```
# Import necessary libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np

# Load dataset (assuming the CSV file is named 'climate_data.csv')
# Make sure to replace this with the actual file path if different
df = pd.read_csv("C:/Users/Lenovo/Downloads/Climate_Change_Indicators.csv")

# Inspect the first few rows to understand the data structure
print(df.head())

# Select the first 100 rows for faster processing
df_limited = df.head(100)

# Ensure the 'Year' column is a datetime object if it's not already
df_limited['Year'] = pd.to_datetime(df_limited['Year'], errors='coerce')

# Set the 'Year' column as the index (assuming 'Year' is a column in the dataset)
df_limited.set_index('Year', inplace=True)
   Year  Global Average Temperature (°C)  CO2 Concentration (ppm)  \
0  1948                            13.17                   397.04
1  1996                            13.10                   313.17
2  2015                            14.67                   311.95
```

3 1966 14.79 304.25

4 1992 13.15 354.52

	Sea Level Rise (mm)	Arctic Ice Area (million km²)
0	116.25	5.97
1	277.92	9.66
2	290.32	8.40
3	189.71	11.83
4	14.84	11.23

C:\Users\Lenovo\AppData\Local\Temp\ipykernel_15396\3606944518.py:18: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.

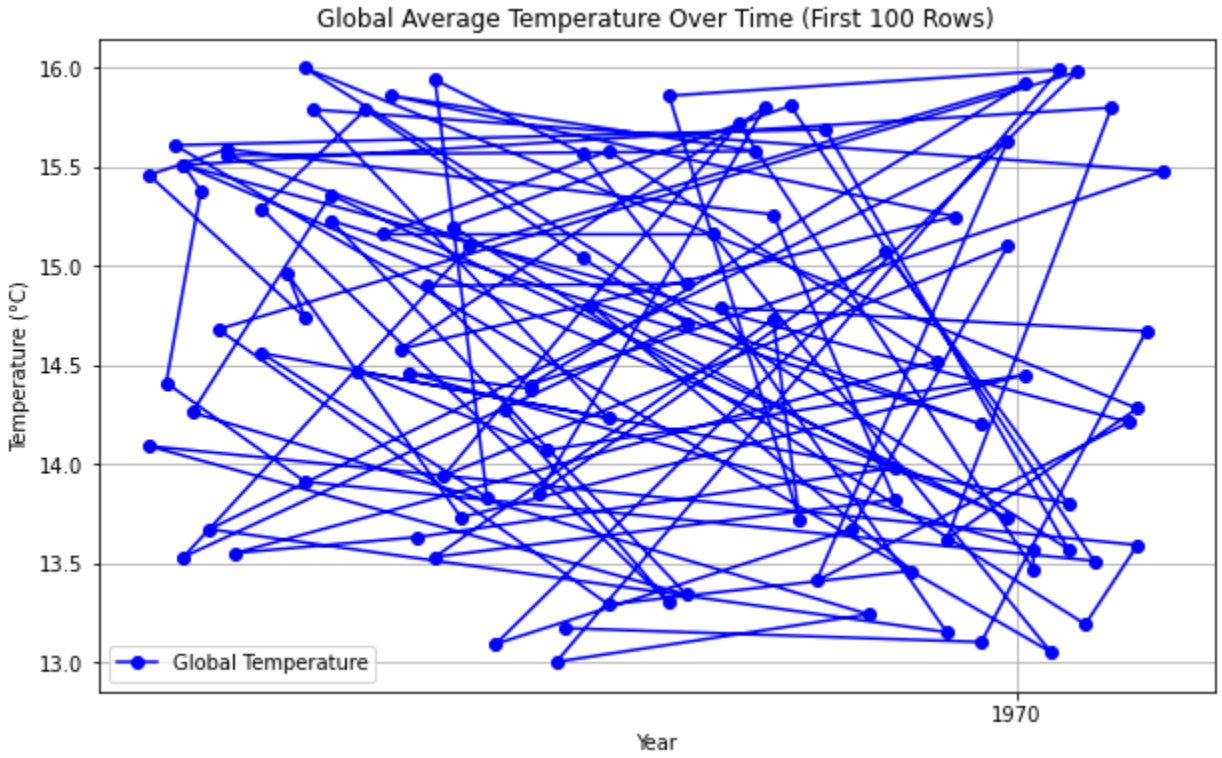
Try using .loc[row_indexer,col_indexer] = value instead

