

WeatherPy

October 2, 2019

0.1 # WeatherPy

Note

- Instructions have been included for each segment. You do not have to follow them exactly, but they are included to help you think through the steps.

```
[2]: # Dependencies and Setup
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import requests
import time
!pip install citipy
from pprint import pprint

# Import API key
#from api_keys import api_key

# Incorporated citipy to determine city based on latitude and longitude
from citipy import citipy
#https://pypi.python.org/pypi/citipy

# Output File (CSV)
output_data_file = "output_data/cities.csv"

# Range of latitudes and longitudes
lat_range = (-90, 90)
lng_range = (-180, 180)

#Where do you request the API key? Which Weather API in particular will you
→need?

#What URL endpoints does it expect? What JSON structure does it respond with?
#Are you getting coverage of the full gamut of latitudes and longitudes?
#Or are you simply choosing 500 cities concentrated in one region of the world?
```

Requirement already satisfied: citipy in c:\users\shalesh
kumbhat\anaconda3\envs\pythondata\lib\site-packages (0.0.5)

Requirement already satisfied: kdtree>=0.12 in c:\users\shalesh kumbhat\anaconda3\envs\pythondata\lib\site-packages (from citipy) (0.16)

0.2 Generate Cities List

```
[3]: # List for holding lat_lngs and cities
lat_lngs = []
cities = []

# Create a set of random lat and lng combinations
lats = np.random.uniform(low=-90.000, high=90.000, size=1500)
lngs = np.random.uniform(low=-180.000, high=180.000, size=1500)
lat_lngs = zip(lats, lngs)

# Identify nearest city for each lat, lng combination
for lat_lng in lat_lngs:
    city = citipy.nearest_city(lat_lng[0], lat_lng[1]).city_name

    # If the city is unique, then add it to a our cities list
    if city not in cities:
        cities.append(city)

# Print the city count to confirm sufficient count
len(cities)
```

[3]: 617

0.2.1 Perform API Calls

- Perform a weather check on each city using a series of successive API calls.
- Include a print log of each city as it's being processed (with the city number and city name).

```
[4]: from api_keys import api_key
url = "http://api.openweathermap.org/data/2.5/weather?"
units = ["metric", "imperial"]
query_url = f"{url}appid={api_key}&units={units}&q="
```

```
[5]: #humidity = []
#max_temp = []
#wind_speed = []
#lat = []
#lon = []
#cloudiness = []
#country = []
#date = []
#valid_cities = []
city_data = []
```

```

for city in cities:
    try:
        response = requests.get(query_url + city).json()
        #valid_cities.append(city)
        #time.sleep(1)
        lat = response['coord']['lat']
        lon=response['coord']['lon']
        humidity=response['main']['humidity']
        max_temp=response['main']['temp_max']
        wind_speed=response['wind']['speed']
        cloudiness=response['clouds']['all']
        country=response['sys']['country']
        date=response['dt']
        city_data.append({"City": city,"Cloudiness":cloudiness, "Country":
→country,"Date":date,"Humidity":humidity, "Lat": lat, "Lng": lon,  "Max Temp":
→max_temp, "Wind Speed":wind_speed})
        print(f'{response["name"]} {response["id"]}')
    except:
        print(f'city not found')
        pass

```

```

Maceio 3395981
Codrington 2160063
Mehamn 778707
Whitley Bay 2634032
Acari 3390864
Hermanus 3366880
Llanes 3118304
Venustiano Carranza 3827407
Hobart 2163355
Katsuura 1865309
Albany 5106834
Tiznit 2527089
Faanui 4034551
Ushuaia 3833367
Punta Arenas 3874787
Luderitz 3355672
Hasaki 2112802
Bluff 2175403
Cairns 2172797
Taikang 2034600
Bathsheba 3374083
Busselton 2075265
Norman Wells 6089245
city not found
Cape Town 3369157
city not found

