In [1]:
```
!pip install fredapi
```

```
Requirement already satisfied: fredapi in c:\users\hemil\anaconda3\lib\site-packages (0.5.2)
Requirement already satisfied: pandas in c:\users\hemil\anaconda3\lib\site-packages (from fredapi) (2.0.3)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\hemil\anaconda3\lib\site-packages (from pandas->fredapi) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\hemil\anaconda3\lib\site-packages (from pandas->fredapi) (2023.3.post1)
Requirement already satisfied: tzdata>=2022.1 in c:\users\hemil\anaconda3\lib\site-packages (from pandas->fredapi) (2023.3)
Requirement already satisfied: numpy>=1.21.0 in c:\users\hemil\anaconda3\lib\site-packages (from pandas->fredapi) (1.24.3)
Requirement already satisfied: six>=1.5 in c:\users\hemil\anaconda3\lib\site-packages (from python-dateutil>=2.8.2->pandas->fredapi) (1.16.0)
```

The fredapi package is a Python library that provides access to the Federal Reserve Economic Data (FRED) API. FRED is a comprehensive database of economic data maintained by the Federal Reserve Bank of St. Louis. It includes a wide range of economic indicators, such as interest rates, employment statistics, GDP, and more. Similarly you can also get data from yahoo finance,investing.com etc by web scraping.

In [2]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import plotly.express as px

plt.style.use('fivethirtyeight')
color_pal=plt.rcParams["axes.prop_cycle"].by_key()["color"]
```

In [3]:
```
from fredapi import Fred

# Initialize the API with your API key
api_key = '2260cc6d0383e514e339ec4d7fea2b8e'
fred = Fred(api_key=api_key)
```

In [4]:
```
#Here We are searching for S&P Data from Fred
sp_search=fred.search('S&P',limit=1000,order_by='popularity')
sp_search
```

DDDI01GTA156NWDB	DDDI01GTA156NWDB	2024-09-17	2024-09-17	Private Credit by Deposit Money Banks to GDP f...	1960-01-01	2021-01-01	Annual	A	Percent	%
Q03069USQ605NNBR	Q03069USQ605NNBR	2024-09-17	2024-09-17	Revenue Freight Tons Originated, Less Than Car...	1920-01-01	1943-07-01	Quarterly	Q	Thousands of Tons	Thous. Of Tons
CSHICPCZA156NRUG	CSHICPCZA156NRUG	2024-09-17	2024-09-17	Share of Gross Capital Formation at Current Pu...	1990-01-01	2019-01-01	Annual	A	Percent	%

1000 rows × 15 columns

In [5]:
```
#Pulling Data with ID SP500
sp500 = fred.get_series('SP500')
sp500
```

Out[5]:
```
2014-09-17    2001.57
2014-09-18    2011.36
2014-09-19    2010.40
2014-09-22    1994.29
2014-09-23    1982.77
               ...
2024-09-10    5495.52
2024-09-11    5554.13
2024-09-12    5595.76
2024-09-13    5626.02
2024-09-16    5633.09
Length: 2609, dtype: float64
```

In [6]:
```
plt.figure(figsize=(9, 3))
plt.plot(sp500.index, sp500.values)

# Add title and labels
plt.title('S&P 500 Index Over Time', fontsize=16)

plt.show()
```

In [7]:
```
#Searching for unemployement data in FRED
unemployment_search_results=fred.search('unemployment')
unemployment_search_results
```

Out[7]:

series id	id	realtime_start	realtime_end	title	observation_start	observation_end	frequency	frequency_short	units	units
UNRATE	UNRATE	2024-09-17	2024-09-17	Unemployment Rate	1948-01-01	2024-08-01	Monthly	M	Percent	
UNRATENSA	UNRATENSA	2024-09-17	2024-09-17	Unemployment Rate	1948-01-01	2024-08-01	Monthly	M	Percent	
UNEMPLOY	UNEMPLOY	2024-09-17	2024-09-17	Unemployment Level	1948-01-01	2024-08-01	Monthly	M	Thousands of Persons	Tl
NROU	NROU	2024-09-17	2024-09-17	Noncyclical Rate of Unemployment	1949-01-01	2034-10-01	Quarterly	Q	Percent	
CCSA	CCSA	2024-09-17	2024-09-17	Continued Claims (Insured Unemployment)	1967-01-07	2024-08-31	Weekly, Ending Saturday	W	Number	I
...	...	...	...	...	...	...	...	...	...	
LAUCN340030000000003A	LAUCN340030000000003A	2024-09-17	2024-09-17	Unemployment Rate in Bergen County, NJ	1990-01-01	2023-01-01	Annual	A	Percent	
LMUNRRTTLUM156S	LMUNRRTTLUM156S	2024-09-17	2024-09-17	Infra-Annual Registered Unemployment and Job V...	1995-01-01	2023-12-01	Monthly	M	Growth rate previous period	Gro
LNS14000315	LNS14000315	2024-09-17	2024-09-17	Unemployment Rate - Married Women	1955-01-01	2024-08-01	Monthly	M	Percent	
LNU04032222	LNU04032222	2024-09-17	2024-09-17	Unemployment Rate - Natural Resources, Constru...	2000-01-01	2024-08-01	Monthly	M	Percent	
LNU04032223	LNU04032223	2024-09-17	2024-09-17	Unemployment Rate - Farming, Fishing, and Fore...	2000-01-01	2024-08-01	Monthly	M	Percent	

1000 rows × 15 columns

In [8]:
```
#Getting the most popular data of Unemployement from Fred using its ID
unrate = fred.get_series('UNRATE')
unrate
```

Out[8]:
```
1948-01-01    3.4
1948-02-01    3.8
1948-03-01    4.0
1948-04-01    3.9
1948-05-01    3.5
              ...
2024-04-01    3.9
2024-05-01    4.0
2024-06-01    4.1
2024-07-01    4.3
2024-08-01    4.2
Length: 920, dtype: float64
```

In [9]:
```
plt.figure(figsize=(9, 3))
plt.plot(unrate.index, unrate.values)

# Add title and labels
plt.title('Unemployement Index Over Time', fontsize=16)

plt.show()
```

In [10]:
```
unemployment_search_state = fred.search('unemployment rate state', filter=('frequency', 'Monthly'))
unemployment_search_state
```

Out[10]:

series id	id	realtime_start	realtime_end	title	observation_start	observation_end	frequency	frequency_short	units	units_short	seasonal_adjusti
UNRATE	UNRATE	2024-09-17	2024-09-17	Unemployment Rate	1948-01-01	2024-08-01	Monthly	M	Percent	%	Seasonally Adju
UNRATENSA	UNRATENSA	2024-09-17	2024-09-17	Unemployment Rate	1948-01-01	2024-08-01	Monthly	M	Percent	%	Not Seasc Adju
LNS14000006	LNS14000006	2024-09-17	2024-09-17	Unemployment Rate - Black or African American	1972-01-01	2024-08-01	Monthly	M	Percent	%	Seasonally Adju
UNEMPLOY	UNEMPLOY	2024-09-17	2024-09-17	Unemployment Level	1948-01-01	2024-08-01	Monthly	M	Thousands of Persons	Thous. of Persons	Seasonally Adju
LNU03000000	LNU03000000	2024-09-17	2024-09-17	Unemployment Level	1948-01-01	2024-08-01	Monthly	M	Thousands of Persons	Thous. of Persons	Not Seasc Adju
...	...	...	...	...	...	...	...	...	...	...	
INBART5URN	INBART5URN	2024-09-17	2024-09-17	Unemployment Rate in Bartholomew County, IN	1990-01-01	2024-07-01	Monthly	M	Percent	%	Not Seasc Adju
MOPRURN	MOPRURN	2024-09-17	2024-09-17	Unemployment Rate in Perry County, MO	1990-01-01	2024-07-01	Monthly	M	Percent	%	Not Seasc Adju
PENS812UR	PENS812UR	2024-09-17	2024-09-17	Unemployment Rate in Pensacola-Ferry Pass-Bren...	1990-01-01	2024-07-01	Monthly	M	Percent	%	Smoothed Seasc Adju
AKRO439UR	AKRO439UR	2024-09-17	2024-09-17	Unemployment Rate in Akron, OH (MSA)	1990-01-01	2024-07-01	Monthly	M	Percent	%	Smoothed Seasc Adju
PORT912UR	PORT912UR	2024-09-17	2024-09-17	Unemployment Rate in Port St. Lucie, FL (MSA)	1990-01-01	2024-07-01	Monthly	M	Percent	%	Smoothed Seasc Adju

1000 rows × 15 columns

In [11]:
```
#we are adding more filters for getting concise and pin point data
unemployment_search_state=unemployment_search_state.query('seasonal_adjustment == "Seasonally Adjusted" and units == "Percent"')
unemployment_search_state
```

Out[11]:

series id	id	realtime_start	realtime_end	title	observation_start	observation_end	frequency	frequency_short	units	units_short
UNRATE	UNRATE	2024-09-17	2024-09-17	Unemployment Rate	1948-01-01	2024-08-01	Monthly	M	Percent	%
LNS14000006	LNS14000006	2024-09-17	2024-09-17	Unemployment Rate - Black or African American	1972-01-01	2024-08-01	Monthly	M	Percent	%
U6RATE	U6RATE	2024-09-17	2024-09-17	Total Unemployed, Plus All Persons Marginally ...	1994-01-01	2024-08-01	Monthly	M	Percent	%
CAUR	CAUR	2024-09-17	2024-09-17	Unemployment Rate in California	1976-01-01	2024-07-01	Monthly	M	Percent	%
TXUR	TXUR	2024-09-17	2024-09-17	Unemployment Rate in Texas	1976-01-01	2024-07-01	Monthly	M	Percent	%
...	...	...	...	...	...	...	...	...	...	...
M08311USM156SNBR	M08311USM156SNBR	2024-09-17	2024-09-17	Unemployment Rate, Married Males, Spouse Prese...	1954-11-01	1968-01-01	Monthly	M	Percent	%
LNS13008397	LNS13008397	2024-09-17	2024-09-17	Of Total Unemployed, Percent Unemployed Less T...	1948-01-01	2024-08-01	Monthly	M	Percent	%
LBSSA20	LBSSA20	2024-09-17	2024-09-17	Labor Force Participation Rate for Kansas	1976-01-01	2024-07-01	Monthly	M	Percent	%
LNS14000150	LNS14000150	2024-09-17	2024-09-17	Unemployment Rate - Married Men	1955-01-01	2024-08-01	Monthly	M	Percent	%
NEIPTERM156SFRBRIC	NEIPTERM156SFRBRIC	2024-09-17	2024-09-17	Hornstein-Kudlyak-Lange Non-Employment Index i...	1994-01-01	2024-08-01	Monthly	M	Percent	%

158 rows × 15 columns

In [12]:
```
unemployment_search_state = unemployment_search_state.loc[unemployment_search_state['title'].str.contains('Unemployment Rate in')]
unemployment_search_state
# Here I have find the data of all united states ,indivudual states having thier unemployement rate statewise.
#Now I can pull any data from this using thier ID.
```

				Oklahoma						
MOUR	MOUR	2024-09-17	2024-09-17	Unemployment Rate in Missouri	1976-01-01	2024-07-01	Monthly	M	Percent	
AKUR	AKUR	2024-09-17	2024-09-17	Unemployment Rate in Alaska	1976-01-01	2024-07-01	Monthly	M	Percent	
IAUR	IAUR	2024-09-17	2024-09-17	Unemployment Rate in Iowa	1976-01-01	2024-07-01	Monthly	M	Percent	
UTUR	UTUR	2024-09-17	2024-09-17	Unemployment Rate in Utah	1976-01-01	2024-07-01	Monthly	M	Percent	
PRUR	PRUR	2024-09-17	2024-09-17	Unemployment Rate in Puerto Rico	1976-01-01	2024-07-01	Monthly	M	Percent	
				Unemployment						

In [13]:
```
#pulling data of all states unemployement rate using for loop
unemployment_search_state=unemployment_search_state['id'].unique()
unemployment_search_state
```

Out[13]:
```
array(['CAUR', 'TXUR', 'NYUR', 'FLUR', 'PAUR', 'OHUR', 'MIUR', 'ALUR',
       'MAUR', 'NCUR', 'ILUR', 'NJUR', 'GAUR', 'COUR', 'AZUR', 'WIUR',
       'VAUR', 'KYUR', 'SCUR', 'NMUR', 'MNUR', 'TNUR', 'WAUR', 'MDUR',
       'ORUR', 'WVUR', 'NVUR', 'ARUR', 'OKUR', 'MOUR', 'AKUR', 'IAUR',
       'UTUR', 'PRUR', 'INUR', 'LAUR', 'HIUR', 'LASMT261982000000003',
       'NDUR', 'MTUR', 'DCUR', 'MSUR', 'MEUR', 'NEUR',
       'LASMT391746000000003', 'CTUR', 'IDUR', 'NHUR', 'RIUR', 'KSUR',
       'WYUR', 'DEUR', 'VTUR', 'SDUR', 'CMWRUR', 'CSOUUR', 'CNERUR',
       'CWSTUR', 'CNEWUR'], dtype=object)
```

In [14]:
```
all_state_unemployment=[]
for my_id in unemployment_search_state:
    unemployment_statewise=fred.get_series(my_id)
    unemployment_statewise=unemployment_statewise.to_frame(name=my_id)#converting raw data to framed data
    all_state_unemployment.append(unemployment_statewise) # appending data of states
```

In [15]:
```
#This data is in list format, we need it in proper format
all_state_unemployment
```

Out[15]:
```
            ...
1976-01-01  10.3
1976-02-01  10.3
1976-03-01  10.2
1976-04-01  10.2
1976-05-01  10.1
...          ...
2024-03-01   4.3
2024-04-01   4.2
2024-05-01   4.2
2024-06-01   4.2
2024-07-01   4.3