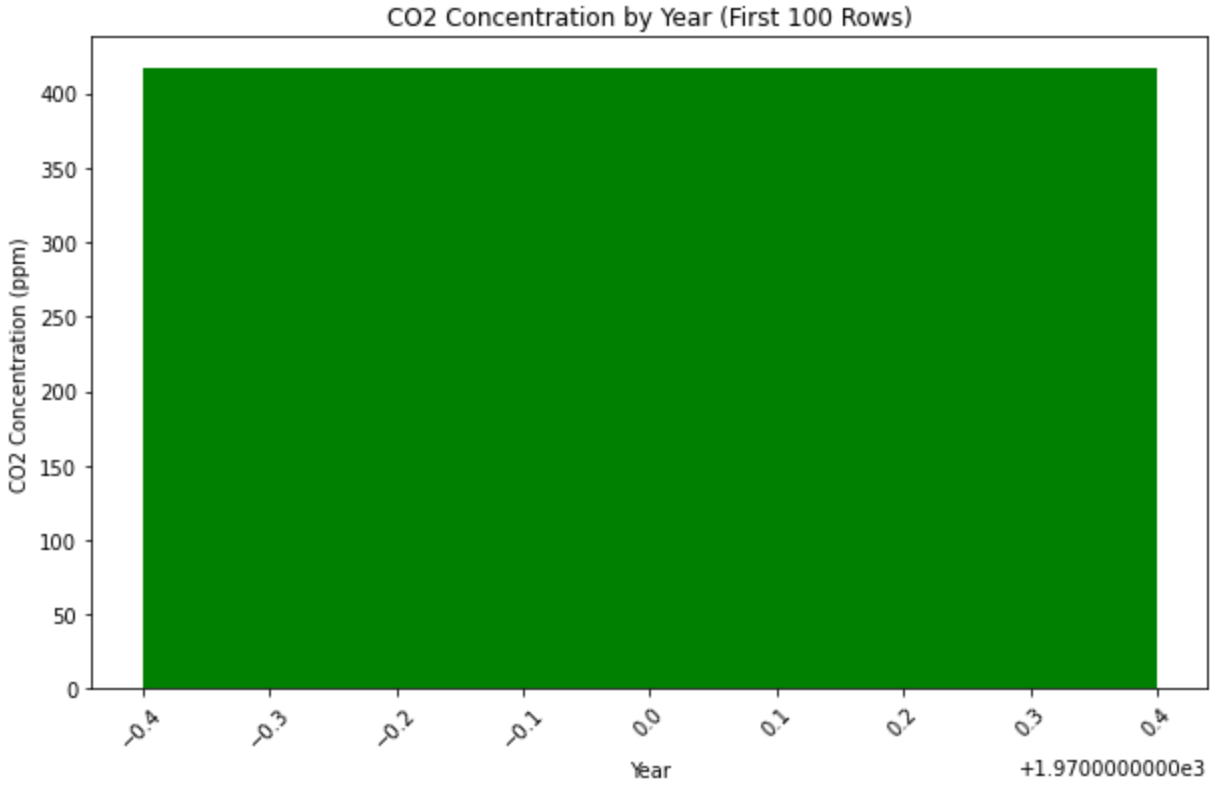
See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