```

Praia da Vitoria 3372760
Provideniya 4031574
Totness 4589590
Arraial do Cabo 3471451
Hithadhoo 1282256
Kagadi 232834
Rikitea 4030556
Port Keats 2063039
Port Lincoln 2063036
Mar del Plata 3863379
Lar 133595
Saint-Augustin 6138501
Coquimbo 3893629
Iberia 3938531
Ostrovnoy 556268
Poya 2138522
Aqtobe 610611
city not found
Nanortalik 3421765
Bambous Virieux 1106677
Hualmay 3939761
Tutoia 3385899
Jalu 86049
Homer 5864145
Clyde River 5924351
Port Elizabeth 4501427
Leningradskiy 2123814
Maple Creek 6065592
Avarua 4035715
Marrakesh 2542997
Mayo 6068416
Lebu 344979
Solnechnyy 2016307
Changde 1791121
city not found
Puerto Ayora 3652764
Rumboci 3191426
Kodiak 4407665
Lebedinyy 2020871
Bayir 304183
Sao Filipe 3374210
Ponta do Sol 3453439
Prince Rupert 6113406
Broome 2656067
Coxim 3465228
Mataura 6201424
Qaqortoq 3420846
Taltal 3870243

Toamasina 1053384
Khor 2022317
Ryotsu 1853371
Buin 3897774
Longyearbyen 2729907
Shanghai 1796236
Chokurdakh 2126123
Alofi 4036284
Gouyave 3580279
Sitka 4267710
Piacabucu 3454005
Meulaboh 1214488
Sala 2680662
Marienburg 2803461
Yellowknife 6185377
Boyolangu 1648082
Aksha 2028028
Karasburg 3356343
Ketchikan 5554428
Atuona 4020109
Santa Fe 3836277
Chimbote 3698304
Pevek 2122090
Lagoa 2267254
Port Macquarie 2152659
Terrell 4736028
Aragarcas 3471840
Khatanga 2022572
Grindavik 3416888
Saint George 262462
Evensk 2125693
Garowe 58933
Sola 151211
Vila Velha 6320062
Talara 3691582
Kysyl-Syr 2021017
Thompson 6165406
Kotelnikovo 543728
city not found
Bredasdorp 1015776
Alyangula 2079582
Yaan 2338660
Upernavik 3418910
Strezhevoy 1490796
Dumai 1645133
Severo-Kurilsk 2121385
Tiksi 2015306
Tasiilaq 3424607

Mount Gambier 2156643
New Norfolk 2155415
Phangnga 1151464
Samfya 899274
Havre-Saint-Pierre 5972291
Christchurch 2192362
San Patricio 3437029
city not found
Satara 1257055
Ribeira Grande 3372707
Kaitangata 2208248
Berlevag 780687
city not found
city not found
Port Hawkesbury 6111867
Russell 4278471
city not found
Ahuimanu 5856516
Ugoofaaru 1337619
Riyadh 108410
Whitehorse 6180550
Vaini 1273574
Luzhou 1801640
Vaitape 4033077
Jamestown 2069194
Lakatoro 2136697
Nova Olinda do Norte 3393838
city not found
city not found
Nikolskoye 546105
city not found
Saskylakh 2017155
Viedma 3832899
Barsovo 1510842
Ingham 2162737
city not found
Sibolga 1213855
Chuy 3443061
Syasstroy 485313
Butaritari 2110227
San Rafael 3836669
Polaniec 761652
Ust-Kuyga 2013921
city not found
Avera 4231997
Bossangoa 2388036
Kavieng 2094342
Antalaha 1071296

Junction City 4273680
Hilo 5855927
Murray Bridge 2065176
Darnah 87205
Kapaa 5848280
Risor 3141747
Neepawa 6086673
Souillac 3026644
Lorengau 2092164
Port Alfred 964432
East London 1006984
Ilulissat 3423146
Olopa 3592035
Drayton Valley 5942547
Pisco 3932145
Fort Nelson 5955902
Saint-Philippe 6138908
Tarakan 1624725
Jaguariaiva 3460214
Deputatskiy 2028164
Salalah 286621
Dikson 1507390
Castro 3896218
Airai 1651810
Barrow 3833859
Cabo San Lucas 3985710
Ustyuzhna 477795
Vardo 4372777
Tual 1623197
Eirunepe 3664321
Yar-Sale 1486321
Chippewa Falls 5248511
Torbay 6167817
Cayenne 3382160
Mattru 2409215
Copperas Cove 4683244
Joshimath 1268814
Carnarvon 1014034
Miri 2347470
Padang 1633419
Fairbanks 5861897
Zhigansk 2012530
Coihaïque 3894426
Aklavik 5882953
Ituverava 3460511
city not found
Atar 2381334
Van 298117