[583 rows x 1 columns],
            FLUR
1976-01-01   9.7
1976-02-01   9.7
1976-03-01   9.6
1976-04-01   9.5
1976-05-01   9.3
```

In [16]:
```
#Now we need to concatenate this data in to one data frame
#Where state are on heading of x axis and dates in y axis with unemployment rate statewise
unemployment_statewise=pd.concat(all_state_unemployment,axis=1)
unemployment_statewise
```

Out[16]:

	CAUR	TXUR	NYUR	FLUR	PAUR	OHUR	MIUR	ALUR	MAUR	NCUR	...	KSUR	WYUR	DEUR	VTUR	SDUR	CMWRUR	CSOUUR	CNERUR	CWSTUR	CNEWUR
1976-01-01	9.2	5.8	10.3	9.7	8.0	8.1	9.9	6.6	10.5	6.4	...	4.2	4.1	8.0	8.6	3.3	6.8	6.9	9.6	8.6	9.6
1976-02-01	9.2	5.8	10.3	9.7	8.1	8.1	9.9	6.6	10.5	6.4	...	4.2	4.1	8.0	8.6	3.3	6.8	6.9	9.6	8.6	9.6
1976-03-01	9.1	5.9	10.2	9.6	8.1	8.1	9.9	6.6	10.5	6.4	...	4.2	4.1	8.0	8.6	3.2	6.8	6.9	9.6	8.6	9.6
1976-04-01	9.1	5.9	10.2	9.5	8.1	8.0	9.8	6.5	10.3	6.3	...	4.2	4.0	8.1	8.6	3.1	6.7	6.8	9.5	8.5	9.4
1976-05-01	9.0	5.9	10.1	9.3	8.1	7.8	9.6	6.4	10.1	6.1	...	4.2	3.9	8.3	8.5	3.1	6.6	6.7	9.5	8.5	9.3
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2024-03-01	5.3	3.9	4.3	3.2	3.4	3.8	3.9	3.0	2.9	3.5	...	2.7	2.8	3.9	2.2	2.1	3.6	3.4	3.9	4.6	3.3
2024-04-01	5.3	4.0	4.2	3.3	3.4	4.0	3.9	3.1	2.9	3.5	...	2.8	2.8	3.9	2.1	2.0	3.6	3.5	3.9	4.6	3.3
2024-05-01	5.2	4.0	4.2	3.3	3.4	4.2	3.9	3.0	3.0	3.6	...	2.9	2.9	3.9	2.1	2.0	3.7	3.5	3.9	4.6	3.4
2024-06-01	5.2	4.0	4.2	3.3	3.4	4.4	4.1	2.9	3.2	3.6	...	3.0	2.9	4.0	2.1	2.0	3.8	3.5	3.8	4.5	3.3
2024-07-01	5.2	4.1	4.3	3.3	3.4	4.5	4.4	2.8	3.5	3.7	...	3.2	2.9	4.1	2.1	2.0	4.0	3.6	3.9	4.6	3.4

583 rows × 59 columns

In [17]:

```
# Create a dictionary to map series IDs to state names
series_to_state = {
    'CAUR': 'California',
    'TXUR': 'Texas',
    'NYUR': 'New York',
    'FLUR': 'Florida',
    'PAUR': 'Pennsylvania',
    'OHUR': 'Ohio',
    'MIUR': 'Michigan',
    'ALUR': 'Alabama',
    'MAUR': 'Massachusetts',
    'NCUR': 'North Carolina',
    'KSUR': 'Kansas',
    'WYUR': 'Wyoming',
    'DEUR': 'Delaware',
    'VTUR': 'Vermont',
    'SDUR': 'South Dakota',
    'CMWRUR': 'West North Central Region',
    'CSOUUR': 'South Region',
    'CNERUR': 'Northeast Region',
    'CWSTUR': 'Western Region',
    'CNEWUR': 'New England Region',
    'ILUR': 'Illinois',
    'NJUR': 'New Jersey',
    'GAUR': 'Georgia',
    'COUR': 'Colorado',
    'AZUR': 'Arizona',
    'WIUR': 'Wisconsin',
    'VAUR': 'Virginia',
    'KYUR': 'Kentucky',
    'SCUR': 'South Carolina',
    'NMUR': 'New Mexico',
    'MNUR': 'Minnesota',
    'TNUR': 'Tennessee',
    'WAUR': 'Washington',
    'MDUR': 'Maryland',
    'ORUR': 'Oregon',
    'WVUR': 'West Virginia',
    'NVUR': 'Nevada',
    'ARUR': 'Arkansas',
    'OKUR': 'Oklahoma',
    'MOUR': 'Missouri',
    'AKUR': 'Alaska',
    'IAUR': 'Iowa',
    'UTUR': 'Utah',
    'PRUR': 'Puerto Rico',
    'INUR': 'Indiana',
    'LAUR': 'Louisiana',
    'HIUR': 'Hawaii',
    'LASMT261982000000003': 'Las Montana Region',  # Assuming this is a specific region or unique code
    'NDUR': 'North Dakota',
    'MTUR': 'Montana',
    'DCUR': 'District of Columbia',
    'MSUR': 'Mississippi',
    'MEUR': 'Maine',
    'NEUR': 'Nebraska',
    'LASMT391746000000003': 'Las Montana Region 2',  # Assuming this is a specific region or unique code
    'CTUR': 'Connecticut',
    'IDUR': 'Idaho',
    'NHUR': 'New Hampshire',
    'RIUR': 'Rhode Island'
}

unemployment_statewise.rename(columns=series_to_state, inplace=True)