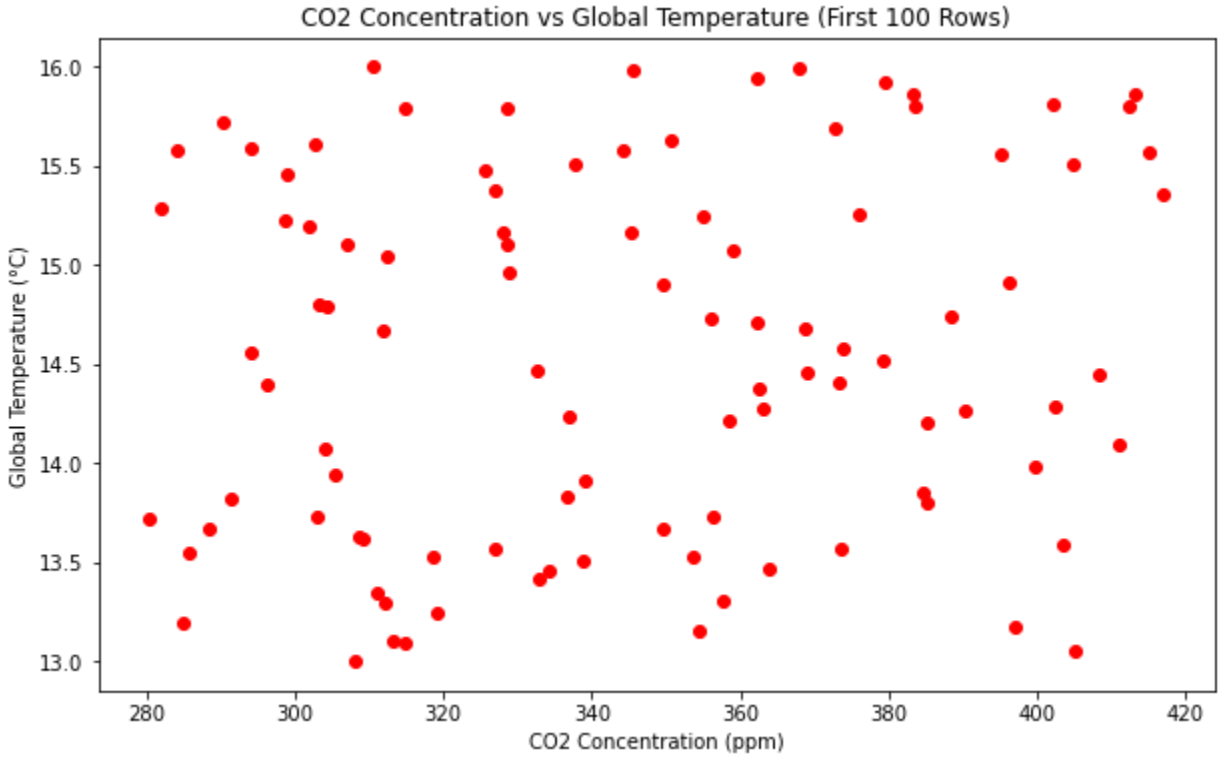
```
df_limited['Year'] = pd.to_datetime(df_limited['Year'], errors='coerce')

# Plot 1: Line Plot (Global Average Temperature over Time)

plt.figure(figsize=(10, 6))

plt.plot(df_limited.index, df_limited['Global Average Temperature (°C)'], marker='o', color='blue', label='Global Temperature')

plt.title('Global Average Temperature Over Time (First 100 Rows)')

plt.xlabel('Year')

plt.ylabel('Temperature (°C)')

plt.legend()

plt.grid(True)

plt.show()
```

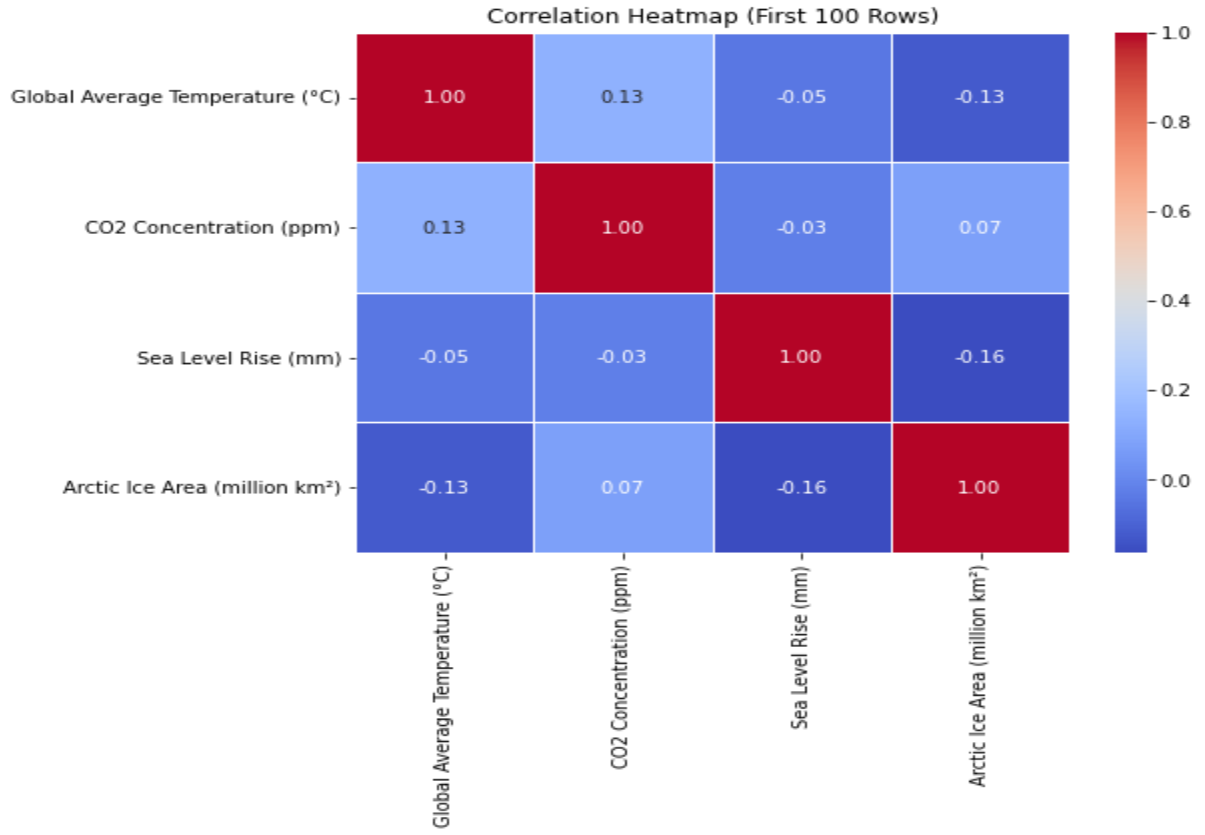
```
# Plot 2: Bar Plot (CO2 Concentration by Year)

plt.figure(figsize=(10, 6))

plt.bar(df_limited.index.year, df_limited['CO2 Concentration (ppm)'], color='green')

plt.title('CO2 Concentration by Year (First 100 Rows)')

plt.xlabel('Year')

plt.ylabel('CO2 Concentration (ppm)')

plt.xticks(rotation=45)

plt.show()


# Plot 3: Scatter Plot (Global Temperature vs CO2 Concentration)

plt.figure(figsize=(10, 6))

plt.scatter(df_limited['CO2 Concentration (ppm)'], df_limited['Global Average Temperature (°C)'],
color='red')

plt.title('CO2 Concentration vs Global Temperature (First 100 Rows)')

plt.xlabel('CO2 Concentration (ppm)')

plt.ylabel('Global Temperature (°C)')

plt.show()


# Plot 4: Heatmap (Correlation Matrix of Data Columns)

correlation = df_limited[['Global Average Temperature (°C)', 'CO2 Concentration (ppm)', 'Sea Level Rise
(mm)', 'Arctic Ice Area (million km²)']].corr()

plt.figure(figsize=(8, 6))

sns.heatmap(correlation, annot=True, cmap='coolwarm', fmt='.2f', linewidths=0.5)

plt.title('Correlation Heatmap (First 100 Rows)')

plt.show()
```

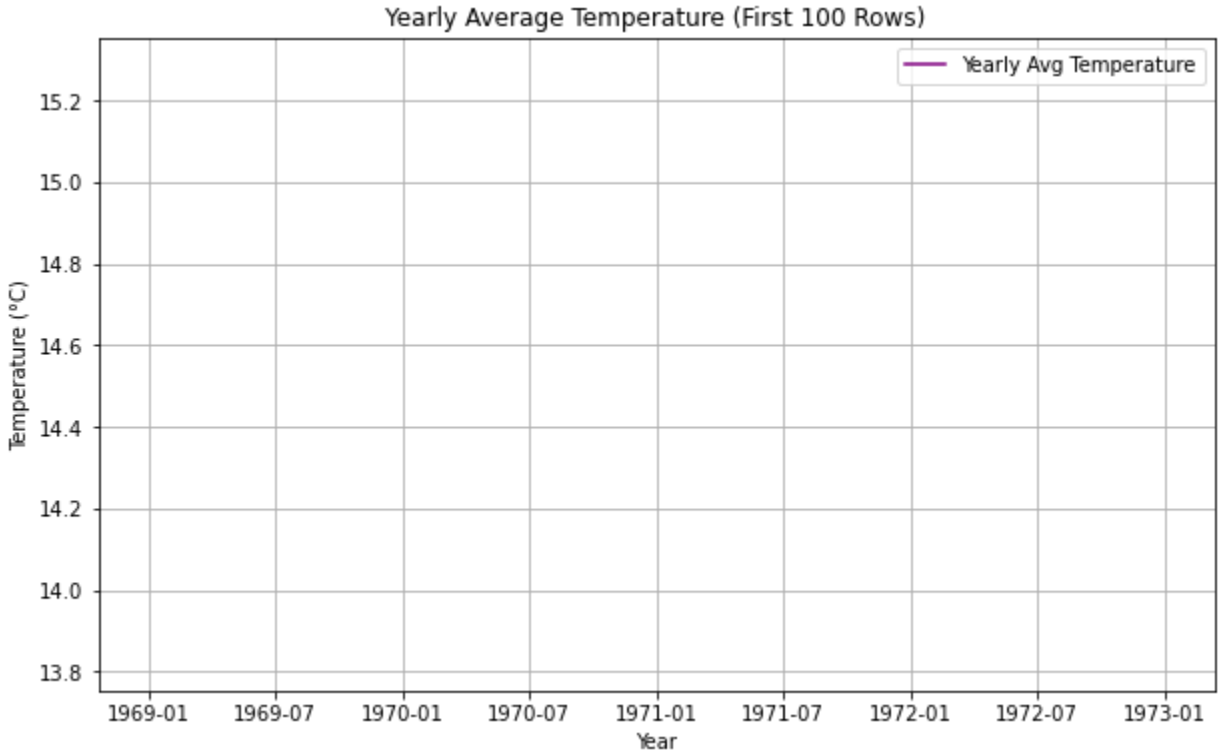
```
# Plot 5: Yearly Average Temperature (using resample)

df_limited_yearly = df_limited.resample('Y').mean()  # Resample by Year and take the mean

plt.figure(figsize=(10, 6))

plt.plot(df_limited_yearly.index, df_limited_yearly['Global Average Temperature (°C)'], color='purple', label='Yearly Avg Temperature')

plt.title('Yearly Average Temperature (First 100 Rows)')

plt.xlabel('Year')

plt.ylabel('Temperature (°C)')

plt.legend()

plt.grid(True)

plt.show()
```




CO2 Concentration by Year (First 100 Rows)
CO2 Concentration (ppm)
0
50
100
150
200
250
300
350
400
−0.4
−0.3
−0.2
−0.1
0.0
0.1
0.2
0.3
0.4
Year
+1.9700000000e3


CO2 Concentration vs Global Temperature (First 100 Rows)
Global Temperature (°C)
13.0
13.5
14.0
14.5
15.0
15.5
16.0
280
300
320
340
360
380
400
420
CO2 Concentration (ppm)


Correlation Heatmap (First 100 Rows)
Global Average Temperature (°C)
CO2 Concentration (ppm)
Sea Level Rise (mm)
Arctic Ice Area (million km²)
1.00
0.13
-0.05
-0.13
0.13
1.00
-0.03
0.07
-0.05
-0.03
1.00
-0.16
-0.13
0.07
-0.16
1.00
1.0
0.8
0.6
0.4
0.2
0.0
Global Average Temperature (°C)
CO2 Concentration (ppm)
Sea Level Rise (mm)
Arctic Ice Area (million km²)


Yearly Average Temperature (First 100 Rows)
Yearly Avg Temperature
Temperature (°C)
15.2
15.0
14.8
14.6
14.4
14.2
14.0
13.8
1969-01
1969-07
1970-01
1970-07
1971-01
1971-07
1972-01
1972-07
1973-01
Year