Matara 425378
city not found
Velikiy Ustyug 476062
Price 5545269
Batagay 2027044
Rognan 3141548
Sarany 498696
Tarko-Sale 1490085
Kavaratti 1267390
Anuradhapura 1251081
Belyy Yar 1510377
Shieli 1524801
Geraldton 5960603
Beringovskiy 2126710
Trairi 3386177
Goderich 5962442
Victoria 1733782
Namatanai 2090021
Ulcinj 3188516
city not found
Benghazi 88319
San Juan 3837213
city not found
city not found
Rincon 3711668
Adrar 2508813
Kishtwar 1266475
Lavrentiya 4031637
Gorontalo 1643837
Taree 2147381
Bandarbeyla 64814
city not found
Dod Ballapur 1272473
Taksimo 2015701
Rockingham 2645753
Zyryanka 2119283
Isangel 2136825
Mahebourg 934322
Chapais 5919850
Qaanaaq 3831208
Sur 286245
Talnakh 1490256
Dawlatabad 1142226
Maniitsoq 3421982
Banff 5892532
Whitehaven 4641239
Jinxiang 1787335
city not found

Dingle 1714733
Narsaq 3421719
Tonekabon 112656
Bilibino 2126682
Mount Isa 2065594
Portland 4975802
Sebastian 4172372
Natchez 4437982
Ambon 3037899
Chernyy Yar 518909
Vao 588365
Poltavka 1494500
city not found
Mineiros 3457147
Comodoro Rivadavia 3860443
Kurumkan 2021188
Bilma 2446796
Anloga 2304548
Esperance 2071860
Machilipatnam 1264637
Guayaramerin 3915350
Tuktoyaktuk 6170031
Lyuban 625721
Harper 4696310
city not found
Makakilo City 5850554
Monywa 1308522
Vestmannaeyjar 3412093
Utrera 2510073
Aksarka 1512019
Svetlogorsk 584051
Warmbad 3305808
Williamsburg 4793846
Pangnirtung 6096551
Gotsu 1863521
city not found
Ongandjera 3354178
Tawang 1254832
Chabahar 1161724
Muros 3115824
Nampula 1033356
Semnan 116402
Masyaf 167046
Chinsali 918905
Conceicao das Alagoas 3465764
Muli 7304020
Mgandu 154097
Mao 3496831

Kahului 5847411
city not found
Trincomalee 1226260
Altamira 3407882
San Quintin 1688687
Missoula 5666639
Chumikan 2025256
Birao 240210
San Policarpo 1688696
Ponta Delgada 3372783
Ust-Nera 2120048
city not found
Hambantota 1244926
city not found
Taywarah 1122464
Marakkanam 1263564
Kruisfontein 986717
Hayden 5595320
city not found
Ayacucho 3947019
Ancud 3899695
Saldanha 2737599
Georgetown 3378644
Lompoc 5367788
Itarema 3393692
Lai 8059273
Payo 1638775
Biltine 244878
Inhambane 1045114
Sayyan 70979
Tupi Paulista 3445922
Tabou 2281120
Imbituba 3461370
San Cristobal 3609418
Yumen 1528998
city not found
Touros 3386213
Bud 7626370
Richards Bay 962367
Constitucion 4011743
Kommunisticheskiy 1502750
Den Helder 2757220
Grand Gaube 934479
San Mateo del Mar 3518382
Kupiskis 597806
Tautira 4033557
Rio Grande 3451138
Leighton Buzzard 2644652

Zhangjiakou 2033196
Kenai 5866063
Olinda 2154386
Derac 3726728
Xacmaz 584717
Alta Floresta 6316343
city not found
city not found
city not found
Bose 6457397
Serov 1492663
Iquique 3887127
Rocha 3440777
Faya 110690
Byron Bay 2172880
Springfield 4409896
Cidreira 3466165
Ofunato 2111530
Barcelos 3665098
Karratha 6620339
Verkhnyaya Inta 1487332
Carazinho 3466978
city not found
Hami 1529484
Grand-Lahou 2288105
city not found
Macamic 6062563
Pasinler 302824
Sinnamary 3380290
city not found
Havoysund 779622
Faro 2268339
Lasa 146639
Mumford 2297810
Murray 5778755
Klerksdorp 989921
Zaragoza 3582790
Amahai 1651591
Port-Gentil 2396518
Biak 1637001
Korfovskiy 2021766
Coro 3645213
city not found
Bethel 5880568
Kloulklubed 7671223
Cabinda 2243271
Tilichiki 2120591
Marovoay 1059507