unemployment_statewise
```

Out[17]:

	California	Texas	New York	Florida	Pennsylvania	Ohio	Michigan	Alabama	Massachusetts	North Carolina	...	Kansas	Wyoming	Delaware	Vermont	South Dakota	West North Central Region	South Region	N
1976-01-01	9.2	5.8	10.3	9.7	8.0	8.1	9.9	6.6	10.5	6.4	...	4.2	4.1	8.0	8.6	3.3	6.8	6.9	
1976-02-01	9.2	5.8	10.3	9.7	8.1	8.1	9.9	6.6	10.5	6.4	...	4.2	4.1	8.0	8.6	3.3	6.8	6.9	
1976-03-01	9.1	5.9	10.2	9.6	8.1	8.1	9.9	6.6	10.5	6.4	...	4.2	4.1	8.0	8.6	3.2	6.8	6.9	
1976-04-01	9.1	5.9	10.2	9.5	8.1	8.0	9.8	6.5	10.3	6.3	...	4.2	4.0	8.1	8.6	3.1	6.7	6.8	
1976-05-01	9.0	5.9	10.1	9.3	8.1	7.8	9.6	6.4	10.1	6.1	...	4.2	3.9	8.3	8.5	3.1	6.6	6.7	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2024-03-01	5.3	3.9	4.3	3.2	3.4	3.8	3.9	3.0	2.9	3.5	...	2.7	2.8	3.9	2.2	2.1	3.6	3.4	
2024-04-01	5.3	4.0	4.2	3.3	3.4	4.0	3.9	3.1	2.9	3.5	...	2.8	2.8	3.9	2.1	2.0	3.6	3.5	
2024-05-01	5.2	4.0	4.2	3.3	3.4	4.2	3.9	3.0	3.0	3.6	...	2.9	2.9	3.9	2.1	2.0	3.7	3.5	
2024-06-01	5.2	4.0	4.2	3.3	3.4	4.4	4.1	2.9	3.2	3.6	...	3.0	2.9	4.0	2.1	2.0	3.8	3.5	
2024-07-01	5.2	4.1	4.3	3.3	3.4	4.5	4.4	2.8	3.5	3.7	...	3.2	2.9	4.1	2.1	2.0	4.0	3.6	

583 rows × 59 columns

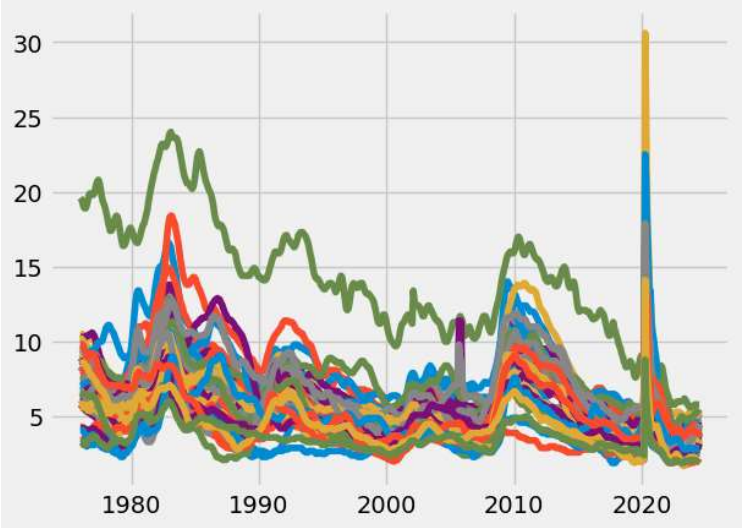
In [18]:
```
unemployment_statewise.isna().sum()
```

Out[18]:
```
California                    0
Texas                         0
New York                      0
Florida                       0
Pennsylvania                  0
Ohio                          0
Michigan                      0
Alabama                       0
Massachusetts                 0
North Carolina                0
Illinois                      0
New Jersey                    0
Georgia                       0
Colorado                      0
Arizona                       0
Wisconsin                     0
Virginia                      0
Kentucky                      0
South Carolina                0
New Mexico                    0
Minnesota                     0
Tennessee                     0
Washington                    0
Maryland                      0
Oregon                        0
West Virginia                 0
Nevada                        0
Arkansas                      0
Oklahoma                      0
Missouri                      0
Alaska                        0
Iowa                          0
Utah                          0
Puerto Rico                   2
Indiana                       0
Louisiana                     0
Hawaii                        0
Las Montana Region          168
North Dakota                  0
Montana                       0
District of Columbia          0
Mississippi                   0
Maine                         0
Nebraska                      0
Las Montana Region 2        168
Connecticut                   0
Idaho                         0
New Hampshire                 0
Rhode Island                  0
Kansas                        0
Wyoming                       0
Delaware                      0
Vermont                       0
South Dakota                  0
West North Central Region     0
South Region                  0
Northeast Region              0
Western Region                0
New England Region            0
dtype: int64
```

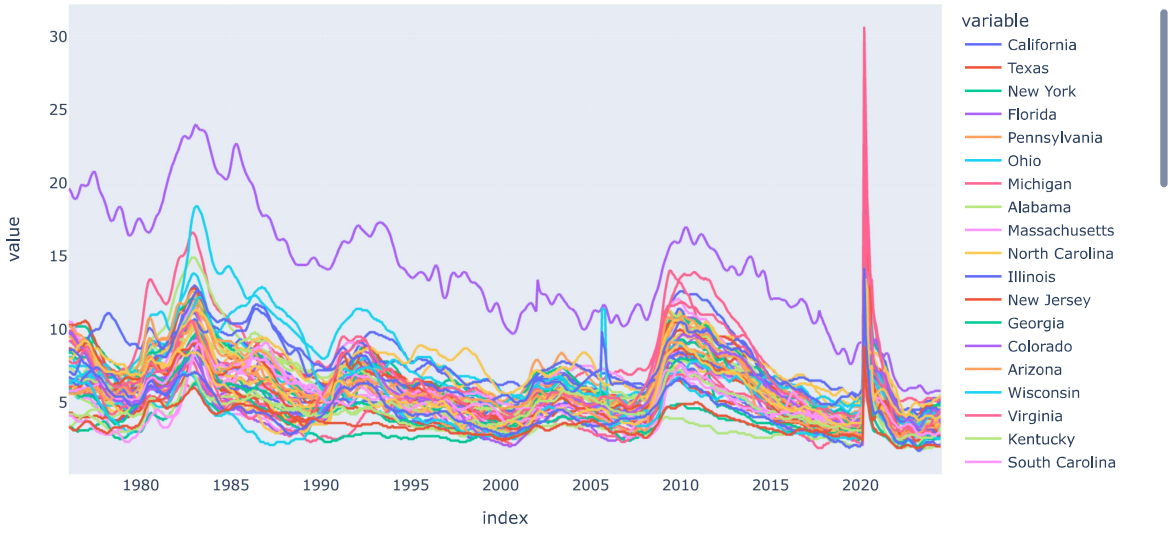
In [19]:
```
# List of columns to drop which are not USA States
columns_to_drop = [
    'Las Montana Region',
    'Las Montana Region 2',
    'New England Region',
    'West North Central Region',
    'South Region',
    'Northeast Region',
    'Western Region'
]

# Drop the columns from the DataFrame
unemployment_statewise = unemployment_statewise.drop(columns=columns_to_drop)

unemployment_statewise.shape
```

Out[19]:
```
(583, 52)
```

In [20]:
```
#we basic chart of unemployement statewise
plt.plot(unemployment_statewise)
plt.show()
```



In [21]:
```
#Plot state wise unemployment rate,also you can select the state,so it displays that states only
px.line(unemployment_statewise)
```



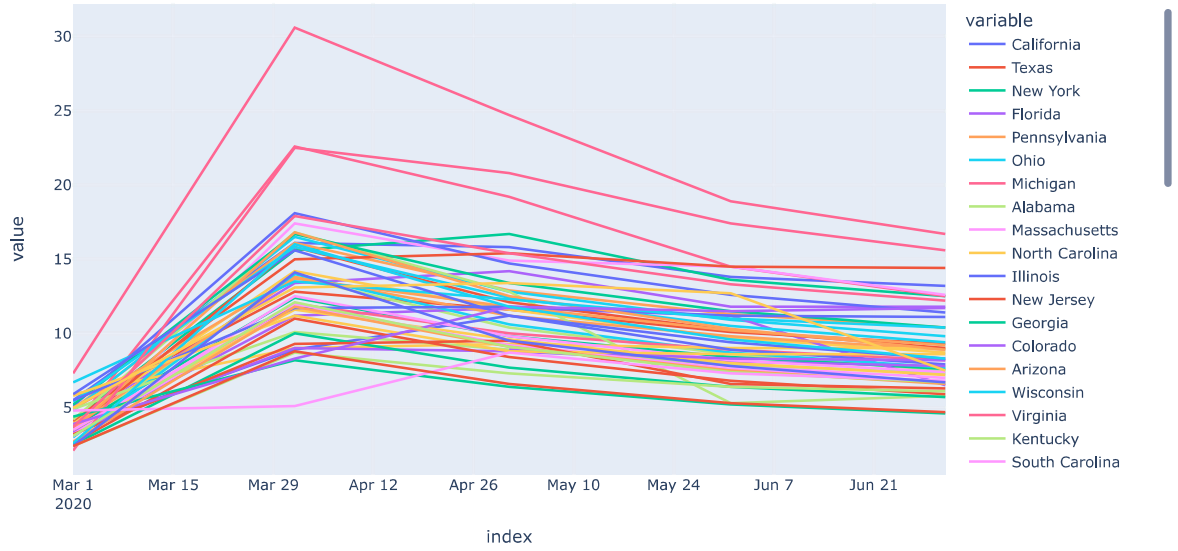
In [22]:
```
#Unemployement rate during corona
unemployment_corona_period=unemployment_statewise.loc[(unemployment_statewise.index > '2020-2-1') & (unemployment_statewise.index < '2020-8-1'
unemployment_corona_period
```

Out[22]:

	California	Texas	New York	Florida	Pennsylvania	Ohio	Michigan	Alabama	Massachusetts	North Carolina	...	Nebraska	Connecticut	Idaho	New Hampshire	Rhode Island	Kansas	Wyomi
2020-03-01	5.5	5.0	4.2	4.1	4.9	4.8	3.7	3.4	3.0	4.0	...	4.4	3.9	2.7	2.6	3.7	3.1	4
2020-04-01	16.1	12.8	15.6	13.4	16.1	16.5	22.6	13.8	17.4	14.2	...	8.2	8.3	11.8	16.0	17.9	12.1	5
2020-05-01	15.8	11.6	16.7	14.2	12.9	12.8	19.2	10.4	14.9	11.6	...	6.4	11.8	9.1	11.8	15.4	9.1	8
2020-06-01	13.8	10.1	13.6	11.8	11.3	10.9	14.5	8.6	14.5	9.7	...	5.2	11.5	7.5	9.6	13.3	7.4	7
2020-07-01	13.2	9.3	12.5	11.8	10.4	9.8	12.5	7.5	12.6	8.7	...	4.6	11.7	6.6	8.3	12.2	6.7	6

5 rows × 52 columns

In [23]:
```
#Plot state wise unemployment rate during corona
px.line(unemployment_corona_period)
```



In [24]:
```
#Unemployement rate when corona has just started
unemployment_corona=unemployment_statewise.loc[unemployment_statewise.index == '2020-3-1']
unemployment_corona
```

Out[24]:

	California	Texas	New York	Florida	Pennsylvania	Ohio	Michigan	Alabama	Massachusetts	North Carolina	...	Nebraska	Connecticut	Idaho	New Hampshire	Rhode Island	Kansas	Wyomi
2020-03-01	5.5	5.0	4.2	4.1	4.9	4.8	3.7	3.4	3.0	4.0	...	4.4	3.9	2.7	2.6	3.7	3.1	4

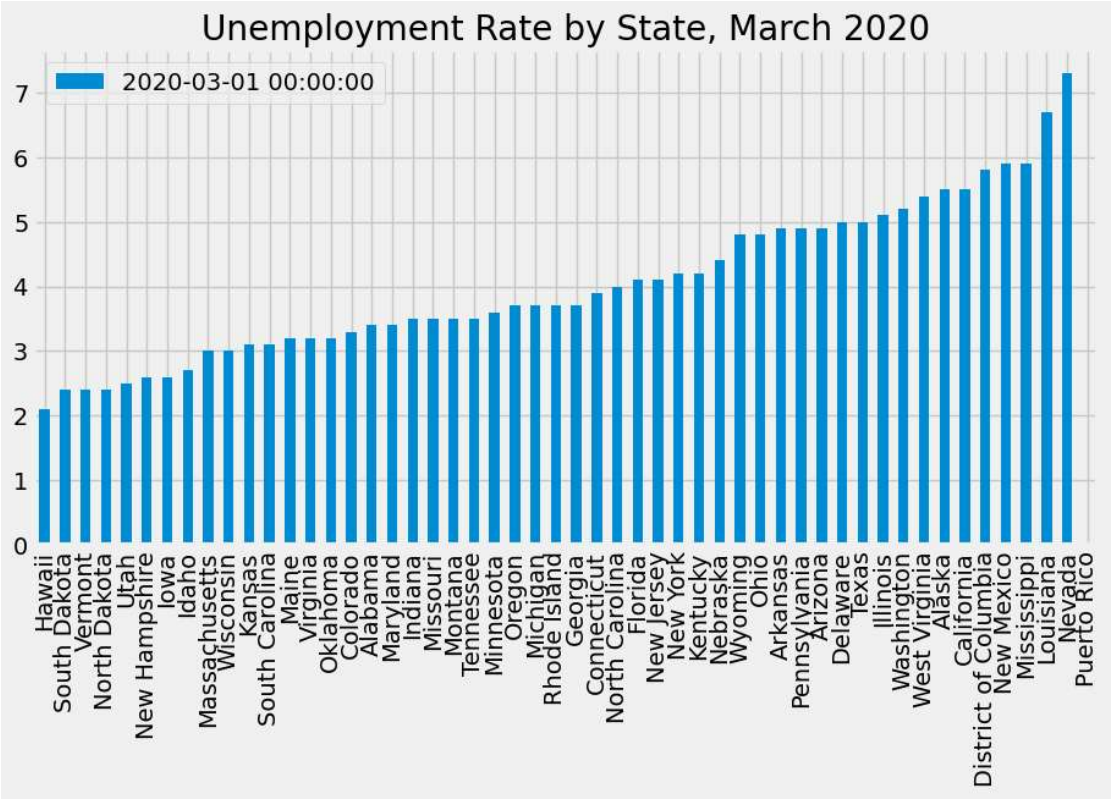
1 rows × 52 columns

In [25]:
```
#Sorting unemployment rate from highest to lowest and transposing it.
ax = unemployment_corona.loc[unemployment_corona.index == '2020-03-01'].T.sort_values('2020-03-01')
ax
```

Out[25]:

	2020-03-01
Hawaii	2.1
South Dakota	2.4
Vermont	2.4
North Dakota	2.4
Utah	2.5
New Hampshire	2.6
Iowa	2.6
Idaho	2.7
Massachusetts	3.0
Wisconsin	3.0
Kansas	3.1
South Carolina	3.1
Maine	3.2
Virginia	3.2
Oklahoma	3.2
Colorado	3.3
Alabama	3.4
Maryland	3.4
Indiana	3.5
Missouri	3.5
Montana	3.5
Tennessee	3.5
Minnesota	3.6
Oregon	3.7
Michigan	3.7
Rhode Island	3.7
Georgia	3.7
Connecticut	3.9
North Carolina	4.0
Florida	4.1
New Jersey	4.1
New York	4.2
Kentucky	4.2
Nebraska	4.4
Wyoming	4.8
Ohio	4.8
Arkansas	4.9
Pennsylvania	4.9
Arizona	4.9
Delaware	5.0
Texas	5.0
Illinois	5.1
Washington	5.2
West Virginia	5.4
Alaska	5.5
California	5.5
District of Columbia	5.8
New Mexico	5.9
Mississippi	5.9
Louisiana	6.7
Nevada	7.3
Puerto Rico	NaN

In [26]:
```
ax.plot(kind='bar', figsize=(10, 5), title='Unemployment Rate by State, March 2020')
plt.show()
```



In [27]:
```
#Now we are searching for job Participation rate and then Pulling that Data from FRED Website
participation_rate=fred.search('participation rate', filter=('frequency', 'Monthly'))
participation_rate=participation_rate.query('seasonal_adjustment == "Seasonally Adjusted" and units == "Percent"')#some more Filters of Data s
participation_rate
```

Out[27]:

series id	id	realtime_start	realtime_end	title	observation_start	observation_end	frequency	frequency_short	units	units_short	seasonal_
CIVPART	CIVPART	2024-09-17	2024-09-17	Labor Force Participation Rate	1948-01-01	2024-08-01	Monthly	M	Percent	%	Seasona
LNS11300060	LNS11300060	2024-09-17	2024-09-17	Labor Force Participation Rate - 25-54 Yrs.	1948-01-01	2024-08-01	Monthly	M	Percent	%	Seasona
LNS11300002	LNS11300002	2024-09-17	2024-09-17	Labor Force Participation Rate - Women	1948-01-01	2024-08-01	Monthly	M	Percent	%	Seasona
LNS11300001	LNS11300001	2024-09-17	2024-09-17	Labor Force Participation Rate - Men	1948-01-01	2024-08-01	Monthly	M	Percent	%	Seasona
LNS11324230	LNS11324230	2024-09-17	2024-09-17	Labor Force Participation Rate - 55 Yrs. & over	1948-01-01	2024-08-01	Monthly	M	Percent	%	Seasona
...	...	...	...	...	...	...	...	...	...	...	
LRIN55MAJPM156S	LRIN55MAJPM156S	2024-09-17	2024-09-17	Infra-Annual Labor Statistics: Inactivity Rate...	1970-01-01	2024-07-01	Monthly	M	Percent	%	Seasona
LRIN24MAJPM156S	LRIN24MAJPM156S	2024-09-17	2024-09-17	Infra-Annual Labor Statistics: Inactivity Rate...	1970-01-01	2024-07-01	Monthly	M	Percent	%	Seasona
LRINTTTTCAM156S	LRINTTTTCAM156S	2024-09-17	2024-09-17	Infra-Annual Labor Statistics: Inactivity Rate...	1995-01-01	2024-08-01	Monthly	M	Percent	%	Seasona
LRIN64MAJPM156S	LRIN64MAJPM156S	2024-09-17	2024-09-17	Infra-Annual Labor Statistics: Inactivity Rate...	1970-01-01	2024-07-01	Monthly	M	Percent	%	Seasona
LRIN64FEJPM156S	LRIN64FEJPM156S	2024-09-17	2024-09-17	Infra-Annual Labor Statistics: Inactivity Rate...	1970-01-01	2024-07-01	Monthly	M	Percent	%	Seasona

278 rows × 15 columns

In [28]:
```
participation_rate = participation_rate.loc[participation_rate['title'].str.contains('Labor Force Participation Rate for')]
participation_rate
# Here I have find the data of all united states ,indivudual states having thier participation rate statewise.
#Now I can pull any data from this using thier ID.
```

LBSSA20	LBSSA20	2024-09-17	2024-09-17	Participation Rate for Kansas	1976-01-01	2024-07-01	Monthly	M	Percent	%	Seasonally Adjusted
LBSSA44	LBSSA44	2024-09-17	2024-09-17	Labor Force Participation Rate for Rhode Island	1976-01-01	2024-07-01	Monthly	M	Percent	%	Seasonally Adjusted
LBSSA11	LBSSA11	2024-09-17	2024-09-17	Labor Force Participation Rate for District Of...	1976-01-01	2024-07-01	Monthly	M	Percent	%	Seasonally Adjusted
LBSSA10	LBSSA10	2024-09-17	2024-09-17	Labor Force Participation Rate for Delaware	1976-01-01	2024-07-01	Monthly	M	Percent	%	Seasonally Adjusted
LBSSA56	LBSSA56	2024-09-17	2024-09-17	Labor Force Participation Rate for Wyoming	1976-01-01	2024-07-01	Monthly	M	Percent	%	Seasonally Adjusted

In [29]:
```
participation_rate.shape
```

Out[29]: (51, 15)

In [30]:
```
#pulling data of all states participation rate using for loop
participation_rate=participation_rate['id'].unique()
participation_rate
```

Out[30]:
```
array(['LBSSA06', 'LBSSA01', 'LBSSA36', 'LBSSA28', 'LBSSA26', 'LBSSA48',
       'LBSSA12', 'LBSSA21', 'LBSSA39', 'LBSSA55', 'LBSSA42', 'LBSSA25',
       'LBSSA27', 'LBSSA24', 'LBSSA54', 'LBSSA47', 'LBSSA23', 'LBSSA22',
       'LBSSA17', 'LBSSA45', 'LBSSA08', 'LBSSA37', 'LBSSA13', 'LBSSA49',
       'LBSSA18', 'LBSSA29', 'LBSSA51', 'LBSSA34', 'LBSSA19', 'LBSSA02',
       'LBSSA53', 'LBSSA04', 'LBSSA35', 'LBSSA16', 'LBSSA05', 'LBSSA40',
       'LBSSA31', 'LBSSA15', 'LBSSA32', 'LBSSA30', 'LBSSA41', 'LBSSA33',
       'LBSSA50', 'LBSSA09', 'LBSSA38', 'LBSSA46', 'LBSSA20', 'LBSSA44',
       'LBSSA11', 'LBSSA10', 'LBSSA56'], dtype=object)
```

In [31]:
```
all_state_participation=[]
for my_id in participation_rate:
    participation_rate_statewise=fred.get_series(my_id)
    participation_rate_statewise=participation_rate_statewise.to_frame(name=my_id)#converting raw data to framed data
    all_state_participation.append(participation_rate_statewise) # appending data of states
```

In [32]:
```
#Now we need to concatenate this data in to one data frame
#Where state are on heading of x axis and dates in y axis with Participation rate statewise
participation_rate_statewise=pd.concat(all_state_participation,axis=1)
participation_rate_statewise
```

Out[32]:

	LBSSA06	LBSSA01	LBSSA36	LBSSA28	LBSSA26	LBSSA48	LBSSA12	LBSSA21	LBSSA39	LBSSA55	...	LBSSA33	LBSSA50	LBSSA09	LBSSA38	LBSSA46	LBSS
1976-01-01	62.6	57.0	58.0	58.8	61.6	63.8	55.8	60.5	61.7	65.6	...	65.9	63.6	64.2	62.6	64.6	6
1976-02-01	62.4	56.9	58.0	58.6	61.5	63.5	55.7	60.3	61.7	65.5	...	65.6	63.4	64.1	62.4	64.4	6
1976-03-01	62.2	56.8	58.0	58.5	61.5	63.4	55.5	60.2	61.7	65.4	...	65.6	63.2	64.0	62.3	64.4	6
1976-04-01	62.2	56.8	58.0	58.5	61.6	63.5	55.5	60.1	61.6	65.4	...	65.7	63.5	64.1	62.5	64.3	6
1976-05-01	62.3	56.8	58.1	58.5	61.7	63.6	55.4	60.1	61.6	65.5	...	66.0	63.6	64.3	62.6	64.3	6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2024-03-01	62.0	57.4	61.4	53.7	62.3	64.1	59.4	56.9	61.8	65.6	...	65.3	65.4	64.6	68.9	67.7	6
2024-04-01	62.0	57.5	61.3	53.7	62.3	64.2	59.3	57.1	61.8	65.6	...	65.5	65.5	64.6	69.0	67.6	6
2024-05-01	62.0	57.5	61.3	53.8	62.3	64.2	59.1	57.3	61.9	65.6	...	65.6	65.6	64.7	68.9	67.5	6
2024-06-01	62.0	57.5	61.3	54.0	62.3	64.3	58.9	57.4	62.1	65.5	...	65.6	65.7	64.6	68.9	67.5	6
2024-07-01	62.0	57.5	61.3	54.2	62.4	64.4	58.8	57.6	62.3	65.5	...	65.6	65.7	64.4	68.9	67.5	6

583 rows × 51 columns

In [33]:

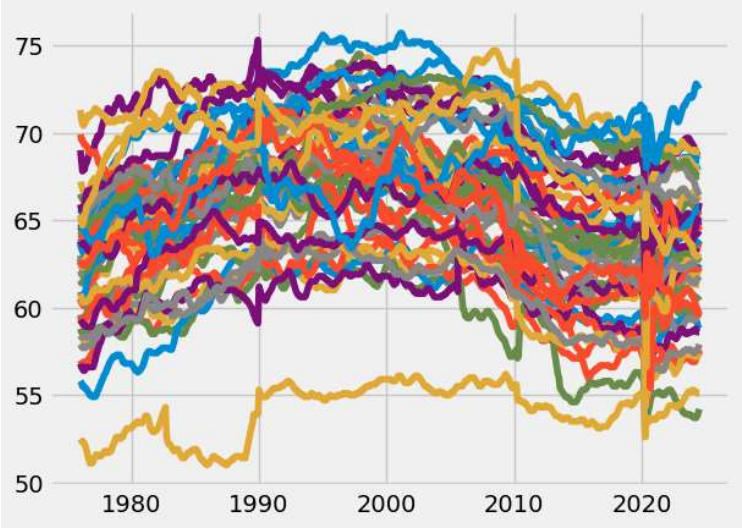
```
# Create a dictionary to map series IDs to state names
state_code_mapping = {
    'LBSSA06': 'California',
    'LBSSA01': 'Alabama',
    'LBSSA36': 'New York',
    'LBSSA28': 'Mississippi',
    'LBSSA26': 'Michigan',
    'LBSSA48': 'Texas',
    'LBSSA12': 'Florida',
    'LBSSA21': 'Kentucky',
    'LBSSA39': 'Ohio',
    'LBSSA55': 'Wisconsin',
    'LBSSA42': 'Pennsylvania',
    'LBSSA25': 'Massachusetts',
    'LBSSA27': 'Minnesota',
    'LBSSA24': 'Maryland',
    'LBSSA54': 'West Virginia',
    'LBSSA47': 'Tennessee',
    'LBSSA23': 'Maine',
    'LBSSA22': 'Louisiana',
    'LBSSA17': 'Illinois',
    'LBSSA45': 'South Carolina',
    'LBSSA08': 'Colorado',
    'LBSSA37': 'North Carolina',
    'LBSSA13': 'Georgia',
    'LBSSA49': 'Utah',
    'LBSSA18': 'Indiana',
    'LBSSA29': 'Missouri',
    'LBSSA51': 'Virginia',
    'LBSSA34': 'New Jersey',
    'LBSSA19': 'Iowa',
    'LBSSA02': 'Alaska',
    'LBSSA53': 'Washington',
    'LBSSA04': 'Arizona',
    'LBSSA35': 'New Mexico',
    'LBSSA16': 'Idaho',
    'LBSSA05': 'Arkansas',
    'LBSSA40': 'Oklahoma',
    'LBSSA31': 'Nebraska',
    'LBSSA15': 'Hawaii',
    'LBSSA32': 'Nevada',
    'LBSSA30': 'Montana',
    'LBSSA41': 'Oregon',
    'LBSSA33': 'North Dakota',
    'LBSSA50': 'Vermont',
    'LBSSA09': 'Connecticut',
    'LBSSA38': 'North Dakota',
    'LBSSA46': 'South Dakota',
    'LBSSA20': 'Kansas',
    'LBSSA44': 'Rhode Island',
    'LBSSA11': 'District of Columbia',
    'LBSSA10': 'Delaware',
    'LBSSA56': 'Wyoming'
}

participation_rate_statewise.rename(columns=state_code_mapping, inplace=True)

participation_rate_statewise
```

Out[33]:

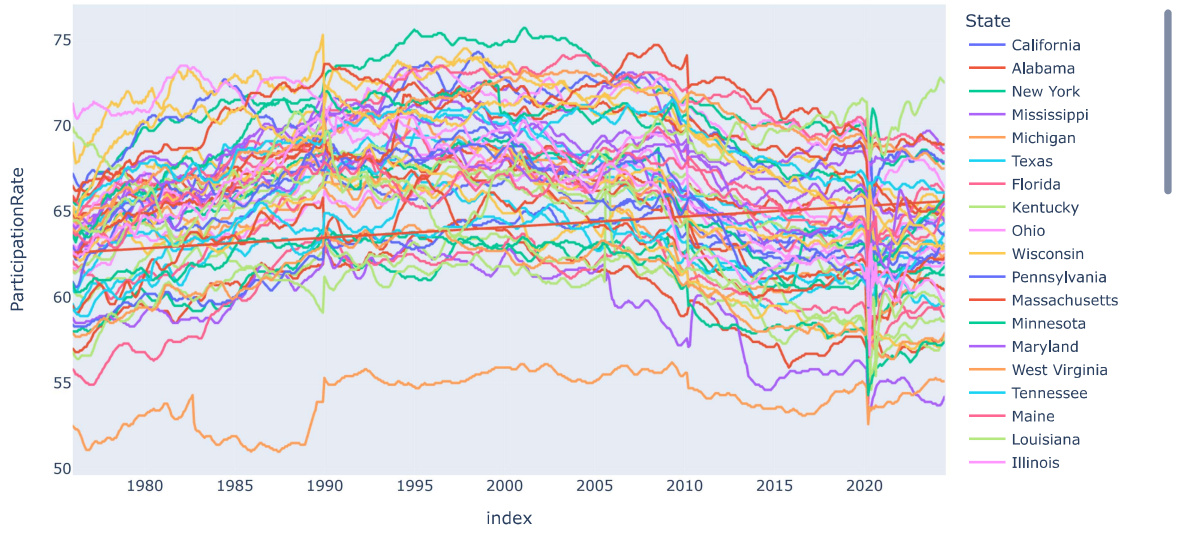
	California	Alabama	New York	Mississippi	Michigan	Texas	Florida	Kentucky	Ohio	Wisconsin	...	North Dakota	Vermont	Connecticut	North Dakota	South Dakota	Kansas	Rhode Island	Distr Columt
1976-01-01	62.6	57.0	58.0	58.8	61.6	63.8	55.8	60.5	61.7	65.6	...	65.9	63.6	64.2	62.6	64.6	65.1	63.8	6
1976-02-01	62.4	56.9	58.0	58.6	61.5	63.5	55.7	60.3	61.7	65.5	...	65.6	63.4	64.1	62.4	64.4	65.0	63.7	6
1976-03-01	62.2	56.8	58.0	58.5	61.5	63.4	55.5	60.2	61.7	65.4	...	65.6	63.2	64.0	62.3	64.4	64.9	63.6	6
1976-04-01	62.2	56.8	58.0	58.5	61.6	63.5	55.5	60.1	61.6	65.4	...	65.7	63.5	64.1	62.5	64.3	65.0	63.7	6
1976-05-01	62.3	56.8	58.1	58.5	61.7	63.6	55.4	60.1	61.6	65.5	...	66.0	63.6	64.3	62.6	64.3	65.1	63.6	6
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2024-03-01	62.0	57.4	61.4	53.7	62.3	64.1	59.4	56.9	61.8	65.6	...	65.3	65.4	64.6	68.9	67.7	66.1	64.4	7
2024-04-01	62.0	57.5	61.3	53.7	62.3	64.2	59.3	57.1	61.8	65.6	...	65.5	65.5	64.6	69.0	67.6	66.1	64.7	7
2024-05-01	62.0	57.5	61.3	53.8	62.3	64.2	59.1	57.3	61.9	65.6	...	65.6	65.6	64.7	68.9	67.5	66.1	64.9	7
2024-06-01	62.0	57.5	61.3	54.0	62.3	64.3	58.9	57.4	62.1	65.5	...	65.6	65.7	64.6	68.9	67.5	66.1	65.1	7
2024-07-01	62.0	57.5	61.3	54.2	62.4	64.4	58.8	57.6	62.3	65.5	...	65.6	65.7	64.4	68.9	67.5	66.1	65.2	7

583 rows × 51 columns

In [34]:
```
#we basic chart of participation rate statewise
plt.plot(participation_rate_statewise)
plt.show()
```



In [35]:
```
# Reshape the DataFrame and plot the line chart in one step
px.line(
    participation_rate_statewise.reset_index().melt(id_vars='index', var_name='State', value_name='ParticipationRate'),
    x='index',
    y='ParticipationRate',
    color='State',
    )
```



This line reshapes the DataFrame `participation_rate_statewise` from a **wide** format (where each state's participation rates are in separate columns) to a **long** format (where there are three columns: Date, State, and Participation Rate). This operation is essential for plotting or analyzing data when you want all your values to be in one column instead of spread across many. participation_rate_statewise.reset_index().melt(id_vars='index', var_name='State', value_name='ParticipationRate')

1. `participation_rate_statewise.reset_index()`

This converts the index (which is the date, as we have seen from your earlier output) into a regular column.

- **Before**: The dates are part of the index.
- **After**: The dates are moved into a new column, typically called `index` by default.

For example, assuming `participation_rate_statewise` looks like this:

Date	California	Alabama	...
1976-01-01	5.6	4.3	...
1976-02-01	5.7	4.2	...

After `reset_index()`, it will look like this:

index	California	Alabama	...
1976-01-01	5.6	4.3	...
1976-02-01	5.7	4.2	...

2. `.melt(id_vars='index', var_name='State', value_name='ParticipationRate')`

The `melt()` function reshapes the DataFrame from wide to long format. Here's how it works:

- **`id_vars='index'`**: This specifies which column to leave as-is, meaning the `index` column (which holds the date values) will stay the same and won't be "melted."
- **`var_name='State'`**: This is the name for the new column that will hold the original column headers (state names). All state names (currently columns like 'California', 'Alabama', etc.) will be gathered into one single column called `State`.
- **`value_name='ParticipationRate'`**: This is the name for the new column that will contain the participation rate values (previously in the individual columns for each state). All values from each state's original column will be placed into this single `ParticipationRate` column.

Result

The new "long" DataFrame looks like this:

index	State	ParticipationRate
1976-01-01	California	5.6
1976-01-01	Alabama	4.3
1976-02-01	California	5.7
1976-02-01	Alabama	4.2

index	State	ParticipationRate
...	...	...

In summary:

- **`index`** (date) stays the same in every row.
- **`State`** (original column names, like 'California', 'Alabama') becomes a new column.
- **`ParticipationRate`** (the values under each state) becomes the corresponding participation rate for each state on each date.

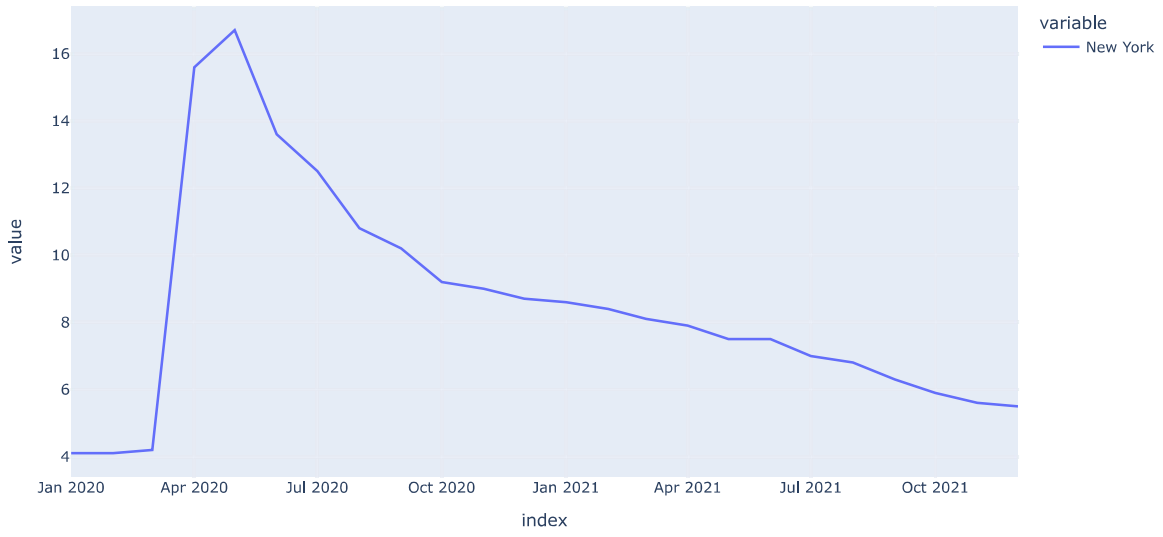
Why is this necessary?

This "long" format makes it easier to plot or work with the data, especially in libraries like Plotly, because instead of needing to specify each state's data separately, you have all

In [36]:
```
#Plotting unemployement VS participation

#Unemployement rate from Jan 2020 to Dec 2021
unemployment_corona_period_newyork=unemployment_statewise['New York'].loc[(unemployment_statewise.index >= '2020-1-1') & (unemployment_statewi
unemployment_corona_period_newyork
```

Out[36]:
```
2020-01-01     4.1
2020-02-01     4.1
2020-03-01     4.2
2020-04-01    15.6
2020-05-01    16.7
2020-06-01    13.6
2020-07-01    12.5
2020-08-01    10.8
2020-09-01    10.2
2020-10-01     9.2
2020-11-01     9.0
2020-12-01     8.7
2021-01-01     8.6
2021-02-01     8.4
2021-03-01     8.1
2021-04-01     7.9
2021-05-01     7.5
2021-06-01     7.5
2021-07-01     7.0
2021-08-01     6.8
2021-09-01     6.3
2021-10-01     5.9
2021-11-01     5.6
2021-12-01     5.5
Freq: MS, Name: New York, dtype: float64
```

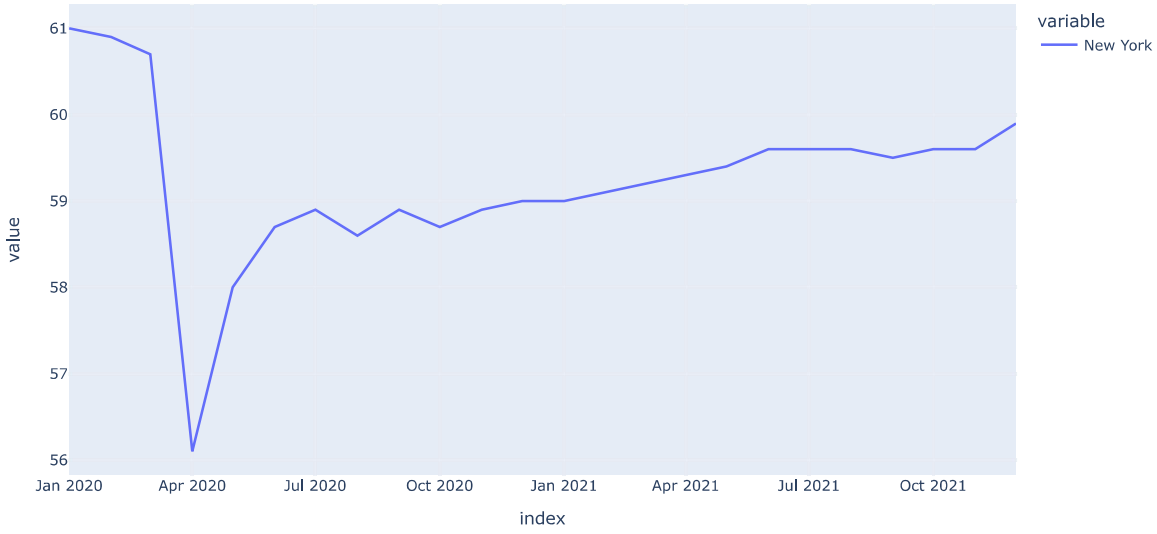
In [37]:
```
#Plot state wise unemployment rate during corona
px.line(unemployment_corona_period_newyork)
```



In [38]:
```
#Plotting unemployement VS participation
#Participation rate from Jan 2020 to Dec 2021
participation_rate_statewise_newyork=participation_rate_statewise['New York'].loc[(participation_rate_statewise.index >= '2020-1-1') & (partic
participation_rate_statewise_newyork
```

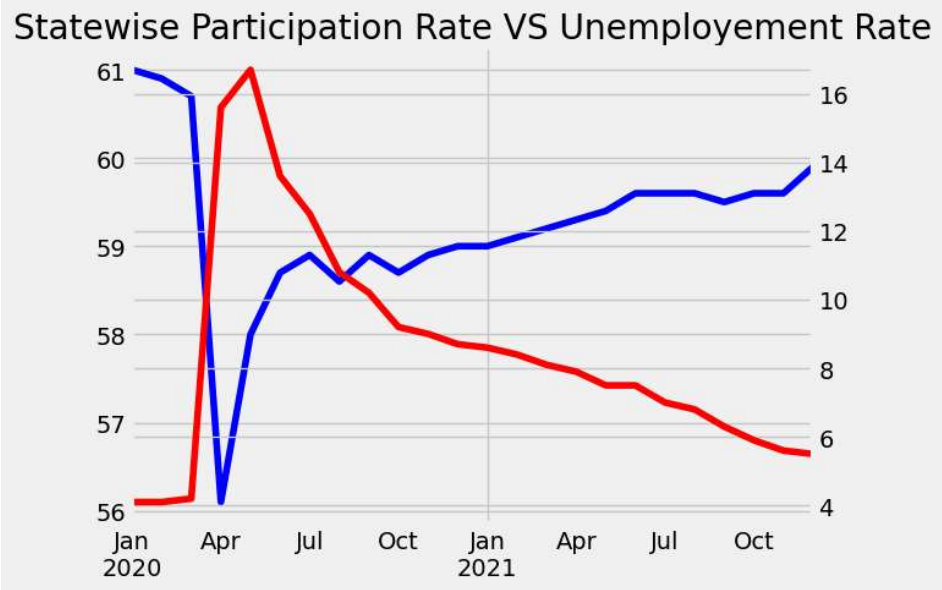
Out[38]:
```
2020-01-01    61.0
2020-02-01    60.9
2020-03-01    60.7
2020-04-01    56.1
2020-05-01    58.0
2020-06-01    58.7
2020-07-01    58.9
2020-08-01    58.6
2020-09-01    58.9
2020-10-01    58.7
2020-11-01    58.9
2020-12-01    59.0
2021-01-01    59.0
2021-02-01    59.1
2021-03-01    59.2
2021-04-01    59.3
2021-05-01    59.4
2021-06-01    59.6
2021-07-01    59.6
2021-08-01    59.6
2021-09-01    59.5
2021-10-01    59.6
2021-11-01    59.6
2021-12-01    59.9
Name: New York, dtype: float64
```

In [39]:
```
#Plot state wise unemployment rate during corona
px.line(participation_rate_statewise_newyork)
```



In [40]:
```
# Create subplots for New york states
fig, ax1 = plt.subplots()
# Assuming participation_rate_statewise is a DataFrame where index represents states and the column represents the participation rate
participation_rate_statewise_newyork.plot(kind='line',ax=ax1,color='b')
plt.title('Statewise Participation Rate VS Unemployement Rate')


ax2 = ax1.twinx()
unemployment_corona_period_newyork.plot(kind='line',ax=ax2,color='r')
```

Out[40]: <Axes: >



In [41]:
```
#Plotting unemployement VS participation
#Participation rate from Jan 2020 to Dec 2021
participation_rate_statewise=participation_rate_statewise.loc[(participation_rate_statewise.index >= '2020-1-1') & (participation_rate_statewi
participation_rate_statewise
unemployment_corona_period=unemployment_statewise.loc[(unemployment_statewise.index >= '2020-1-1') & (unemployment_statewise.index < '2022-1-1
unemployment_corona_period
```

Out[41]:

	California	Texas	New York	Florida	Pennsylvania	Ohio	Michigan	Alabama	Massachusetts	North Carolina	...	Nebraska	Connecticut	Idaho	New Hampshire	Rhode Island	Kansas	Wyomi
2020-01-01	4.3	3.5	4.1	3.0	4.5	4.4	3.7	3.2	3.0	3.8	...	3.0	3.8	2.8	2.6	3.6	3.1	4
2020-02-01	4.4	3.6	4.1	3.0	4.7	4.6	3.7	3.3	3.0	3.8	...	3.0	3.8	2.8	2.6	3.7	3.1	4
2020-03-01	5.5	5.0	4.2	4.1	4.9	4.8	3.7	3.4	3.0	4.0	...	4.4	3.9	2.7	2.6	3.7	3.1	4
2020-04-01	16.1	12.8	15.6	13.4	16.1	16.5	22.6	13.8	17.4	14.2	...	8.2	8.3	11.8	16.0	17.9	12.1	5
2020-05-01	15.8	11.6	16.7	14.2	12.9	12.8	19.2	10.4	14.9	11.6	...	6.4	11.8	9.1	11.8	15.4	9.1	8
2020-06-01	13.8	10.1	13.6	11.8	11.3	10.9	14.5	8.6	14.5	9.7	...	5.2	11.5	7.5	9.6	13.3	7.4	7
2020-07-01	13.2	9.3	12.5	11.8	10.4	9.8	12.5	7.5	12.6	8.7	...	4.6	11.7	6.6	8.3	12.2	6.7	6
2020-08-01	11.9	8.1	10.8	8.8	9.3	8.3	10.0	6.3	10.4	7.3	...	3.9	9.6	5.4	6.7	10.3	5.8	6
2020-09-01	10.0	7.7	10.2	8.1	8.8	7.6	8.9	5.9	9.7	6.7	...	3.5	8.8	5.0	6.1	9.9	5.4	5
2020-10-01	9.3	7.1	9.2	7.1	8.1	6.8	7.7	5.2	8.5	6.0	...	3.1	7.9	4.4	5.2	7.0	4.9	5
2020-11-01	9.0	7.0	9.0	6.6	7.9	6.4	7.1	4.8	7.9	5.8	...	3.0	7.5	4.2	4.8	7.0	4.7	5
2020-12-01	9.0	6.9	8.7	6.4	7.6	6.3	7.0	4.5	7.6	5.8	...	3.0	7.4	4.2	4.6	6.9	4.4	5
2021-01-01	8.7	6.7	8.6	5.9	7.4	6.0	6.5	4.2	6.9	5.6	...	2.9	7.1	4.1	4.2	6.6	4.0	5
2021-02-01	8.6	6.6	8.4	5.6	7.1	5.9	6.3	3.9	6.5	5.5	...	2.9	7.1	4.1	4.1	6.4	3.8	5
2021-03-01	8.4	6.4	8.1	5.4	6.8	5.8	6.2	3.8	6.2	5.4	...	2.9	7.0	4.0	4.0	6.2	3.7	5
2021-04-01	8.3	6.2	7.9	5.2	6.6	5.7	6.2	3.7	6.1	5.3	...	2.8	7.1	3.9	3.9	6.2	3.6	5
2021-05-01	7.9	6.0	7.5	4.9	6.3	5.5	6.2	3.5	5.7	5.2	...	2.7	6.9	3.7	3.7	6.0	3.6	4
2021-06-01	7.8	5.8	7.5	4.9	6.1	5.3	6.2	3.5	5.7	5.1	...	2.7	6.8	3.6	3.6	6.0	3.5	4
2021-07-01	7.4	5.6	7.0	4.6	5.9	5.1	6.0	3.3	5.3	4.9	...	2.6	6.5	3.5	3.4	5.8	3.4	4
2021-08-01	7.0	5.3	6.8	4.4	5.6	4.9	5.8	3.2	5.1	4.8	...	2.5	6.2	3.4	3.2	5.5	3.3	4
2021-09-01	6.5	5.1	6.3	4.1	5.2	4.7	5.4	3.0	4.7	4.5	...	2.4	5.9	3.3	3.0	5.1	3.1	4
2021-10-01	6.1	4.9	5.9	3.9	4.9	4.5	5.1	2.9	4.5	4.3	...	2.3	5.6	3.1	2.8	4.6	2.9	3
2021-11-01	5.7	4.6	5.6	3.8	4.7	4.3	4.8	2.8	4.2	4.1	...	2.2	5.3	3.0	2.6	4.1	2.7	3
2021-12-01	5.5	4.5	5.5	3.6	4.5	4.2	4.5	2.7	3.9	3.9	...	2.1	5.1	2.9	2.4	3.7	2.6	3

24 rows × 52 columns

In [42]:
```
#Dropping district of columbia,Puerto Rico from both the table
participation_rate_statewise.columns
```

Out[42]:
```
Index(['California', 'Alabama', 'New York', 'Mississippi', 'Michigan', 'Texas',
       'Florida', 'Kentucky', 'Ohio', 'Wisconsin', 'Pennsylvania',
       'Massachusetts', 'Minnesota', 'Maryland', 'West Virginia', 'Tennessee',
       'Maine', 'Louisiana', 'Illinois', 'South Carolina', 'Colorado',
       'North Carolina', 'Georgia', 'Utah', 'Indiana', 'Missouri', 'Virginia',
       'New Jersey', 'Iowa', 'Alaska', 'Washington', 'Arizona', 'New Mexico',
       'Idaho', 'Arkansas', 'Oklahoma', 'Nebraska', 'Hawaii', 'Nevada',
       'Montana', 'Oregon', 'North Dakota', 'Vermont', 'Connecticut',
       'North Dakota', 'South Dakota', 'Kansas', 'Rhode Island',
       'District of Columbia', 'Delaware', 'Wyoming'],
      dtype='object')
```

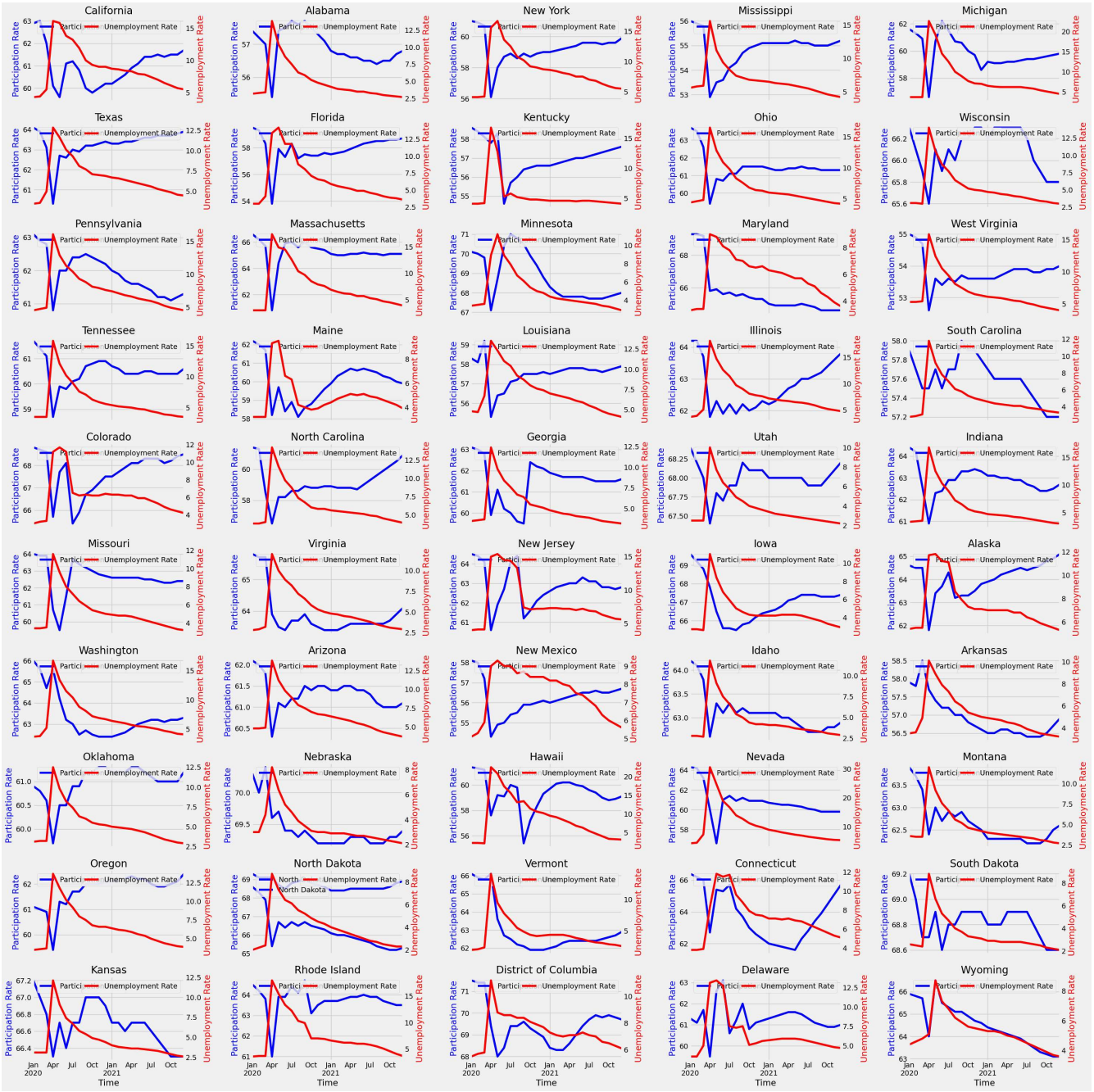
In [43]:
```
unemployment_corona_period.columns
```

Out[43]:
```
Index(['California', 'Texas', 'New York', 'Florida', 'Pennsylvania', 'Ohio',
       'Michigan', 'Alabama', 'Massachusetts', 'North Carolina', 'Illinois',
       'New Jersey', 'Georgia', 'Colorado', 'Arizona', 'Wisconsin', 'Virginia',
       'Kentucky', 'South Carolina', 'New Mexico', 'Minnesota', 'Tennessee',
       'Washington', 'Maryland', 'Oregon', 'West Virginia', 'Nevada',
       'Arkansas', 'Oklahoma', 'Missouri', 'Alaska', 'Iowa', 'Utah',
       'Puerto Rico', 'Indiana', 'Louisiana', 'Hawaii', 'North Dakota',
       'Montana', 'District of Columbia', 'Mississippi', 'Maine', 'Nebraska',
       'Connecticut', 'Idaho', 'New Hampshire', 'Rhode Island', 'Kansas',
       'Wyoming', 'Delaware', 'Vermont', 'South Dakota'],
      dtype='object')
```

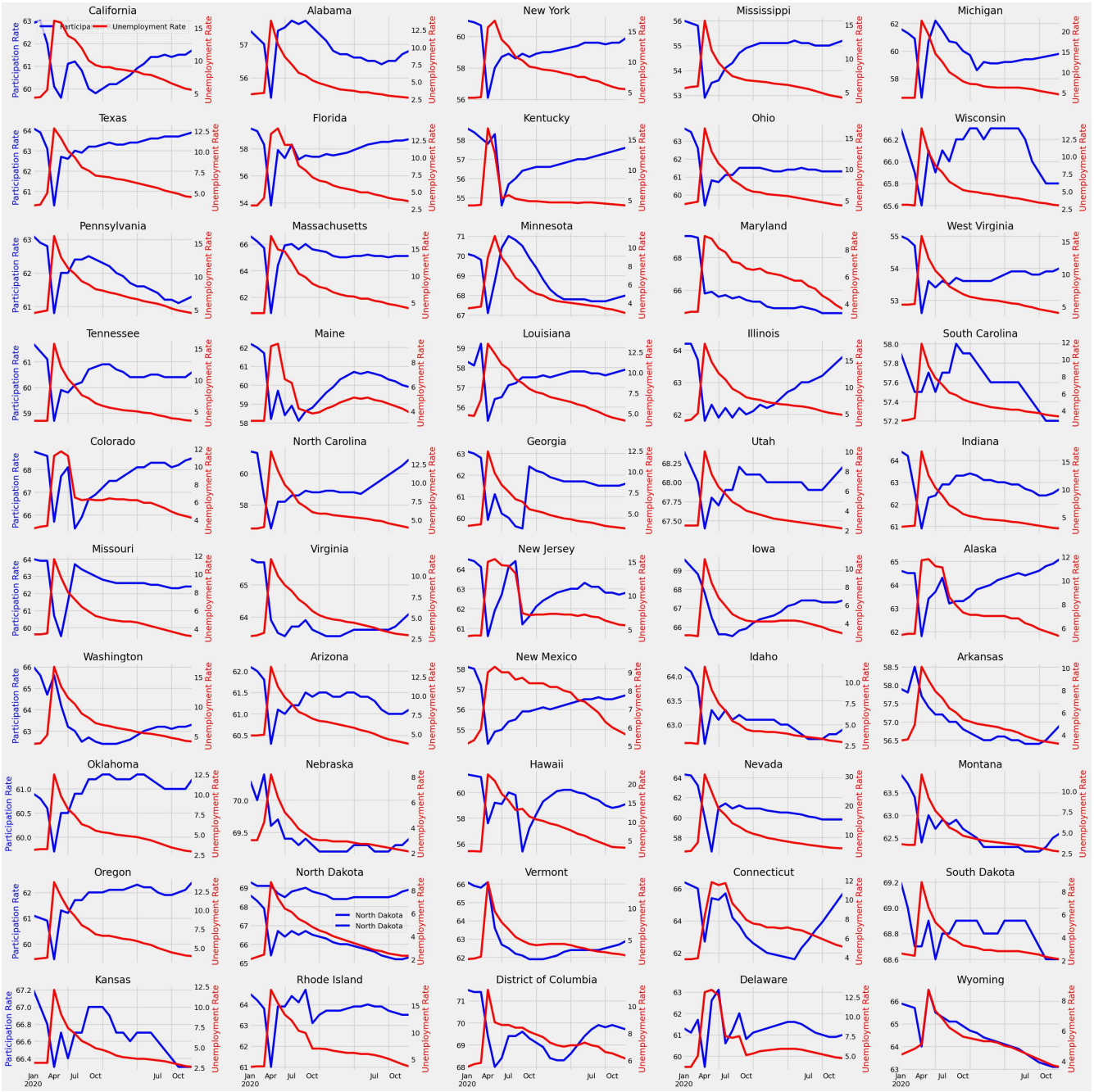
In [44]:
```
# Find the common columns between both DataFrames as some columns name are ambiguous and some states are not usa states in data so removing it
common_columns = participation_rate_statewise.columns.intersection(unemployment_corona_period.columns)

# Subset both DataFrames to keep only the common columns
participation_rate_statewise = participation_rate_statewise[common_columns]
unemployment_corona_period = unemployment_corona_period[common_columns]

# Print the updated column lists to verify
print("Common columns between both DataFrames:")
print(participation_rate_statewise.columns)
print(unemployment_corona_period.columns)
```

```
Common columns between both DataFrames:
Index(['California', 'Alabama', 'New York', 'Mississippi', 'Michigan', 'Texas',
       'Florida', 'Kentucky', 'Ohio', 'Wisconsin', 'Pennsylvania',
       'Massachusetts', 'Minnesota', 'Maryland', 'West Virginia', 'Tennessee',
       'Maine', 'Louisiana', 'Illinois', 'South Carolina', 'Colorado',
       'North Carolina', 'Georgia', 'Utah', 'Indiana', 'Missouri', 'Virginia',
       'New Jersey', 'Iowa', 'Alaska', 'Washington', 'Arizona', 'New Mexico',
       'Idaho', 'Arkansas', 'Oklahoma', 'Nebraska', 'Hawaii', 'Nevada',
       'Montana', 'Oregon', 'North Dakota', 'North Dakota', 'Vermont',
       'Connecticut', 'South Dakota', 'Kansas', 'Rhode Island',
       'District of Columbia', 'Delaware', 'Wyoming'],
      dtype='object')
Index(['California', 'Alabama', 'New York', 'Mississippi', 'Michigan', 'Texas',
       'Florida', 'Kentucky', 'Ohio', 'Wisconsin', 'Pennsylvania',
       'Massachusetts', 'Minnesota', 'Maryland', 'West Virginia', 'Tennessee',
       'Maine', 'Louisiana', 'Illinois', 'South Carolina', 'Colorado',
       'North Carolina', 'Georgia', 'Utah', 'Indiana', 'Missouri', 'Virginia',
       'New Jersey', 'Iowa', 'Alaska', 'Washington', 'Arizona', 'New Mexico',
       'Idaho', 'Arkansas', 'Oklahoma', 'Nebraska', 'Hawaii', 'Nevada',
       'Montana', 'Oregon', 'North Dakota', 'Vermont', 'Connecticut',
       'South Dakota', 'Kansas', 'Rhode Island', 'District of Columbia',
       'Delaware', 'Wyoming'],
      dtype='object')
```

In [45]:
```
import matplotlib.pyplot as plt

fig, axs = plt.subplots(10, 5, figsize=(30, 30), sharex=True)
axs = axs.flatten()

for i, state in enumerate(unemployment_corona_period.columns):
    # Create a twin axis
    ax2 = axs[i].twinx()

    # Plot participation rate on the primary axis
    participation_rate_statewise[state].plot(kind='line', ax=axs[i], color='b', label='Participation Rate')

    # Plot unemployment rate on the secondary axis
    unemployment_corona_period[state].plot(kind='line', ax=ax2, color='r', label='Unemployment Rate')

    # Set titles and labels
    axs[i].set_title(state)
    axs[i].set_xlabel('Time')
    axs[i].set_ylabel('Participation Rate', color='b')
    ax2.set_ylabel('Unemployment Rate', color='r')

    # Optionally add a legend
    axs[i].legend(loc='upper left')
    ax2.legend(loc='upper right')

    # Remove grid for the secondary axis
    ax2.grid(False)

plt.tight_layout()
plt.show()
```


California
Alabama
New York
Mississippi
Michigan
Texas
Florida
Kentucky
Ohio
Wisconsin
Pennsylvania
Massachusetts
Minnesota
Maryland
West Virginia
Tennessee
Maine
Louisiana
Illinois
South Carolina
Colorado
North Carolina
Georgia
Utah
Indiana
Missouri
Virginia
New Jersey
Iowa
Alaska
Washington
Arizona
New Mexico
Idaho
Arkansas
Oklahoma
Nebraska
Hawaii
Nevada
Montana
Oregon
North Dakota
Vermont
Connecticut
South Dakota
Kansas
Rhode Island
District of Columbia
Delaware
Wyoming
Participation Rate
Unemployment Rate
Time
Jan 2020
Apr
Jul
Oct
Jan 2021
Apr
Jul
Oct

In [46]:
```
import matplotlib.pyplot as plt

fig, axs = plt.subplots(10, 5, figsize=(30, 30), sharex=True)
axs = axs.flatten()

for i, state in enumerate(unemployment_corona_period.columns):
    # Create a twin axis
    ax2 = axs[i].twinx()

    # Plot participation rate on the primary axis
    participation_rate_statewise[state].plot(kind='line', ax=axs[i], color='b', label='Participation Rate')

    # Plot unemployment rate on the secondary axis
    unemployment_corona_period[state].plot(kind='line', ax=ax2, color='r', label='Unemployment Rate')

    # Set titles and labels
    axs[i].set_title(state)

    # Set y-labels only for the leftmost subplots
    if i % 5 == 0:
        axs[i].set_ylabel('Participation Rate', color='b')
    else:
        axs[i].set_ylabel('')

    ax2.set_ylabel('Unemployment Rate', color='r')

    # Remove redundant x-labels (shared axes)
    if i < 45:
        axs[i].set_xlabel('')

    # Reduce the number of ticks
    axs[i].xaxis.set_major_locator(plt.MaxNLocator(5))

    # Optionally add a legend only for the first plot
    if i == 0:
        axs[i].legend(loc='upper left')
        ax2.legend(loc='upper right')

    # Remove grid for the secondary axis
    ax2.grid(False)

# Adjust x-ticks to be more readable
plt.xticks(rotation=45)

# Adjust layout to prevent overlapping
plt.tight_layout()
plt.show()
```


California
Participa
Unemployment Rate
Alabama
New York
Mississippi
Michigan
Texas
Florida
Kentucky
Ohio
Wisconsin
Pennsylvania
Massachusetts
Minnesota
Maryland
West Virginia
Tennessee
Maine
Louisiana
Illinois
South Carolina
Colorado
North Carolina
Georgia
Utah
Indiana
Missouri
Virginia
New Jersey
Iowa
Alaska
Washington
Arizona
New Mexico
Idaho
Arkansas
Oklahoma
Nebraska
Hawaii
Nevada
Montana
Oregon
North Dakota
North Dakota
North Dakota
Vermont
Connecticut
South Dakota
Kansas
Rhode Island
District of Columbia
Delaware
Wyoming
Participation Rate
Unemployment Rate
Jan
2020
Apr
Jul
Oct
Jul
Oct

In [ ]:

In [ ]: