7:amd64.
Preparing to unpack .../33-libruby2.7_2.7.0-5ubuntu1.11_amd64.deb ...
Unpacking libruby2.7:amd64 (2.7.0-5ubuntu1.11) ...
Selecting previously unselected package libsyntax2:amd64.
Preparing to unpack .../34-libsyntax2_2019.20190605.51237-3ubuntu0.1_amd64.deb
...
Unpacking libsyntax2:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Selecting previously unselected package libteckit0:amd64.
Preparing to unpack .../35-libteckit0_2.5.8+ds2-5ubuntu2_amd64.deb ...
Unpacking libteckit0:amd64 (2.5.8+ds2-5ubuntu2) ...
Selecting previously unselected package libtexlua53:amd64.
Preparing to unpack .../36-libtexlua53_2019.20190605.51237-3ubuntu0.1_amd64.deb
...
Unpacking libtexlua53:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Selecting previously unselected package libtexluaajit2:amd64.
Preparing to unpack
.../37-libtexluaajit2_2019.20190605.51237-3ubuntu0.1_amd64.deb ...
Unpacking libtexluaajit2:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Selecting previously unselected package libzip-0-13:amd64.
Preparing to unpack .../38-libzip-0-13_0.13.62-3.2ubuntu1_amd64.deb ...
Unpacking libzip-0-13:amd64 (0.13.62-3.2ubuntu1) ...
Selecting previously unselected package xfonts-encodings.
Preparing to unpack .../39-xfonts-encodings_1%3a1.0.5-0ubuntu1_all.deb ...
Unpacking xfonts-encodings (1:1.0.5-0ubuntu1) ...
Selecting previously unselected package xfonts-utils.
Preparing to unpack .../40-xfonts-utils_1%3a7.7+6_amd64.deb ...
Unpacking xfonts-utils (1:7.7+6) ...
Selecting previously unselected package lmodern.
Preparing to unpack .../41-lmodern_2.004.5-6_all.deb ...
Unpacking lmodern (2.004.5-6) ...
Selecting previously unselected package preview-latex-style.
Preparing to unpack .../42-preview-latex-style_11.91-2ubuntu2_all.deb ...
Unpacking preview-latex-style (11.91-2ubuntu2) ...
Selecting previously unselected package t1utils.
Preparing to unpack .../43-t1utils_1.41-3_amd64.deb ...

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Unpacking t1utils (1.41-3) ...
Selecting previously unselected package teckit.
Preparing to unpack .../44-teckit_2.5.8+ds2-5ubuntu2_amd64.deb ...
Unpacking teckit (2.5.8+ds2-5ubuntu2) ...
Selecting previously unselected package tex-gyre.
Preparing to unpack .../45-tex-gyre_20180621-3_all.deb ...
Unpacking tex-gyre (20180621-3) ...
Selecting previously unselected package texlive-binaries.
Preparing to unpack .../46-texlive-
binaries_2019.20190605.51237-3ubuntu0.1_amd64.deb ...
Unpacking texlive-binaries (2019.20190605.51237-3ubuntu0.1) ...
Selecting previously unselected package texlive-base.
Preparing to unpack .../47-texlive-base_2019.20200218-1_all.deb ...
Unpacking texlive-base (2019.20200218-1) ...
Selecting previously unselected package texlive-fonts-recommended.
Preparing to unpack .../48-texlive-fonts-recommended_2019.20200218-1_all.deb ...
Unpacking texlive-fonts-recommended (2019.20200218-1) ...
Selecting previously unselected package texlive-latex-base.
Preparing to unpack .../49-texlive-latex-base_2019.20200218-1_all.deb ...
Unpacking texlive-latex-base (2019.20200218-1) ...
Selecting previously unselected package libfontbox-java.
Preparing to unpack .../50-libfontbox-java_1%3a1.8.16-2_all.deb ...
Unpacking libfontbox-java (1:1.8.16-2) ...
Selecting previously unselected package libpdfbox-java.
Preparing to unpack .../51-libpdfbox-java_1%3a1.8.16-2_all.deb ...
Unpacking libpdfbox-java (1:1.8.16-2) ...
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack .../52-texlive-latex-recommended_2019.20200218-1_all.deb ...
Unpacking texlive-latex-recommended (2019.20200218-1) ...
Selecting previously unselected package texlive-pictures.
Preparing to unpack .../53-texlive-pictures_2019.20200218-1_all.deb ...
Unpacking texlive-pictures (2019.20200218-1) ...
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack .../54-texlive-latex-extra_2019.202000218-1_all.deb ...
Unpacking texlive-latex-extra (2019.202000218-1) ...
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack .../55-texlive-plain-generic_2019.202000218-1_all.deb ...
Unpacking texlive-plain-generic (2019.202000218-1) ...
Selecting previously unselected package tipa.
Preparing to unpack .../56-tipa_2%3a1.3-20_all.deb ...
Unpacking tipa (2:1.3-20) ...
Selecting previously unselected package texlive-xetex.
Preparing to unpack .../57-texlive-xetex_2019.20200218-1_all.deb ...
Unpacking texlive-xetex (2019.20200218-1) ...
Setting up javascript-common (11) ...
Setting up libharfbuzz-icu0:amd64 (2.6.4-1ubuntu4.2) ...
Setting up fonts-lato (2.0-2) ...
Setting up fonts-noto-mono (20200323-1build1~ubuntu20.04.1) ...

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Setting up libwoff1:amd64 (1.0.2-1build2) ...
Setting up ruby-power-assert (1.1.7-1) ...
Setting up libtexlua53:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Setting up libijs-0.35:amd64 (0.35-15) ...
Setting up libtexluajit2:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Setting up libfontbox-java (1:1.8.16-2) ...
Setting up rubygems-integration (1.16) ...
Setting up libzip-0-13:amd64 (0.13.62-3.2ubuntu1) ...
Setting up fonts-urw-base35 (20170801.1-3) ...
Setting up poppler-data (0.4.9-2) ...
Setting up ruby-minitest (5.13.0-1) ...
Setting up tex-common (6.13) ...
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
76.)
debconf: falling back to frontend: Readline
update-language: texlive-base not installed and configured, doing nothing!
Setting up libfontenc1:amd64 (1:1.1.4-0ubuntu1) ...
Setting up ruby-test-unit (3.3.5-1) ...
Setting up libjbig2dec0:amd64 (0.18-1ubuntu1) ...
Setting up libidn11:amd64 (1.33-2.2ubuntu2) ...
Setting up libteckit0:amd64 (2.5.8+ds2-5ubuntu2) ...
Setting up libapache-pom-java (18-1) ...
Setting up ruby-net-telnet (0.1.1-2) ...
Setting up xfonts-encodings (1:1.0.5-0ubuntu1) ...
Setting up t1utils (1.41-3) ...
Setting up fonts-texgyre (20180621-3) ...
Setting up libkpathsea6:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Setting up fonts-lmodern (2.004.5-6) ...
Setting up fonts-droid-fallback (1:6.0.1r16-1.1) ...
Setting up libjs-jquery (3.3.1~dfsg-3) ...
Setting up ruby-xmlrpc (0.3.0-2) ...
Setting up libsynchronet2:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Setting up libgs9-common (9.50~dfsg-5ubuntu4.7) ...
Setting up teckit (2.5.8+ds2-5ubuntu2) ...
Setting up libpdfbox-java (1:1.8.16-2) ...
Setting up libgs9:amd64 (9.50~dfsg-5ubuntu4.7) ...
Setting up preview-latex-style (11.91-2ubuntu2) ...
Setting up libcommons-parent-java (43-1) ...
Setting up dvisvgm (2.8.1-1build1) ...
Setting up libcommons-logging-java (1.2-2) ...
Setting up xfonts-utils (1:7.7+6) ...
Setting up libptexenc1:amd64 (2019.20190605.51237-3ubuntu0.1) ...
Setting up texlive-binaries (2019.20190605.51237-3ubuntu0.1) ...
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin
(xdvi.bin) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex

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(bibtex) in auto mode
Setting up lmodern (2.004.5-6) ...
Setting up texlive-base (2019.20200218-1) ...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN...
mktexlsr: Updating /var/lib/texmf/ls-R...
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
tl-paper: setting paper size for pdftex to a4:
/var/lib/texmf/tex/generic/config/pdftexconfig.tex
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
76.)
debconf: falling back to frontend: Readline
Setting up tex-gyre (20180621-3) ...
Setting up texlive-plain-generic (2019.20200218-1) ...
Setting up texlive-latex-base (2019.20200218-1) ...
Setting up texlive-latex-recommended (2019.20200218-1) ...
Setting up texlive-pictures (2019.20200218-1) ...
Setting up texlive-fonts-recommended (2019.20200218-1) ...
Setting up tipa (2:1.3-20) ...
Regenerating '/var/lib/texmf/fmtutil.cnf-DEBIAN'... done.
Regenerating '/var/lib/texmf/fmtutil.cnf-TEXLIVEDIST'... done.
update-fmtutil has updated the following file(s):
    /var/lib/texmf/fmtutil.cnf-DEBIAN
    /var/lib/texmf/fmtutil.cnf-TEXLIVEDIST
If you want to activate the changes in the above file(s),
you should run fmtutil-sys or fmtutil.
Setting up texlive-latex-extra (2019.20200218-1) ...
Setting up texlive-xetex (2019.20200218-1) ...
Setting up rake (13.0.1-4) ...
Setting up libruby2.7:amd64 (2.7.0-5ubuntu1.11) ...
Setting up ruby2.7 (2.7.0-5ubuntu1.11) ...
Setting up ruby (1:2.7+1) ...
Processing triggers for fontconfig (2.13.1-2ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.9) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for tex-common (6.13) ...
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
76.)

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debconf: falling back to frontend: Readline
Running updmap-sys. This may take some time... done.
Running mktexlsr /var/lib/texmf ... done.
Building format(s) --all.
    This may take some time...
```