Huilog 1784131
Naze 2337542
Phalaborwa 965528
Capira 3713047
Iwanai 2129868
Vorobyevka 472113
Matagami 2335713
Horadiz 148003
Cockburn Town 3576994
city not found
Zaraza 3625066
Lingyuan 2036075
Kaniama 214389
Sassandra 2281951
Tupik 2014836
Kushima 1895695
La Joya 4703997
Lida 626081
Ardakan 143073
Poronaysk 2121909
city not found
Kilindoni 157429
Balkhash 1525798
Launceston 2160517
Koumac 2140558
Ahipara 2194098
Kabanjahe 1214965
Gemena 2315728
city not found
Dauphin 5935341
Funadhoo 1337620
Nome 4732862
Ayagoz 1525988
Sanming 1796663
Saint-Joseph 3037456
Saint-Pierre 2995603
Liekse 648090
city not found
Kaeo 2189343
North Bend 5742974
Broken Hill 2173911
city not found
Altay 1529651
city not found
city not found
Yatou 2225940
Maryville 4639848
Mirabad 1160571

Haines Junction 5969025
Gladstone 2165478
Imperia 6541484
Elliot 1005781
Baghdad 98182
Bayanday 2027004
Nelson 6086871
city not found
Singaparna 1626936
Hofn 2630299
Dongsheng 1788268
Aykhal 2027296
Kabompo 916246
Baculin 1729469
Baillif 3579761
city not found
Roald 3141667
Takoradi 2294915
Tessalit 2449893
Port-Cartier 6111696
Manta 685981
Guarne 3681429
Acoyapa 3620978
Moranbah 6533368
Makokou 2399371
Thousand Oaks 5402405
Palmer 2067070
city not found
Saint-Raphael 3717546
San Lorenzo 3601977
Parker 5230309
Salamanca 3988214
Nykoping 2687700
city not found
Bushehr 139817
Mogadishu 53654
Okhotsk 2122605
Luwuk 1637001
Nizwa 286987
Dawei 1293625
Santa Maria 3462672
Henties Bay 3356832
city not found
Umm Kaddadah 364933
Dryden 5942913
city not found
Log 3197147
Nouadhibou 2377457

Tommot 2015179
Phan Thiet 1571058
Abnub 362973
Torres 3446295
Cedar City 5536630
Zhanakorgan 1517323
Am Timan 245338
Mookane 933290
Chicama 3698359
Manaus 3663517
Waldkirchen 2814880
Acapulco 3533462
Half Moon Bay 5354943
Tromso 3133895
Almaznyy 582447
Omsukchan 2122493
Waitati 2179825
Zhanaozen 607610
Lampa 3885273
Port Hedland 2063042
Vallenar 3868633
city not found
Hamilton 5969785
Tsiroanomandidy 1054463
Nueva Helvecia 3441483
city not found
Obo 236950
Rawson 3839307
Siirt 300822
Mega 331259
city not found
Antofagasta 3899539
Hvide Sande 2619537
Santiago del Estero 3835869
Auki 2339937
Petropavlovsk-Kamchatskiy 2122104
Bang Saphan 1157662
Egvekinot 4031742
Tal 3220838
Ormara 1168700
Acajutla 3587498
Sal 164071
Sorland 3137469
city not found
Ayan 117656
Uhlove 690820
Severnoye 496381
Tamandare 3661980

Koutiala 2454268
Morondava 1058381
Puerto Leguizamo 3671437
city not found
Moose Factory 6078372
Buala 2109528
Mbandaka 2312895
Calatayud 3127047
Longford 2159683
Sept-Iles 6144312
Sol-Iletsk 491019
Fortuna 5563839
city not found
Hoby 57000
Petrovec 3190813
Alihe 2038665
Ballitoville 1021360
Ambunti 2100933
Belem de Sao Francisco 3405852
Kupang 2057087
Farafangana 1065158
Tampere 634964
Srednekolymsk 2121025
Bauta 3567612
Plouzane 2986626
Mizdah 2214827
Fare 4034496
Neuquen 3843123
Meadow Lake 6071421
Kaseda 1859964
Tura 2014833
Kutum 371745
Chapayeve 710940
Nabire 1634614
Miguel Hidalgo 3827408
Kirensk 2022083
city not found
Minab 123941
Carutapera 3402648
Jieshi 1805857
Batticaloa 1250161
Eyl 60019
Sukumo 1851462
Dunmore Town 3572462
Natal 3394023
Vestmanna 2610343
Sychevka 485280
city not found

Clearwater 4151316
 Belmonte 8010472
 city not found
 city not found
 Kendari 1640344
 Flin Flon 5954718
 Nuuk 3421319
 Magadan 2123628
 Luanda 2240449
 Morro Bay 5374920
 city not found
 Nata 933238
 Cherskiy 2126199
 Palencia 3114531
 Kashary 552006

0.2.2 Convert Raw Data to DataFrame

- Export the city data into a .csv.
- Display the DataFrame

```
[6]: #weather_dict = {"City": valid_cities, "Cloudiness": cloudiness, "Country":
      → country, "Date": date, "Humidity": humidity, "Lat": lat, "Lng": lon, "Max Temp":
      → max_temp, "Wind Speed": wind_speed}
      weather_data = pd.DataFrame(city_data)
```

```
[7]: weather_data.head()
```

```
[7]:
```

	City	Cloudiness	Country	Date	Humidity	Lat	Lng	\
0	maceio	20	BR	1570004163	94	-9.67	-35.74	
1	codrington	0	AU	1570004163	49	-28.95	153.24	
2	mehamn	75	NO	1570004163	55	71.03	27.85	
3	whitley bay	0	GB	1570004163	75	55.04	-1.44	
4	acari	5	BR	1570004164	77	-6.44	-36.64	

	Max Temp	Wind Speed
0	294.150	1.00
1	294.150	5.70
2	278.150	7.70
3	279.820	5.70
4	294.705	3.36

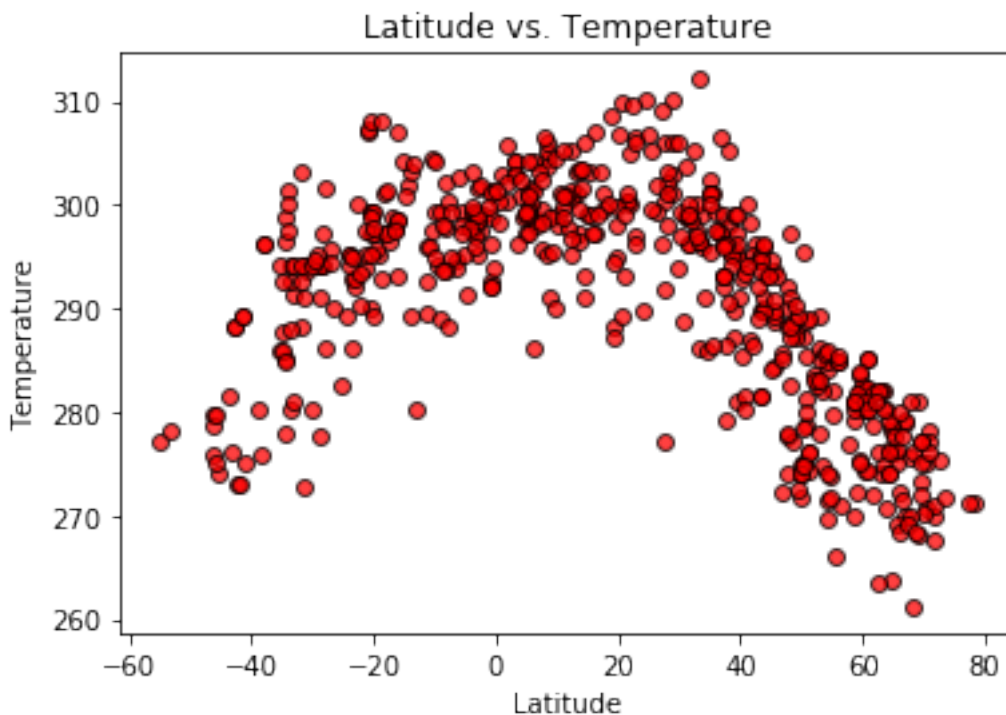
```
[8]: #weather_data["Country"].value_counts()
```

0.2.3 Plotting the Data

- Use proper labeling of the plots using plot titles (including date of analysis) and axes labels.
- Save the plotted figures as .pngs.

Latitude vs. Temperature Plot

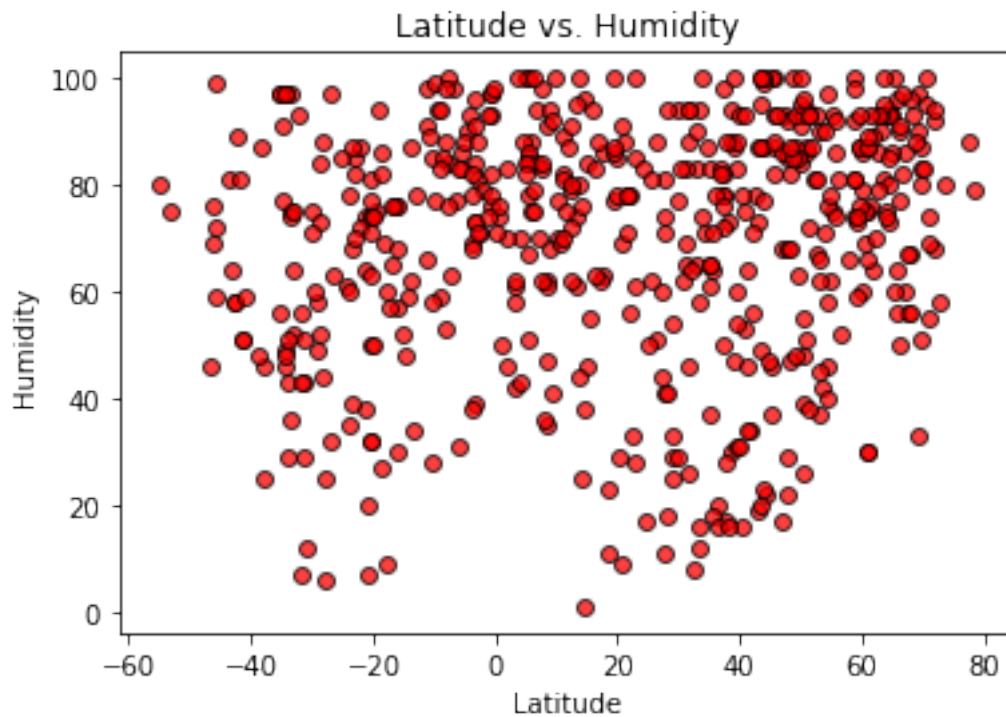
```
[9]: latitude = weather_data["Lat"]
temperature = weather_data["Max Temp"]
plt.scatter(latitude, temperature, label="cities", facecolors="red",
            edgecolors="black", alpha=0.75)
plt.ylim(0, 1)
plt.xlabel("Latitude")
plt.ylabel("Temperature")
plt.title("Latitude vs. Temperature")
plt.savefig("../Lat_Temp.png")
plt.show()
```



Latitude vs. Humidity Plot

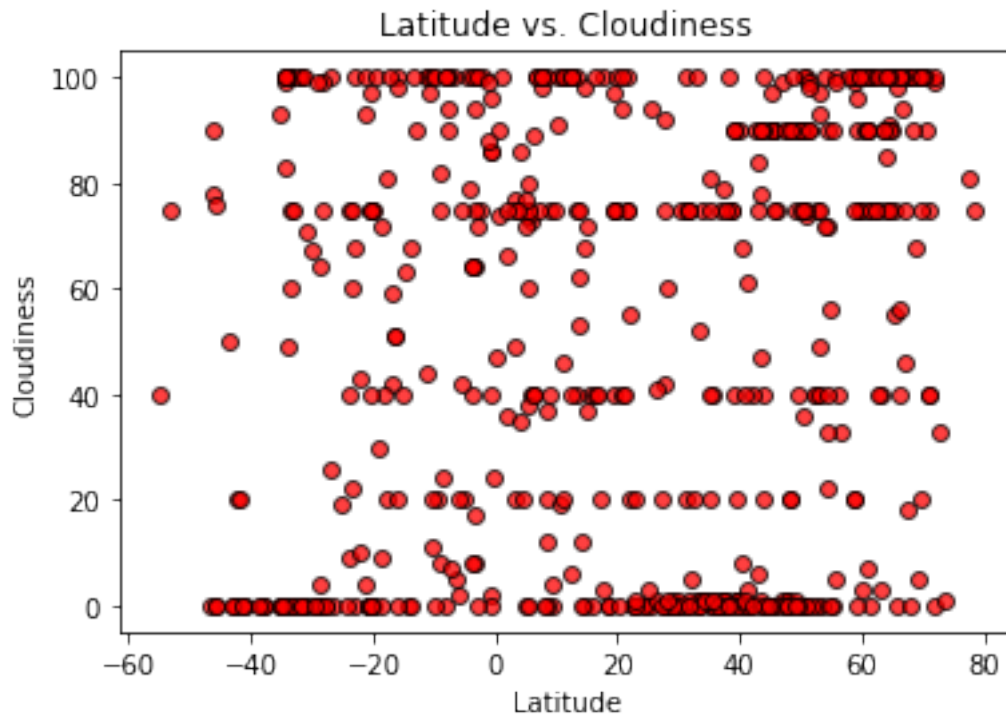
```
[10]: latitude = weather_data["Lat"]
humid = weather_data["Humidity"]
plt.scatter(latitude, humid, label="cities", facecolors="red",
            edgecolors="black", alpha=0.75)
plt.ylim(0, 1)
plt.xlabel("Latitude")
plt.ylabel("Humidity")
plt.title("Latitude vs. Humidity")
plt.savefig("../Lat_Humid.png")
```

```
plt.show()
```



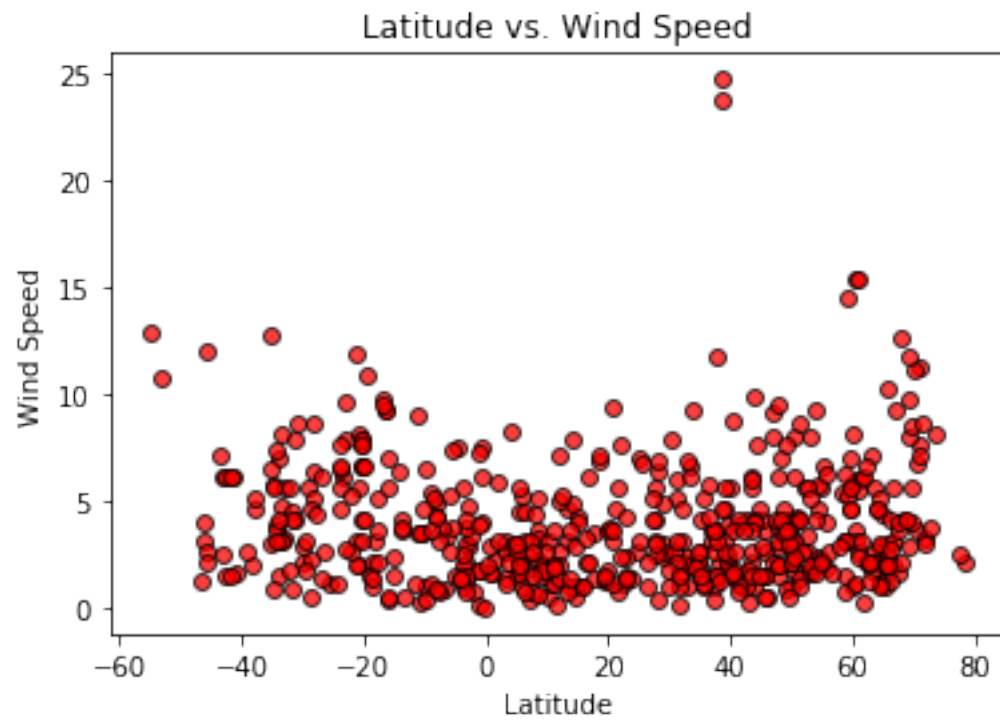
Latitude vs. Cloudiness Plot

```
[11]: latitude = weather_data["Lat"]
      cloud = weather_data["Cloudiness"]
      plt.scatter(latitude, cloud, label="cities", facecolors="red",
                  edgecolors="black", alpha=0.75)
      #plt.ylim(0, 1)
      plt.xlabel("Latitude")
      plt.ylabel("Cloudiness")
      plt.title("Latitude vs. Cloudiness")
      plt.savefig("../Lat_Cloud.png")
      plt.show()
```



Latitude vs. Wind Speed Plot

```
[12]: latitude = weather_data["Lat"]
wind = weather_data["Wind Speed"]
plt.scatter(latitude, wind, label="cities", facecolors="red",
            edgecolors="black", alpha=0.75)
plt.ylim(0, 1)
plt.xlabel("Latitude")
plt.ylabel("Wind Speed")
plt.title("Latitude vs. Wind Speed")
plt.savefig("../Lat_Wind.png")
plt.show()
```



[: