Project : Stock Prediction

Import Required Libraries

In [ ]:
```
import numpy as np
import pandas as pd
df=pd.read_csv('/content/GOOG.csv')
df
```

Out[ ]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	2022-08-08	119.120003	120.860001	117.830002	118.139999	118.139999	17061100
1	2022-08-09	117.989998	118.199997	116.559998	117.500000	117.500000	15424300
2	2022-08-10	119.589996	121.779999	119.360001	120.650002	120.650002	20497000
3	2022-08-11	122.080002	122.339996	119.550003	119.820000	119.820000	16671600
4	2022-08-12	121.160004	122.650002	120.400002	122.650002	122.650002	16121100
...	...	...	...	...	...	...	...
245	2023-07-31	133.009995	133.830002	132.130005	133.110001	133.110001	18381900
246	2023-08-01	130.854996	132.919998	130.750000	131.889999	131.889999	22154300
247	2023-08-02	129.839996	130.419998	127.849998	128.639999	128.639999	22705800
248	2023-08-03	128.369995	129.770004	127.775002	128.770004	128.770004	15018100
249	2023-08-04	129.600006	131.929993	128.315002	128.539993	128.539993	20509500

250 rows × 7 columns

In [ ]:
```
df.head()
```

Out[ ]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	2022-08-08	119.120003	120.860001	117.830002	118.139999	118.139999	17061100
1	2022-08-09	117.989998	118.199997	116.559998	117.500000	117.500000	15424300
2	2022-08-10	119.589996	121.779999	119.360001	120.650002	120.650002	20497000
3	2022-08-11	122.080002	122.339996	119.550003	119.820000	119.820000	16671600
4	2022-08-12	121.160004	122.650002	120.400002	122.650002	122.650002	16121100

In [ ]:
```
df.tail()
```

Out[ ]:

	Date	Open	High	Low	Close	Adj Close	Volume
245	2023-07-31	133.009995	133.830002	132.130005	133.110001	133.110001	18381900
246	2023-08-01	130.854996	132.919998	130.750000	131.889999	131.889999	22154300
247	2023-08-02	129.839996	130.419998	127.849998	128.639999	128.639999	22705800
248	2023-08-03	128.369995	129.770004	127.775002	128.770004	128.770004	15018100
249	2023-08-04	129.600006	131.929993	128.315002	128.539993	128.539993	20509500

In [ ]:
```
df.dtypes
```

Out[ ]:
```
Date          object
Open         float64
High         float64
Low          float64
Close        float64
Adj Close    float64
Volume         int64
dtype: object
```

In [ ]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 250 entries, 0 to 249
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   Date       250 non-null    object 
 1   Open       250 non-null    float64
 2   High       250 non-null    float64
 3   Low        250 non-null    float64
 4   Close      250 non-null    float64
 5   Adj Close  250 non-null    float64
 6   Volume     250 non-null    int64  
dtypes: float64(5), int64(1), object(1)
memory usage: 13.8+ KB
```

Checking missing values

In [ ]:
```
df.isna().sum()
```

Out[ ]:
```
Date         0
Open         0
High         0
Low          0
Close        0
Adj Close    0
Volume       0
dtype: int64
```

In [ ]:
```
df.describe(include='all')
```

Out[ ]:

	Date	Open	High	Low	Close	Adj Close	Volume
count	250	250.000000	250.000000	250.000000	250.000000	250.000000	2.500000e+02
unique	250	NaN	NaN	NaN	NaN	NaN	NaN
top	2023-08-04	NaN	NaN	NaN	NaN	NaN	NaN
freq	1	NaN	NaN	NaN	NaN	NaN	NaN
mean	NaN	105.696616	107.172900	104.519432	105.829780	105.829780	2.707343e+07
std	NaN	12.367202	12.436379	12.389783	12.388743	12.388743	1.111356e+07
min	NaN	85.510002	86.550003	83.449997	83.489998	83.489998	8.567800e+06
25%	NaN	95.749998	97.344997	94.440003	95.835001	95.835001	2.063240e+07
50%	NaN	102.799999	104.205002	101.857502	103.549999	103.549999	2.423745e+07
75%	NaN	117.929998	119.688748	116.782501	118.070002	118.070002	3.022488e+07
max	NaN	133.009995	134.070007	132.130005	133.110001	133.110001	9.779860e+07

In [ ]:
```
df['Date']=pd.to_datetime(df['Date'])
df.set_index(df['Date'],inplace=True)
```

Remove unwanted columns

In [ ]:
```
df.drop(columns=['Open','High','Low','Adj Close','Volume'],inplace=True)
```

In [ ]:
```
df.head()
```

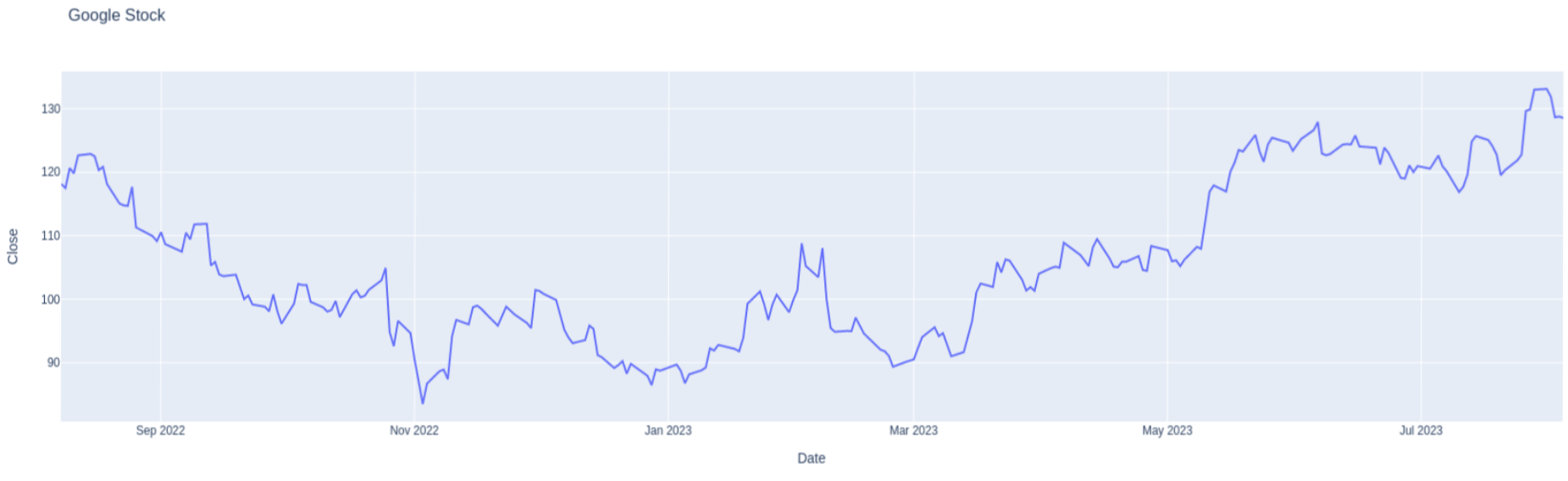
Out[ ]:

	Date	Close
Date		
2022-08-08	2022-08-08	118.139999
2022-08-09	2022-08-09	117.500000
2022-08-10	2022-08-10	120.650002
2022-08-11	2022-08-11	119.820000
2022-08-12	2022-08-12	122.650002

Google Stock

In [ ]:
```
import plotly.graph_objects as go
trace1=go.Scatter(
      x=df['Date'],
      y=df['Close'],
      mode='lines',
      name='Data'
)
layout=go.Layout(
      title="Google Stock",
      xaxis={'title':'Date'},
```

```
        yaxis={'title':'Close'}
)
fig=go.Figure(
        data=[trace1],
        layout=layout
)
fig.show()
```



In [ ]:
```
close_data=df['Close'].values
```

In [ ]:
```
close_data
```

Out[ ]:
```
array([118.139999, 117.5   , 120.650002, 119.82  , 122.650002,
       122.879997, 122.510002, 120.32  , 120.860001, 118.120003,
       115.07  , 114.769997, 114.699997, 117.699997, 111.300003,
       110.339996, 109.910004, 109.150002, 110.550003, 108.68  ,
       107.480003, 110.480003, 109.419998, 111.779999, 111.870003,
       105.309998, 105.870003, 103.900002, 103.629997, 103.849998,
       101.830002, 100.010002, 100.57  ,  99.169998,  98.809998,
        98.089996, 100.739998,  98.089996,  96.150002,  99.300003,
       102.410004, 102.220001, 102.239998,  99.57  ,  98.709999,
        98.050003,  98.300003,  99.709999,  97.18  , 100.779999,
       101.389999, 100.290001, 100.529999, 101.480003, 102.970001,
       104.93  ,  94.82  ,  92.599998,  96.580002,  94.660004,
        90.5   ,  87.07  ,  83.489998,  86.699997,  88.650002,
        88.910004,  87.400002,  94.169998,  96.730003,  96.029999,
        98.720001,  98.989998,  98.5   ,  97.800003,  95.830002,
        97.330002,  98.82  ,  97.599998,  96.25  ,  95.440002,
       101.449997, 101.279999, 100.830002,  99.870003,  97.309998,
        95.150002,  93.949997,  93.07  ,  93.559998,  95.849998,
        95.309998,  91.199997,  90.860001,  89.150002,  89.629997,
        90.25  ,  88.260002,  89.809998,  87.93  ,  86.459999,
        88.949997,  88.730003,  89.699997,  88.709999,  86.769997,
        88.160004,  88.800003,  89.239998,  92.260002,  91.910004,
        92.800003,  92.160004,  91.779999,  93.910004,  99.279999,
       101.209999,  99.209999,  96.730003,  99.160004, 100.709999,
        97.949997,  99.870003, 101.43  , 108.800003, 105.220001,
       103.470001, 108.040001, 100.    ,  95.459999,  94.860001,
        95.    ,  94.949997,  97.099998,  95.779999,  94.589996,
        92.050003,  91.800003,  91.07  ,  89.349998,  90.099998,
        90.300003,  90.510002,  92.309998,  94.019997,  95.580002,
        94.169998,  94.650002,  92.660004,  91.010002,  91.660004,
        94.25  ,  96.550003, 101.07  , 102.459999, 101.93  ,
       105.839996, 104.220001, 106.260002, 106.059998, 103.059998,
       101.360001, 101.900002, 101.32  , 104.    , 104.910004,
       105.120003, 104.949997, 108.900002, 106.949997, 106.120003,
       105.220001, 108.190002, 109.459999, 106.419998, 105.120003,
       105.019997, 105.900002, 105.910004, 106.779999, 104.610001,
       104.449997, 108.370003, 108.220001, 107.709999, 105.980003,
       106.120003, 105.209999, 106.214996, 108.239998, 107.940002,
       112.279999, 116.900002, 117.919998, 116.959999, 120.089996,
       121.480003, 123.519997, 123.25  , 125.870003, 123.290001,
       121.639999, 124.349998, 125.43  , 124.639999, 123.370003,
       124.370003, 125.230003, 126.629997, 127.910004, 122.940002,
       122.669998, 122.870003, 124.349998, 124.43  , 124.379997,
       125.790001, 124.059998, 123.849998, 121.260002, 123.870003,
       123.019997, 119.089996, 119.010002, 121.080002, 120.010002,
       120.970001, 120.559998, 122.629997, 120.93  , 120.139999,
       116.870003, 117.709999, 119.620003, 124.830002, 125.699997,
       125.059998, 124.080002, 122.779999, 119.529999, 120.309998,
       121.879997, 122.790001, 129.660004, 129.869995, 133.009995,
       133.110001, 131.889999, 128.639999, 128.770004, 128.539993])
```

In [ ]:
```
#reshape into 2-D array with one column
close_data=close_data.reshape(-1,1)
close_data
```

Out[ ]:
```
array([[118.139999],
       [117.5     ],
       [120.650002],
       [119.82    ],
       [122.650002],
       [122.879997],
       [122.510002],
       [120.32    ],
       [120.860001],
       [118.120003],
       [115.07    ],
       [114.769997],
       [114.699997],
       [117.699997],
       [111.300003],
       [110.339996],
       [109.910004],
       [109.150002],
       [110.550003],
       [108.68    ],
       [107.480003],
       [110.480003],
       [109.419998],
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       [111.870003],
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       [105.870003],
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       [100.010002],
       [100.57    ],
       [ 99.169998],
       [ 98.809998],
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       [100.739998],
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       [ 99.709999],
       [ 97.18    ],
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       [101.389999],
       [100.290001],
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       [102.970001],
       [104.93    ],
       [ 94.82    ],
       [ 92.599998],
       [ 96.580002],
       [ 94.660004],
       [ 90.5     ],
       [ 87.07    ],
       [ 83.489998],
       [ 86.699997],
       [ 88.650002],
       [ 88.910004],
       [ 87.400002],
       [ 94.169998],
       [ 96.730003],
       [ 96.029999],
       [ 98.720001],
       [ 98.989998],
       [ 98.5     ],
       [ 97.800003],
       [ 95.830002],
       [ 97.330002],
       [ 98.82    ],
       [ 97.599998],
       [ 96.25    ],
       [ 95.440002],
       [101.449997],
       [101.279999],
       [100.830002],
       [ 99.870003],
       [ 97.309998],
       [ 95.150002],
       [ 93.949997],
```

[93.07   ],
[93.559998],
[95.849998],
[95.309998],
[91.199997],
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[95.   ],
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[95.580002],
[94.169998],
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[92.660004],
[91.010002],
[91.660004],
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[96.550003],
[101.07   ],
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[103.059998],
[101.360001],
[101.900002],
[101.32   ],
[104.   ],
[104.910004],
[105.120003],
[104.949997],
[108.900002],
[106.949997],
[106.120003],
[105.220001],
[108.190002],
[109.459999],
[106.419998],

```
       [105.120003],
       [105.019997],
       [105.900002],
       [105.910004],
       [106.779999],
       [104.610001],
       [104.449997],
       [108.370003],
       [108.220001],
       [107.709999],
       [105.980003],
       [106.120003],
       [105.209999],
       [106.214996],
       [108.239998],
       [107.940002],
       [112.279999],
       [116.900002],
       [117.919998],
       [116.959999],
       [120.089996],
       [121.480003],
       [123.519997],
       [123.25    ],
       [125.870003],
       [123.290001],
       [121.639999],
       [124.349998],
       [125.43    ],
       [124.639999],
       [123.370003],
       [124.370003],
       [125.230003],
       [126.629997],
       [127.910004],
       [122.940002],
       [122.669998],
       [122.870003],
       [124.349998],
       [124.43    ],
       [124.379997],
       [125.790001],
       [124.059998],
       [123.849998],
       [121.260002],
       [123.870003],
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       [121.080002],
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       [120.139999],
       [116.870003],
       [117.709999],
       [119.620003],
       [124.830002],
       [125.699997],
       [125.059998],
       [124.080002],
       [122.779999],
       [119.529999],
       [120.309998],
       [121.879997],
       [122.790001],
       [129.660004],
       [129.869995],
       [133.009995],
       [133.110001],
       [131.889999],
       [128.639999],
       [128.770004],
       [128.539993]])
```

In [ ]:
```
total_records=len(close_data)
```

In [ ]:
```
#80% of data for training
split_perecentage=0.80
split=int(split_perecentage*total_records)
split
```

Out[ ]:
```
200
```

Split the data into Training & Testing data

In [ ]:
```
close_train=close_data[:split]
close_test=close_data[split:]
```

In [ ]:
```
date_train=df['Date'][:split]
date_test=df['Date'][split:]
```

In [ ]:
```
import tensorflow as tf
from keras.models import Sequential
from keras.layers import LSTM,Dense
from keras.preprocessing.sequence import TimeseriesGenerator
```

In [ ]:
```
look_back=15
train_generator=TimeseriesGenerator(close_train,close_train,length=look_back,batch_size=20)
test_generator=TimeseriesGenerator(close_test,close_test,length=look_back,batch_size=20)
```

In [ ]:
```
#define model
model=Sequential()

model.add(LSTM(10,activation='relu',input_shape=(look_back,1)))
model.add(Dense(1))
```

```
WARNING:tensorflow:Layer lstm will not use cuDNN kernels since it doesn't meet the criteria. It will use a generic G
PU kernel as fallback when running on GPU.
```

Compile

In [ ]:
```
model.compile(optimizer='adam',loss='mse')
```

In [ ]:
```
model.fit_generator(train_generator,epochs=1000)
```

```
Epoch 1/1000
 7/10 [====================>.....] - ETA: 0s - loss: 3943.9150
<ipython-input-33-be6f90f28a06>:1: UserWarning:

`Model.fit_generator` is deprecated and will be removed in a future version. Please use `Model.fit`, which supports
generators.
```

```
10/10 [==============================] - 0s 18ms/step - loss: 3548.9531
Epoch 2/1000
10/10 [==============================] - 0s 18ms/step - loss: 3116.4016
Epoch 3/1000
10/10 [==============================] - 0s 18ms/step - loss: 2554.1978
Epoch 4/1000
10/10 [==============================] - 0s 17ms/step - loss: 968.6497
Epoch 5/1000
10/10 [==============================] - 0s 19ms/step - loss: 680.9602
Epoch 6/1000
10/10 [==============================] - 0s 18ms/step - loss: 423.0995
Epoch 7/1000
10/10 [==============================] - 0s 18ms/step - loss: 311.9388
Epoch 8/1000
10/10 [==============================] - 0s 19ms/step - loss: 345.7666
Epoch 9/1000
10/10 [==============================] - 0s 20ms/step - loss: 351.9143
Epoch 10/1000
10/10 [==============================] - 0s 18ms/step - loss: 330.4429
Epoch 11/1000
10/10 [==============================] - 0s 19ms/step - loss: 352.4808
Epoch 12/1000
10/10 [==============================] - 0s 18ms/step - loss: 314.8892
Epoch 13/1000
10/10 [==============================] - 0s 19ms/step - loss: 324.3746
Epoch 14/1000
10/10 [==============================] - 0s 20ms/step - loss: 313.4367
Epoch 15/1000
10/10 [==============================] - 0s 18ms/step - loss: 304.6690
Epoch 16/1000
10/10 [==============================] - 0s 17ms/step - loss: 319.6423
Epoch 17/1000
10/10 [==============================] - 0s 19ms/step - loss: 321.5884
Epoch 18/1000
10/10 [==============================] - 0s 18ms/step - loss: 254.6851
Epoch 19/1000
10/10 [==============================] - 0s 20ms/step - loss: 281.0443
Epoch 20/1000
10/10 [==============================] - 0s 18ms/step - loss: 239.7110
Epoch 21/1000
10/10 [==============================] - 0s 18ms/step - loss: 283.0518
Epoch 22/1000
10/10 [==============================] - 0s 19ms/step - loss: 257.8968
Epoch 23/1000
10/10 [==============================] - 0s 18ms/step - loss: 243.0474
Epoch 24/1000
10/10 [==============================] - 0s 17ms/step - loss: 243.2950
Epoch 25/1000
10/10 [==============================] - 0s 18ms/step - loss: 253.4409
Epoch 26/1000
10/10 [==============================] - 0s 18ms/step - loss: 232.0098
Epoch 27/1000
10/10 [==============================] - 0s 18ms/step - loss: 266.3382
Epoch 28/1000
10/10 [==============================] - 0s 19ms/step - loss: 215.3146
Epoch 29/1000
10/10 [==============================] - 0s 18ms/step - loss: 246.6355
Epoch 30/1000
10/10 [==============================] - 0s 19ms/step - loss: 268.7704
Epoch 31/1000
10/10 [==============================] - 0s 18ms/step - loss: 232.7218
Epoch 32/1000
10/10 [==============================] - 0s 18ms/step - loss: 295.3586
Epoch 33/1000
10/10 [==============================] - 0s 22ms/step - loss: 303.7019
Epoch 34/1000
10/10 [==============================] - 0s 18ms/step - loss: 296.6756
Epoch 35/1000
10/10 [==============================] - 0s 18ms/step - loss: 304.6314
Epoch 36/1000
10/10 [==============================] - 0s 18ms/step - loss: 312.8996
Epoch 37/1000
10/10 [==============================] - 0s 20ms/step - loss: 283.8188
Epoch 38/1000
10/10 [==============================] - 0s 18ms/step - loss: 287.4523
Epoch 39/1000
10/10 [==============================] - 0s 17ms/step - loss: 268.7820
Epoch 40/1000
10/10 [==============================] - 0s 28ms/step - loss: 247.9019
Epoch 41/1000
10/10 [==============================] - 0s 32ms/step - loss: 250.5431
Epoch 42/1000
10/10 [==============================] - 0s 30ms/step - loss: 247.6173
Epoch 43/1000
10/10 [==============================] - 0s 26ms/step - loss: 232.7878
Epoch 44/1000
10/10 [==============================] - 0s 18ms/step - loss: 292.9250
```

```
Epoch 45/1000
10/10 [==============================] - 0s 17ms/step - loss: 257.0494
Epoch 46/1000
10/10 [==============================] - 0s 18ms/step - loss: 303.7308
Epoch 47/1000
10/10 [==============================] - 0s 19ms/step - loss: 351.6944
Epoch 48/1000
10/10 [==============================] - 0s 18ms/step - loss: 414.0584
Epoch 49/1000
10/10 [==============================] - 0s 19ms/step - loss: 440.7578
Epoch 50/1000
10/10 [==============================] - 0s 18ms/step - loss: 444.5614
Epoch 51/1000
10/10 [==============================] - 0s 19ms/step - loss: 523.8313
Epoch 52/1000
10/10 [==============================] - 0s 20ms/step - loss: 684.0475
Epoch 53/1000
10/10 [==============================] - 0s 18ms/step - loss: 612.6298
Epoch 54/1000
10/10 [==============================] - 0s 20ms/step - loss: 599.6151
Epoch 55/1000
10/10 [==============================] - 0s 20ms/step - loss: 343.3327
Epoch 56/1000
10/10 [==============================] - 0s 18ms/step - loss: 283.8091
Epoch 57/1000
10/10 [==============================] - 0s 18ms/step - loss: 313.7863
Epoch 58/1000
10/10 [==============================] - 0s 18ms/step - loss: 392.8999
Epoch 59/1000
10/10 [==============================] - 0s 20ms/step - loss: 375.5288
Epoch 60/1000
10/10 [==============================] - 0s 19ms/step - loss: 414.5876
Epoch 61/1000
10/10 [==============================] - 0s 19ms/step - loss: 378.9161
Epoch 62/1000
10/10 [==============================] - 0s 19ms/step - loss: 376.9406
Epoch 63/1000
10/10 [==============================] - 0s 19ms/step - loss: 385.5988
Epoch 64/1000
10/10 [==============================] - 0s 19ms/step - loss: 362.6060
Epoch 65/1000
10/10 [==============================] - 0s 19ms/step - loss: 333.0495
Epoch 66/1000
10/10 [==============================] - 0s 18ms/step - loss: 324.9782
Epoch 67/1000
10/10 [==============================] - 0s 19ms/step - loss: 324.9149
Epoch 68/1000
10/10 [==============================] - 0s 19ms/step - loss: 324.2355
Epoch 69/1000
10/10 [==============================] - 0s 18ms/step - loss: 323.3784
Epoch 70/1000
10/10 [==============================] - 0s 18ms/step - loss: 320.7109
Epoch 71/1000
10/10 [==============================] - 0s 18ms/step - loss: 333.0840
Epoch 72/1000
10/10 [==============================] - 0s 19ms/step - loss: 326.8543
Epoch 73/1000
10/10 [==============================] - 0s 18ms/step - loss: 305.2367
Epoch 74/1000
10/10 [==============================] - 0s 18ms/step - loss: 305.4862
Epoch 75/1000
10/10 [==============================] - 0s 18ms/step - loss: 299.8921
Epoch 76/1000
10/10 [==============================] - 0s 19ms/step - loss: 319.5190
Epoch 77/1000
10/10 [==============================] - 0s 19ms/step - loss: 319.8545
Epoch 78/1000
10/10 [==============================] - 0s 17ms/step - loss: 321.4131
Epoch 79/1000
10/10 [==============================] - 0s 17ms/step - loss: 310.9934
Epoch 80/1000
10/10 [==============================] - 0s 18ms/step - loss: 322.8468
Epoch 81/1000
10/10 [==============================] - 0s 20ms/step - loss: 317.4547
Epoch 82/1000
10/10 [==============================] - 0s 18ms/step - loss: 299.3168
Epoch 83/1000
10/10 [==============================] - 0s 18ms/step - loss: 297.8661
Epoch 84/1000
10/10 [==============================] - 0s 18ms/step - loss: 293.8156
Epoch 85/1000
10/10 [==============================] - 0s 18ms/step - loss: 291.3370
Epoch 86/1000
10/10 [==============================] - 0s 32ms/step - loss: 280.6445
Epoch 87/1000
10/10 [==============================] - 0s 31ms/step - loss: 286.2991
Epoch 88/1000
```

10/10 [==============================] - 0s 30ms/step - loss: 289.0482
Epoch 89/1000
10/10 [==============================] - 0s 31ms/step - loss: 276.0211
Epoch 90/1000
10/10 [==============================] - 0s 26ms/step - loss: 278.0014
Epoch 91/1000
10/10 [==============================] - 0s 20ms/step - loss: 250.5713
Epoch 92/1000
10/10 [==============================] - 0s 18ms/step - loss: 259.2241
Epoch 93/1000
10/10 [==============================] - 0s 21ms/step - loss: 276.3582
Epoch 94/1000
10/10 [==============================] - 0s 18ms/step - loss: 269.0358
Epoch 95/1000
10/10 [==============================] - 0s 17ms/step - loss: 265.2802
Epoch 96/1000
10/10 [==============================] - 0s 19ms/step - loss: 259.3775
Epoch 97/1000
10/10 [==============================] - 0s 18ms/step - loss: 258.4184
Epoch 98/1000
10/10 [==============================] - 0s 17ms/step - loss: 274.8899
Epoch 99/1000
10/10 [==============================] - 0s 19ms/step - loss: 264.4287
Epoch 100/1000
10/10 [==============================] - 0s 19ms/step - loss: 255.6367
Epoch 101/1000
10/10 [==============================] - 0s 19ms/step - loss: 253.6534
Epoch 102/1000
10/10 [==============================] - 0s 19ms/step - loss: 252.6568
Epoch 103/1000
10/10 [==============================] - 0s 19ms/step - loss: 259.7603
Epoch 104/1000
10/10 [==============================] - 0s 20ms/step - loss: 262.8347
Epoch 105/1000
10/10 [==============================] - 0s 19ms/step - loss: 254.6748
Epoch 106/1000
10/10 [==============================] - 0s 18ms/step - loss: 249.8567
Epoch 107/1000
10/10 [==============================] - 0s 19ms/step - loss: 254.0149
Epoch 108/1000
10/10 [==============================] - 0s 19ms/step - loss: 254.0897
Epoch 109/1000
10/10 [==============================] - 0s 19ms/step - loss: 253.7655
Epoch 110/1000
10/10 [==============================] - 0s 19ms/step - loss: 250.2758
Epoch 111/1000
10/10 [==============================] - 0s 18ms/step - loss: 258.5958
Epoch 112/1000
10/10 [==============================] - 0s 18ms/step - loss: 270.4108
Epoch 113/1000
10/10 [==============================] - 0s 19ms/step - loss: 269.0443
Epoch 114/1000
10/10 [==============================] - 0s 20ms/step - loss: 255.9949
Epoch 115/1000
10/10 [==============================] - 0s 20ms/step - loss: 249.7531
Epoch 116/1000
10/10 [==============================] - 0s 20ms/step - loss: 250.5980
Epoch 117/1000
10/10 [==============================] - 0s 19ms/step - loss: 248.7642
Epoch 118/1000
10/10 [==============================] - 0s 19ms/step - loss: 251.0316
Epoch 119/1000
10/10 [==============================] - 0s 18ms/step - loss: 248.4641
Epoch 120/1000
10/10 [==============================] - 0s 19ms/step - loss: 249.9932
Epoch 121/1000
10/10 [==============================] - 0s 19ms/step - loss: 248.0830
Epoch 122/1000
10/10 [==============================] - 0s 21ms/step - loss: 250.1164
Epoch 123/1000
10/10 [==============================] - 0s 19ms/step - loss: 248.9569
Epoch 124/1000
10/10 [==============================] - 0s 19ms/step - loss: 247.5913
Epoch 125/1000
10/10 [==============================] - 0s 19ms/step - loss: 249.5679
Epoch 126/1000
10/10 [==============================] - 0s 21ms/step - loss: 247.4255
Epoch 127/1000
10/10 [==============================] - 0s 20ms/step - loss: 246.9140
Epoch 128/1000
10/10 [==============================] - 0s 19ms/step - loss: 247.4878
Epoch 129/1000
10/10 [==============================] - 0s 18ms/step - loss: 277.9670
Epoch 130/1000
10/10 [==============================] - 0s 18ms/step - loss: 309.4527
Epoch 131/1000
10/10 [==============================] - 0s 18ms/step - loss: 289.9989

```
Epoch 132/1000
10/10 [==============================] - 0s 28ms/step - loss: 307.3405
Epoch 133/1000
10/10 [==============================] - 0s 34ms/step - loss: 305.8922
Epoch 134/1000
10/10 [==============================] - 0s 35ms/step - loss: 349.0678
Epoch 135/1000
10/10 [==============================] - 0s 33ms/step - loss: 264.6615
Epoch 136/1000
10/10 [==============================] - 0s 19ms/step - loss: 279.6818
Epoch 137/1000
10/10 [==============================] - 0s 19ms/step - loss: 283.3222
Epoch 138/1000
10/10 [==============================] - 0s 20ms/step - loss: 284.5837
Epoch 139/1000
10/10 [==============================] - 0s 18ms/step - loss: 283.3016
Epoch 140/1000
10/10 [==============================] - 0s 18ms/step - loss: 277.7371
Epoch 141/1000
10/10 [==============================] - 0s 18ms/step - loss: 273.3456
Epoch 142/1000
10/10 [==============================] - 0s 21ms/step - loss: 287.1786
Epoch 143/1000
10/10 [==============================] - 0s 17ms/step - loss: 279.5292
Epoch 144/1000
10/10 [==============================] - 0s 19ms/step - loss: 277.3306
Epoch 145/1000
10/10 [==============================] - 0s 18ms/step - loss: 288.0358
Epoch 146/1000
10/10 [==============================] - 0s 22ms/step - loss: 301.1006
Epoch 147/1000
10/10 [==============================] - 0s 23ms/step - loss: 278.2440
Epoch 148/1000
10/10 [==============================] - 0s 20ms/step - loss: 260.9413
Epoch 149/1000
10/10 [==============================] - 0s 19ms/step - loss: 211.7150
Epoch 150/1000
10/10 [==============================] - 0s 17ms/step - loss: 203.8588
Epoch 151/1000
10/10 [==============================] - 0s 18ms/step - loss: 220.4283
Epoch 152/1000
10/10 [==============================] - 0s 17ms/step - loss: 196.6416
Epoch 153/1000
10/10 [==============================] - 0s 18ms/step - loss: 205.6714
Epoch 154/1000
10/10 [==============================] - 0s 20ms/step - loss: 198.4727
Epoch 155/1000
10/10 [==============================] - 0s 19ms/step - loss: 215.1708
Epoch 156/1000
10/10 [==============================] - 0s 18ms/step - loss: 204.1729
Epoch 157/1000
10/10 [==============================] - 0s 18ms/step - loss: 223.8336
Epoch 158/1000
10/10 [==============================] - 0s 19ms/step - loss: 206.1839
Epoch 159/1000
10/10 [==============================] - 0s 19ms/step - loss: 222.8583
Epoch 160/1000
10/10 [==============================] - 0s 18ms/step - loss: 203.9035
Epoch 161/1000
10/10 [==============================] - 0s 19ms/step - loss: 203.9152
Epoch 162/1000
10/10 [==============================] - 0s 18ms/step - loss: 206.7277
Epoch 163/1000
10/10 [==============================] - 0s 18ms/step - loss: 247.8100
Epoch 164/1000
10/10 [==============================] - 0s 18ms/step - loss: 390.5569
Epoch 165/1000
10/10 [==============================] - 0s 18ms/step - loss: 397.3986
Epoch 166/1000
10/10 [==============================] - 0s 18ms/step - loss: 276.4444
Epoch 167/1000
10/10 [==============================] - 0s 20ms/step - loss: 231.5407
Epoch 168/1000
10/10 [==============================] - 0s 19ms/step - loss: 325.4946
Epoch 169/1000
10/10 [==============================] - 0s 19ms/step - loss: 367.0120
Epoch 170/1000
10/10 [==============================] - 0s 18ms/step - loss: 304.6370
Epoch 171/1000
10/10 [==============================] - 0s 18ms/step - loss: 303.8026
Epoch 172/1000
10/10 [==============================] - 0s 18ms/step - loss: 305.8822
Epoch 173/1000
10/10 [==============================] - 0s 19ms/step - loss: 272.7427
Epoch 174/1000
10/10 [==============================] - 0s 18ms/step - loss: 306.0377
Epoch 175/1000
```

10/10 [==============================] - 0s 20ms/step - loss: 389.3362
Epoch 176/1000
10/10 [==============================] - 0s 19ms/step - loss: 448.2407
Epoch 177/1000
10/10 [==============================] - 0s 32ms/step - loss: 240.0972
Epoch 178/1000
10/10 [==============================] - 0s 30ms/step - loss: 214.0049
Epoch 179/1000
10/10 [==============================] - 0s 32ms/step - loss: 249.2162
Epoch 180/1000
10/10 [==============================] - 0s 34ms/step - loss: 248.8451
Epoch 181/1000
10/10 [==============================] - 0s 20ms/step - loss: 213.1337
Epoch 182/1000
10/10 [==============================] - 0s 18ms/step - loss: 267.5938
Epoch 183/1000
10/10 [==============================] - 0s 19ms/step - loss: 305.7062
Epoch 184/1000
10/10 [==============================] - 0s 17ms/step - loss: 351.7192
Epoch 185/1000
10/10 [==============================] - 0s 18ms/step - loss: 432.7143
Epoch 186/1000
10/10 [==============================] - 0s 20ms/step - loss: 385.1845
Epoch 187/1000
10/10 [==============================] - 0s 18ms/step - loss: 305.6905
Epoch 188/1000
10/10 [==============================] - 0s 20ms/step - loss: 207.0957
Epoch 189/1000
10/10 [==============================] - 0s 19ms/step - loss: 185.1438
Epoch 190/1000
10/10 [==============================] - 0s 18ms/step - loss: 182.2398
Epoch 191/1000
10/10 [==============================] - 0s 19ms/step - loss: 208.3405
Epoch 192/1000
10/10 [==============================] - 0s 19ms/step - loss: 219.6229
Epoch 193/1000
10/10 [==============================] - 0s 18ms/step - loss: 196.1805
Epoch 194/1000
10/10 [==============================] - 0s 19ms/step - loss: 212.0628
Epoch 195/1000
10/10 [==============================] - 0s 19ms/step - loss: 206.0881
Epoch 196/1000
10/10 [==============================] - 0s 18ms/step - loss: 205.2912
Epoch 197/1000
10/10 [==============================] - 0s 19ms/step - loss: 211.2757
Epoch 198/1000
10/10 [==============================] - 0s 18ms/step - loss: 206.7575
Epoch 199/1000
10/10 [==============================] - 0s 19ms/step - loss: 197.8704
Epoch 200/1000
10/10 [==============================] - 0s 19ms/step - loss: 189.3132
Epoch 201/1000
10/10 [==============================] - 0s 19ms/step - loss: 219.0798
Epoch 202/1000
10/10 [==============================] - 0s 19ms/step - loss: 167.0889
Epoch 203/1000
10/10 [==============================] - 0s 18ms/step - loss: 185.2074
Epoch 204/1000
10/10 [==============================] - 0s 19ms/step - loss: 209.8944
Epoch 205/1000
10/10 [==============================] - 0s 20ms/step - loss: 184.5410
Epoch 206/1000
10/10 [==============================] - 0s 19ms/step - loss: 218.0450
Epoch 207/1000
10/10 [==============================] - 0s 19ms/step - loss: 177.9403
Epoch 208/1000
10/10 [==============================] - 0s 19ms/step - loss: 158.4093
Epoch 209/1000
10/10 [==============================] - 0s 17ms/step - loss: 223.5844
Epoch 210/1000
10/10 [==============================] - 0s 18ms/step - loss: 221.4328
Epoch 211/1000
10/10 [==============================] - 0s 19ms/step - loss: 217.9118
Epoch 212/1000
10/10 [==============================] - 0s 19ms/step - loss: 224.9448
Epoch 213/1000
10/10 [==============================] - 0s 19ms/step - loss: 183.6513
Epoch 214/1000
10/10 [==============================] - 0s 20ms/step - loss: 190.4537
Epoch 215/1000
10/10 [==============================] - 0s 19ms/step - loss: 207.6337
Epoch 216/1000
10/10 [==============================] - 0s 19ms/step - loss: 187.3478
Epoch 217/1000
10/10 [==============================] - 0s 20ms/step - loss: 180.8517
Epoch 218/1000
10/10 [==============================] - 0s 18ms/step - loss: 193.0840

```
Epoch 219/1000
10/10 [==============================] - 0s 19ms/step - loss: 160.7048
Epoch 220/1000
10/10 [==============================] - 0s 19ms/step - loss: 159.2213
Epoch 221/1000
10/10 [==============================] - 0s 18ms/step - loss: 193.4149
Epoch 222/1000
10/10 [==============================] - 0s 18ms/step - loss: 209.5162
Epoch 223/1000
10/10 [==============================] - 0s 19ms/step - loss: 185.5469
Epoch 224/1000
10/10 [==============================] - 0s 17ms/step - loss: 188.3775
Epoch 225/1000
10/10 [==============================] - 0s 18ms/step - loss: 186.6314
Epoch 226/1000
10/10 [==============================] - 0s 27ms/step - loss: 191.5008
Epoch 227/1000
10/10 [==============================] - 0s 32ms/step - loss: 146.2384
Epoch 228/1000
10/10 [==============================] - 0s 33ms/step - loss: 188.8491
Epoch 229/1000
10/10 [==============================] - 0s 31ms/step - loss: 157.9069
Epoch 230/1000
10/10 [==============================] - 0s 18ms/step - loss: 176.6037
Epoch 231/1000
10/10 [==============================] - 0s 18ms/step - loss: 187.0622
Epoch 232/1000
10/10 [==============================] - 0s 18ms/step - loss: 189.4883
Epoch 233/1000
10/10 [==============================] - 0s 20ms/step - loss: 190.6956
Epoch 234/1000
10/10 [==============================] - 0s 19ms/step - loss: 211.5609
Epoch 235/1000
10/10 [==============================] - 0s 20ms/step - loss: 219.6458
Epoch 236/1000
10/10 [==============================] - 0s 20ms/step - loss: 230.6275
Epoch 237/1000
10/10 [==============================] - 0s 19ms/step - loss: 229.2815
Epoch 238/1000
10/10 [==============================] - 0s 18ms/step - loss: 185.0123
Epoch 239/1000
10/10 [==============================] - 0s 20ms/step - loss: 221.6836
Epoch 240/1000
10/10 [==============================] - 0s 20ms/step - loss: 217.9844
Epoch 241/1000
10/10 [==============================] - 0s 17ms/step - loss: 218.7262
Epoch 242/1000
10/10 [==============================] - 0s 18ms/step - loss: 185.7137
Epoch 243/1000
10/10 [==============================] - 0s 19ms/step - loss: 194.2939
Epoch 244/1000
10/10 [==============================] - 0s 19ms/step - loss: 209.0105
Epoch 245/1000
10/10 [==============================] - 0s 18ms/step - loss: 442.8311
Epoch 246/1000
10/10 [==============================] - 0s 19ms/step - loss: 637.2531
Epoch 247/1000
10/10 [==============================] - 0s 18ms/step - loss: 644.1233
Epoch 248/1000
10/10 [==============================] - 0s 20ms/step - loss: 612.3277
Epoch 249/1000
10/10 [==============================] - 0s 18ms/step - loss: 581.6738
Epoch 250/1000
10/10 [==============================] - 0s 17ms/step - loss: 559.8140
Epoch 251/1000
10/10 [==============================] - 0s 18ms/step - loss: 607.8565
Epoch 252/1000
10/10 [==============================] - 0s 19ms/step - loss: 538.7772
Epoch 253/1000
10/10 [==============================] - 0s 20ms/step - loss: 653.6263
Epoch 254/1000
10/10 [==============================] - 0s 19ms/step - loss: 521.0903
Epoch 255/1000
10/10 [==============================] - 0s 18ms/step - loss: 361.8680
Epoch 256/1000
10/10 [==============================] - 0s 18ms/step - loss: 387.5622
Epoch 257/1000
10/10 [==============================] - 0s 18ms/step - loss: 318.5430
Epoch 258/1000
10/10 [==============================] - 0s 19ms/step - loss: 230.8782
Epoch 259/1000
10/10 [==============================] - 0s 19ms/step - loss: 252.4396
Epoch 260/1000
10/10 [==============================] - 0s 22ms/step - loss: 227.8082
Epoch 261/1000
10/10 [==============================] - 0s 20ms/step - loss: 244.8593
Epoch 262/1000
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10/10 [==============================] - 0s 20ms/step - loss: 294.4766
Epoch 263/1000
10/10 [==============================] - 0s 18ms/step - loss: 223.4410
Epoch 264/1000
10/10 [==============================] - 0s 18ms/step - loss: 269.4861
Epoch 265/1000
10/10 [==============================] - 0s 18ms/step - loss: 246.2513
Epoch 266/1000
10/10 [==============================] - 0s 18ms/step - loss: 227.8594
Epoch 267/1000
10/10 [==============================] - 0s 21ms/step - loss: 206.3752
Epoch 268/1000
10/10 [==============================] - 0s 18ms/step - loss: 189.1217
Epoch 269/1000
10/10 [==============================] - 0s 22ms/step - loss: 184.5175
Epoch 270/1000
10/10 [==============================] - 0s 19ms/step - loss: 171.9540
Epoch 271/1000
10/10 [==============================] - 0s 28ms/step - loss: 147.9047
Epoch 272/1000
10/10 [==============================] - 0s 31ms/step - loss: 192.7730
Epoch 273/1000
10/10 [==============================] - 0s 32ms/step - loss: 164.7095
Epoch 274/1000
10/10 [==============================] - 0s 36ms/step - loss: 175.2602
Epoch 275/1000
10/10 [==============================] - 0s 34ms/step - loss: 168.9907
Epoch 276/1000
10/10 [==============================] - 0s 19ms/step - loss: 176.1181
Epoch 277/1000
10/10 [==============================] - 0s 19ms/step - loss: 180.5176
Epoch 278/1000
10/10 [==============================] - 0s 19ms/step - loss: 263.2057
Epoch 279/1000
10/10 [==============================] - 0s 20ms/step - loss: 206.1361
Epoch 280/1000
10/10 [==============================] - 0s 18ms/step - loss: 304.9249
Epoch 281/1000
10/10 [==============================] - 0s 19ms/step - loss: 364.9752
Epoch 282/1000
10/10 [==============================] - 0s 20ms/step - loss: 368.8515
Epoch 283/1000
10/10 [==============================] - 0s 18ms/step - loss: 331.4369
Epoch 284/1000
10/10 [==============================] - 0s 21ms/step - loss: 277.1130
Epoch 285/1000
10/10 [==============================] - 0s 18ms/step - loss: 266.9627
Epoch 286/1000
10/10 [==============================] - 0s 20ms/step - loss: 279.3279
Epoch 287/1000
10/10 [==============================] - 0s 18ms/step - loss: 180.8796
Epoch 288/1000
10/10 [==============================] - 0s 20ms/step - loss: 167.8273
Epoch 289/1000
10/10 [==============================] - 0s 20ms/step - loss: 148.3708
Epoch 290/1000
10/10 [==============================] - 0s 18ms/step - loss: 146.2458
Epoch 291/1000
10/10 [==============================] - 0s 18ms/step - loss: 137.0797
Epoch 292/1000
10/10 [==============================] - 0s 17ms/step - loss: 135.5556
Epoch 293/1000
10/10 [==============================] - 0s 19ms/step - loss: 132.9268
Epoch 294/1000
10/10 [==============================] - 0s 19ms/step - loss: 133.7765
Epoch 295/1000
10/10 [==============================] - 0s 19ms/step - loss: 147.5879
Epoch 296/1000
10/10 [==============================] - 0s 19ms/step - loss: 172.3863
Epoch 297/1000
10/10 [==============================] - 0s 19ms/step - loss: 193.8913
Epoch 298/1000
10/10 [==============================] - 0s 21ms/step - loss: 199.9655
Epoch 299/1000
10/10 [==============================] - 0s 19ms/step - loss: 147.5146
Epoch 300/1000
10/10 [==============================] - 0s 20ms/step - loss: 193.8717
Epoch 301/1000
10/10 [==============================] - 0s 20ms/step - loss: 179.9452
Epoch 302/1000
10/10 [==============================] - 0s 19ms/step - loss: 182.5325
Epoch 303/1000
10/10 [==============================] - 0s 18ms/step - loss: 184.8776
Epoch 304/1000
10/10 [==============================] - 0s 19ms/step - loss: 179.7035
Epoch 305/1000
10/10 [==============================] - 0s 19ms/step - loss: 191.4602

```
Epoch 306/1000
10/10 [==============================] - 0s 20ms/step - loss: 141.0729
Epoch 307/1000
10/10 [==============================] - 0s 18ms/step - loss: 158.6752
Epoch 308/1000
10/10 [==============================] - 0s 18ms/step - loss: 173.5399
Epoch 309/1000
10/10 [==============================] - 0s 18ms/step - loss: 160.2383
Epoch 310/1000
10/10 [==============================] - 0s 18ms/step - loss: 133.3106
Epoch 311/1000
10/10 [==============================] - 0s 19ms/step - loss: 136.7690
Epoch 312/1000
10/10 [==============================] - 0s 19ms/step - loss: 136.3545
Epoch 313/1000
10/10 [==============================] - 0s 20ms/step - loss: 197.8330
Epoch 314/1000
10/10 [==============================] - 0s 19ms/step - loss: 179.6236
Epoch 315/1000
10/10 [==============================] - 0s 19ms/step - loss: 158.7384
Epoch 316/1000
10/10 [==============================] - 0s 19ms/step - loss: 660.4052
Epoch 317/1000
10/10 [==============================] - 0s 19ms/step - loss: 1021.9172
Epoch 318/1000
10/10 [==============================] - 0s 34ms/step - loss: 984.7993
Epoch 319/1000
10/10 [==============================] - 0s 32ms/step - loss: 767.8625
Epoch 320/1000
10/10 [==============================] - 0s 34ms/step - loss: 417.4086
Epoch 321/1000
10/10 [==============================] - 0s 23ms/step - loss: 197.3797
Epoch 322/1000
10/10 [==============================] - 0s 18ms/step - loss: 175.7191
Epoch 323/1000
10/10 [==============================] - 0s 18ms/step - loss: 203.5322
Epoch 324/1000
10/10 [==============================] - 0s 21ms/step - loss: 163.1100
Epoch 325/1000
10/10 [==============================] - 0s 18ms/step - loss: 145.6903
Epoch 326/1000
10/10 [==============================] - 0s 18ms/step - loss: 135.7827
Epoch 327/1000
10/10 [==============================] - 0s 18ms/step - loss: 119.5773
Epoch 328/1000
10/10 [==============================] - 0s 19ms/step - loss: 113.8451
Epoch 329/1000
10/10 [==============================] - 0s 19ms/step - loss: 143.8219
Epoch 330/1000
10/10 [==============================] - 0s 18ms/step - loss: 725.0461
Epoch 331/1000
10/10 [==============================] - 0s 19ms/step - loss: 988.7616
Epoch 332/1000
10/10 [==============================] - 0s 18ms/step - loss: 519.3939
Epoch 333/1000
10/10 [==============================] - 0s 19ms/step - loss: 346.4208
Epoch 334/1000
10/10 [==============================] - 0s 19ms/step - loss: 349.7964
Epoch 335/1000
10/10 [==============================] - 0s 19ms/step - loss: 347.5775
Epoch 336/1000
10/10 [==============================] - 0s 19ms/step - loss: 304.0873
Epoch 337/1000
10/10 [==============================] - 0s 19ms/step - loss: 286.1131
Epoch 338/1000
10/10 [==============================] - 0s 18ms/step - loss: 250.4491
Epoch 339/1000
10/10 [==============================] - 0s 18ms/step - loss: 224.8222
Epoch 340/1000
10/10 [==============================] - 0s 20ms/step - loss: 247.7308
Epoch 341/1000
10/10 [==============================] - 0s 22ms/step - loss: 252.4490
Epoch 342/1000
10/10 [==============================] - 0s 20ms/step - loss: 212.3565
Epoch 343/1000
10/10 [==============================] - 0s 19ms/step - loss: 245.5661
Epoch 344/1000
10/10 [==============================] - 0s 19ms/step - loss: 217.9855
Epoch 345/1000
10/10 [==============================] - 0s 20ms/step - loss: 211.9601
Epoch 346/1000
10/10 [==============================] - 0s 19ms/step - loss: 231.3014
Epoch 347/1000
10/10 [==============================] - 0s 19ms/step - loss: 257.4931
Epoch 348/1000
10/10 [==============================] - 0s 20ms/step - loss: 264.8979
Epoch 349/1000
```

10/10 [==============================] - 0s 20ms/step - loss: 395.8409
Epoch 350/1000
10/10 [==============================] - 0s 20ms/step - loss: 484.0336
Epoch 351/1000
10/10 [==============================] - 0s 20ms/step - loss: 537.6376
Epoch 352/1000
10/10 [==============================] - 0s 19ms/step - loss: 440.9286
Epoch 353/1000
10/10 [==============================] - 0s 21ms/step - loss: 504.3961
Epoch 354/1000
10/10 [==============================] - 0s 20ms/step - loss: 450.2081
Epoch 355/1000
10/10 [==============================] - 0s 19ms/step - loss: 431.9898
Epoch 356/1000
10/10 [==============================] - 0s 19ms/step - loss: 432.7821
Epoch 357/1000
10/10 [==============================] - 0s 19ms/step - loss: 447.7328
Epoch 358/1000
10/10 [==============================] - 0s 22ms/step - loss: 593.8584
Epoch 359/1000
10/10 [==============================] - 0s 20ms/step - loss: 483.0959
Epoch 360/1000
10/10 [==============================] - 0s 19ms/step - loss: 510.6010
Epoch 361/1000
10/10 [==============================] - 0s 19ms/step - loss: 326.7743
Epoch 362/1000
10/10 [==============================] - 0s 28ms/step - loss: 374.1521
Epoch 363/1000
10/10 [==============================] - 0s 33ms/step - loss: 436.3829
Epoch 364/1000
10/10 [==============================] - 0s 34ms/step - loss: 433.0633
Epoch 365/1000
10/10 [==============================] - 0s 35ms/step - loss: 430.5683
Epoch 366/1000
10/10 [==============================] - 0s 32ms/step - loss: 294.2011
Epoch 367/1000
10/10 [==============================] - 0s 19ms/step - loss: 308.5737
Epoch 368/1000
10/10 [==============================] - 0s 19ms/step - loss: 279.2181
Epoch 369/1000
10/10 [==============================] - 0s 19ms/step - loss: 309.1293
Epoch 370/1000
10/10 [==============================] - 0s 19ms/step - loss: 301.8559
Epoch 371/1000
10/10 [==============================] - 0s 18ms/step - loss: 300.1734
Epoch 372/1000
10/10 [==============================] - 0s 19ms/step - loss: 249.0287
Epoch 373/1000
10/10 [==============================] - 0s 19ms/step - loss: 239.9097
Epoch 374/1000
10/10 [==============================] - 0s 21ms/step - loss: 211.6857
Epoch 375/1000
10/10 [==============================] - 0s 18ms/step - loss: 196.1777
Epoch 376/1000
10/10 [==============================] - 0s 18ms/step - loss: 199.4919
Epoch 377/1000
10/10 [==============================] - 0s 19ms/step - loss: 192.8662
Epoch 378/1000
10/10 [==============================] - 0s 21ms/step - loss: 188.4499
Epoch 379/1000
10/10 [==============================] - 0s 19ms/step - loss: 179.3230
Epoch 380/1000
10/10 [==============================] - 0s 19ms/step - loss: 178.3266
Epoch 381/1000
10/10 [==============================] - 0s 20ms/step - loss: 175.9669
Epoch 382/1000
10/10 [==============================] - 0s 20ms/step - loss: 177.6628
Epoch 383/1000
10/10 [==============================] - 0s 19ms/step - loss: 176.1198
Epoch 384/1000
10/10 [==============================] - 0s 18ms/step - loss: 172.2018
Epoch 385/1000
10/10 [==============================] - 0s 20ms/step - loss: 193.7000
Epoch 386/1000
10/10 [==============================] - 0s 18ms/step - loss: 184.6924
Epoch 387/1000
10/10 [==============================] - 0s 20ms/step - loss: 150.9404
Epoch 388/1000
10/10 [==============================] - 0s 19ms/step - loss: 160.0534
Epoch 389/1000
10/10 [==============================] - 0s 18ms/step - loss: 158.8653
Epoch 390/1000
10/10 [==============================] - 0s 19ms/step - loss: 164.2368
Epoch 391/1000
10/10 [==============================] - 0s 18ms/step - loss: 138.0834
Epoch 392/1000
10/10 [==============================] - 0s 18ms/step - loss: 149.1953

```
Epoch 393/1000
10/10 [==============================] - 0s 19ms/step - loss: 150.4000
Epoch 394/1000
10/10 [==============================] - 0s 18ms/step - loss: 133.1881
Epoch 395/1000
10/10 [==============================] - 0s 19ms/step - loss: 125.7391
Epoch 396/1000
10/10 [==============================] - 0s 21ms/step - loss: 124.3594
Epoch 397/1000
10/10 [==============================] - 0s 18ms/step - loss: 140.7888
Epoch 398/1000
10/10 [==============================] - 0s 19ms/step - loss: 116.1456
Epoch 399/1000
10/10 [==============================] - 0s 20ms/step - loss: 105.2962
Epoch 400/1000
10/10 [==============================] - 0s 20ms/step - loss: 134.5997
Epoch 401/1000
10/10 [==============================] - 0s 19ms/step - loss: 133.7585
Epoch 402/1000
10/10 [==============================] - 0s 19ms/step - loss: 115.5472
Epoch 403/1000
10/10 [==============================] - 0s 20ms/step - loss: 131.3134
Epoch 404/1000
10/10 [==============================] - 0s 19ms/step - loss: 115.6944
Epoch 405/1000
10/10 [==============================] - 0s 19ms/step - loss: 107.8604
Epoch 406/1000
10/10 [==============================] - 0s 19ms/step - loss: 108.5009
Epoch 407/1000
10/10 [==============================] - 0s 32ms/step - loss: 120.4582
Epoch 408/1000
10/10 [==============================] - 0s 32ms/step - loss: 115.6822
Epoch 409/1000
10/10 [==============================] - 0s 33ms/step - loss: 114.8415
Epoch 410/1000
10/10 [==============================] - 0s 33ms/step - loss: 111.9262
Epoch 411/1000
10/10 [==============================] - 0s 18ms/step - loss: 108.0771
Epoch 412/1000
10/10 [==============================] - 0s 19ms/step - loss: 130.3591
Epoch 413/1000
10/10 [==============================] - 0s 19ms/step - loss: 161.7733
Epoch 414/1000
10/10 [==============================] - 0s 19ms/step - loss: 145.4034
Epoch 415/1000
10/10 [==============================] - 0s 20ms/step - loss: 145.8563
Epoch 416/1000
10/10 [==============================] - 0s 21ms/step - loss: 121.9578
Epoch 417/1000
10/10 [==============================] - 0s 20ms/step - loss: 120.6505
Epoch 418/1000
10/10 [==============================] - 0s 20ms/step - loss: 116.8605
Epoch 419/1000
10/10 [==============================] - 0s 19ms/step - loss: 112.0027
Epoch 420/1000
10/10 [==============================] - 0s 20ms/step - loss: 111.2299
Epoch 421/1000
10/10 [==============================] - 0s 20ms/step - loss: 124.7292
Epoch 422/1000
10/10 [==============================] - 0s 19ms/step - loss: 108.5971
Epoch 423/1000
10/10 [==============================] - 0s 21ms/step - loss: 109.8470
Epoch 424/1000
10/10 [==============================] - 0s 23ms/step - loss: 118.9327
Epoch 425/1000
10/10 [==============================] - 0s 20ms/step - loss: 118.1800
Epoch 426/1000
10/10 [==============================] - 0s 20ms/step - loss: 118.7848
Epoch 427/1000
10/10 [==============================] - 0s 21ms/step - loss: 120.3507
Epoch 428/1000
10/10 [==============================] - 0s 19ms/step - loss: 120.6515
Epoch 429/1000
10/10 [==============================] - 0s 20ms/step - loss: 107.1959
Epoch 430/1000
10/10 [==============================] - 0s 20ms/step - loss: 107.3284
Epoch 431/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.5823
Epoch 432/1000
10/10 [==============================] - 0s 20ms/step - loss: 112.6654
Epoch 433/1000
10/10 [==============================] - 0s 21ms/step - loss: 123.1632
Epoch 434/1000
10/10 [==============================] - 0s 20ms/step - loss: 120.2550
Epoch 435/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.6134
Epoch 436/1000
```

10/10 [==============================] - 0s 22ms/step - loss: 116.4529
Epoch 437/1000
10/10 [==============================] - 0s 19ms/step - loss: 108.4466
Epoch 438/1000
10/10 [==============================] - 0s 19ms/step - loss: 115.4846
Epoch 439/1000
10/10 [==============================] - 0s 20ms/step - loss: 116.4671
Epoch 440/1000
10/10 [==============================] - 0s 20ms/step - loss: 105.6028
Epoch 441/1000
10/10 [==============================] - 0s 22ms/step - loss: 122.0551
Epoch 442/1000
10/10 [==============================] - 0s 20ms/step - loss: 107.3242
Epoch 443/1000
10/10 [==============================] - 0s 20ms/step - loss: 108.7258
Epoch 444/1000
10/10 [==============================] - 0s 21ms/step - loss: 105.0971
Epoch 445/1000
10/10 [==============================] - 0s 21ms/step - loss: 104.2789
Epoch 446/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.2292
Epoch 447/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.7669
Epoch 448/1000
10/10 [==============================] - 0s 21ms/step - loss: 104.7939
Epoch 449/1000
10/10 [==============================] - 0s 21ms/step - loss: 105.2339
Epoch 450/1000
10/10 [==============================] - 0s 31ms/step - loss: 103.9287
Epoch 451/1000
10/10 [==============================] - 0s 33ms/step - loss: 104.4110
Epoch 452/1000
10/10 [==============================] - 0s 30ms/step - loss: 104.2948
Epoch 453/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.4085
Epoch 454/1000
10/10 [==============================] - 0s 21ms/step - loss: 104.4799
Epoch 455/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.2803
Epoch 456/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.8275
Epoch 457/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.7006
Epoch 458/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.1378
Epoch 459/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.6068
Epoch 460/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.1341
Epoch 461/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.3845
Epoch 462/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.4395
Epoch 463/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.4733
Epoch 464/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.0880
Epoch 465/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.3207
Epoch 466/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.7461
Epoch 467/1000
10/10 [==============================] - 0s 22ms/step - loss: 104.1024
Epoch 468/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.4287
Epoch 469/1000
10/10 [==============================] - 0s 22ms/step - loss: 103.5543
Epoch 470/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.7720
Epoch 471/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.2380
Epoch 472/1000
10/10 [==============================] - 0s 21ms/step - loss: 104.1296
Epoch 473/1000
10/10 [==============================] - 0s 22ms/step - loss: 103.3449
Epoch 474/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.4163
Epoch 475/1000
10/10 [==============================] - 0s 18ms/step - loss: 103.3514
Epoch 476/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.4808
Epoch 477/1000
10/10 [==============================] - 0s 21ms/step - loss: 104.0734
Epoch 478/1000
10/10 [==============================] - 0s 21ms/step - loss: 100.5234
Epoch 479/1000
10/10 [==============================] - 0s 20ms/step - loss: 29722.7969

```
Epoch 480/1000
10/10 [==============================] - 0s 19ms/step - loss: 108.6127
Epoch 481/1000
10/10 [==============================] - 0s 21ms/step - loss: 126.4894
Epoch 482/1000
10/10 [==============================] - 0s 20ms/step - loss: 122.2634
Epoch 483/1000
10/10 [==============================] - 0s 19ms/step - loss: 118.6944
Epoch 484/1000
10/10 [==============================] - 0s 19ms/step - loss: 112.2165
Epoch 485/1000
10/10 [==============================] - 0s 22ms/step - loss: 109.9293
Epoch 486/1000
10/10 [==============================] - 0s 19ms/step - loss: 107.9691
Epoch 487/1000
10/10 [==============================] - 0s 19ms/step - loss: 107.0760
Epoch 488/1000
10/10 [==============================] - 0s 19ms/step - loss: 106.4547
Epoch 489/1000
10/10 [==============================] - 0s 19ms/step - loss: 105.1882
Epoch 490/1000
10/10 [==============================] - 0s 18ms/step - loss: 104.6482
Epoch 491/1000
10/10 [==============================] - 0s 20ms/step - loss: 105.1048
Epoch 492/1000
10/10 [==============================] - 0s 36ms/step - loss: 104.3779
Epoch 493/1000
10/10 [==============================] - 0s 31ms/step - loss: 104.0196
Epoch 494/1000
10/10 [==============================] - 0s 29ms/step - loss: 104.3446
Epoch 495/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.2035
Epoch 496/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.8199
Epoch 497/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.7245
Epoch 498/1000
10/10 [==============================] - 0s 18ms/step - loss: 103.8921
Epoch 499/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.6794
Epoch 500/1000
10/10 [==============================] - 0s 18ms/step - loss: 103.6556
Epoch 501/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.6875
Epoch 502/1000
10/10 [==============================] - 0s 18ms/step - loss: 103.8251
Epoch 503/1000
10/10 [==============================] - 0s 18ms/step - loss: 103.9570
Epoch 504/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.7634
Epoch 505/1000
10/10 [==============================] - 0s 20ms/step - loss: 104.1462
Epoch 506/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.5133
Epoch 507/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.1467
Epoch 508/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.8340
Epoch 509/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.7512
Epoch 510/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.1349
Epoch 511/1000
10/10 [==============================] - 0s 23ms/step - loss: 103.9573
Epoch 512/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.7684
Epoch 513/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.7823
Epoch 514/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.6382
Epoch 515/1000
10/10 [==============================] - 0s 19ms/step - loss: 104.0377
Epoch 516/1000
10/10 [==============================] - 0s 22ms/step - loss: 103.4112
Epoch 517/1000
10/10 [==============================] - 0s 22ms/step - loss: 103.3448
Epoch 518/1000
10/10 [==============================] - 0s 21ms/step - loss: 103.4267
Epoch 519/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.6251
Epoch 520/1000
10/10 [==============================] - 0s 21ms/step - loss: 103.4018
Epoch 521/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.2545
Epoch 522/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.5571
Epoch 523/1000
```

10/10 [==============================] - 0s 21ms/step - loss: 103.2951
Epoch 524/1000
10/10 [==============================] - 0s 21ms/step - loss: 103.3870
Epoch 525/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.4157
Epoch 526/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.3794
Epoch 527/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.0347
Epoch 528/1000
10/10 [==============================] - 0s 21ms/step - loss: 103.7157
Epoch 529/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.1154
Epoch 530/1000
10/10 [==============================] - 0s 19ms/step - loss: 102.9969
Epoch 531/1000
10/10 [==============================] - 0s 20ms/step - loss: 102.8071
Epoch 532/1000
10/10 [==============================] - 0s 18ms/step - loss: 103.6808
Epoch 533/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.4854
Epoch 534/1000
10/10 [==============================] - 0s 28ms/step - loss: 102.7802
Epoch 535/1000
10/10 [==============================] - 0s 31ms/step - loss: 103.2570
Epoch 536/1000
10/10 [==============================] - 0s 32ms/step - loss: 103.3247
Epoch 537/1000
10/10 [==============================] - 0s 33ms/step - loss: 102.7602
Epoch 538/1000
10/10 [==============================] - 0s 20ms/step - loss: 103.4932
Epoch 539/1000
10/10 [==============================] - 0s 19ms/step - loss: 103.1812
Epoch 540/1000
10/10 [==============================] - 0s 20ms/step - loss: 101.9593
Epoch 541/1000
10/10 [==============================] - 0s 20ms/step - loss: 100.7803
Epoch 542/1000
10/10 [==============================] - 0s 22ms/step - loss: 100.3268
Epoch 543/1000
10/10 [==============================] - 0s 20ms/step - loss: 89.5596
Epoch 544/1000
10/10 [==============================] - 0s 20ms/step - loss: 91.6199
Epoch 545/1000
10/10 [==============================] - 0s 18ms/step - loss: 90.3706
Epoch 546/1000
10/10 [==============================] - 0s 20ms/step - loss: 87.8392
Epoch 547/1000
10/10 [==============================] - 0s 20ms/step - loss: 88.8109
Epoch 548/1000
10/10 [==============================] - 0s 19ms/step - loss: 93.6480
Epoch 549/1000
10/10 [==============================] - 0s 19ms/step - loss: 89.4586
Epoch 550/1000
10/10 [==============================] - 0s 19ms/step - loss: 86.8865
Epoch 551/1000
10/10 [==============================] - 0s 20ms/step - loss: 86.1317
Epoch 552/1000
10/10 [==============================] - 0s 19ms/step - loss: 95.0174
Epoch 553/1000
10/10 [==============================] - 0s 19ms/step - loss: 90.6835
Epoch 554/1000
10/10 [==============================] - 0s 20ms/step - loss: 86.9199
Epoch 555/1000
10/10 [==============================] - 0s 20ms/step - loss: 91.3743
Epoch 556/1000
10/10 [==============================] - 0s 19ms/step - loss: 87.2842
Epoch 557/1000
10/10 [==============================] - 0s 18ms/step - loss: 86.8869
Epoch 558/1000
10/10 [==============================] - 0s 21ms/step - loss: 85.5939
Epoch 559/1000
10/10 [==============================] - 0s 20ms/step - loss: 91.7524
Epoch 560/1000
10/10 [==============================] - 0s 20ms/step - loss: 86.9144
Epoch 561/1000
10/10 [==============================] - 0s 20ms/step - loss: 90.3761
Epoch 562/1000
10/10 [==============================] - 0s 22ms/step - loss: 86.8987
Epoch 563/1000
10/10 [==============================] - 0s 21ms/step - loss: 90.8058
Epoch 564/1000
10/10 [==============================] - 0s 19ms/step - loss: 86.9450
Epoch 565/1000
10/10 [==============================] - 0s 21ms/step - loss: 86.5680
Epoch 566/1000
10/10 [==============================] - 0s 22ms/step - loss: 85.0914

```
Epoch 567/1000
10/10 [==============================] - 0s 20ms/step - loss: 94.6549
Epoch 568/1000
10/10 [==============================] - 0s 22ms/step - loss: 91.2840
Epoch 569/1000
10/10 [==============================] - 0s 21ms/step - loss: 87.9102
Epoch 570/1000
10/10 [==============================] - 0s 21ms/step - loss: 89.9491
Epoch 571/1000
10/10 [==============================] - 0s 21ms/step - loss: 89.0283
Epoch 572/1000
10/10 [==============================] - 0s 19ms/step - loss: 85.6493
Epoch 573/1000
10/10 [==============================] - 0s 18ms/step - loss: 87.6716
Epoch 574/1000
10/10 [==============================] - 0s 21ms/step - loss: 86.9575
Epoch 575/1000
10/10 [==============================] - 0s 19ms/step - loss: 89.1771
Epoch 576/1000
10/10 [==============================] - 0s 19ms/step - loss: 87.0727
Epoch 577/1000
10/10 [==============================] - 0s 36ms/step - loss: 85.6751
Epoch 578/1000
10/10 [==============================] - 0s 34ms/step - loss: 84.7931
Epoch 579/1000
10/10 [==============================] - 0s 30ms/step - loss: 91.9830
Epoch 580/1000
10/10 [==============================] - 0s 32ms/step - loss: 89.6198
Epoch 581/1000
10/10 [==============================] - 0s 29ms/step - loss: 86.0968
Epoch 582/1000
10/10 [==============================] - 0s 21ms/step - loss: 89.0315
Epoch 583/1000
10/10 [==============================] - 0s 20ms/step - loss: 78.6947
Epoch 584/1000
10/10 [==============================] - 0s 18ms/step - loss: 75.4192
Epoch 585/1000
10/10 [==============================] - 0s 19ms/step - loss: 73.3713
Epoch 586/1000
10/10 [==============================] - 0s 21ms/step - loss: 72.7010
Epoch 587/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.7924
Epoch 588/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.2361
Epoch 589/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.1797
Epoch 590/1000
10/10 [==============================] - 0s 21ms/step - loss: 72.3881
Epoch 591/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.3438
Epoch 592/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.0411
Epoch 593/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.8040
Epoch 594/1000
10/10 [==============================] - 0s 22ms/step - loss: 71.5781
Epoch 595/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.1908
Epoch 596/1000
10/10 [==============================] - 0s 19ms/step - loss: 71.7653
Epoch 597/1000
10/10 [==============================] - 0s 19ms/step - loss: 72.7550
Epoch 598/1000
10/10 [==============================] - 0s 20ms/step - loss: 70.8662
Epoch 599/1000
10/10 [==============================] - 0s 22ms/step - loss: 70.5341
Epoch 600/1000
10/10 [==============================] - 0s 19ms/step - loss: 70.7160
Epoch 601/1000
10/10 [==============================] - 0s 23ms/step - loss: 69.8566
Epoch 602/1000
10/10 [==============================] - 0s 19ms/step - loss: 69.7716
Epoch 603/1000
10/10 [==============================] - 0s 19ms/step - loss: 69.1223
Epoch 604/1000
10/10 [==============================] - 0s 20ms/step - loss: 67.6311
Epoch 605/1000
10/10 [==============================] - 0s 22ms/step - loss: 63.0111
Epoch 606/1000
10/10 [==============================] - 0s 20ms/step - loss: 59.8938
Epoch 607/1000
10/10 [==============================] - 0s 21ms/step - loss: 58.4351
Epoch 608/1000
10/10 [==============================] - 0s 18ms/step - loss: 57.8106
Epoch 609/1000
10/10 [==============================] - 0s 20ms/step - loss: 57.1053
Epoch 610/1000
```

10/10 [==============================] - 0s 20ms/step - loss: 56.3805
Epoch 611/1000
10/10 [==============================] - 0s 19ms/step - loss: 55.8543
Epoch 612/1000
10/10 [==============================] - 0s 20ms/step - loss: 55.7251
Epoch 613/1000
10/10 [==============================] - 0s 22ms/step - loss: 55.4078
Epoch 614/1000
10/10 [==============================] - 0s 20ms/step - loss: 54.9869
Epoch 615/1000
10/10 [==============================] - 0s 19ms/step - loss: 55.0041
Epoch 616/1000
10/10 [==============================] - 0s 19ms/step - loss: 54.5619
Epoch 617/1000
10/10 [==============================] - 0s 19ms/step - loss: 56.8977
Epoch 618/1000
10/10 [==============================] - 0s 18ms/step - loss: 55.2675
Epoch 619/1000
10/10 [==============================] - 0s 30ms/step - loss: 55.1580
Epoch 620/1000
10/10 [==============================] - 0s 32ms/step - loss: 54.8710
Epoch 621/1000
10/10 [==============================] - 0s 36ms/step - loss: 54.5813
Epoch 622/1000
10/10 [==============================] - 0s 25ms/step - loss: 54.2533
Epoch 623/1000
10/10 [==============================] - 0s 19ms/step - loss: 54.1216
Epoch 624/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.8186
Epoch 625/1000
10/10 [==============================] - 0s 22ms/step - loss: 53.5756
Epoch 626/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.4603
Epoch 627/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.2631
Epoch 628/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.1430
Epoch 629/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.9196
Epoch 630/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.7276
Epoch 631/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.5118
Epoch 632/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.2867
Epoch 633/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.0374
Epoch 634/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.8732
Epoch 635/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.7679
Epoch 636/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.7699
Epoch 637/1000
10/10 [==============================] - 0s 23ms/step - loss: 51.6961
Epoch 638/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.9245
Epoch 639/1000
10/10 [==============================] - 0s 22ms/step - loss: 52.3680
Epoch 640/1000
10/10 [==============================] - 0s 22ms/step - loss: 53.1094
Epoch 641/1000
10/10 [==============================] - 0s 22ms/step - loss: 53.6224
Epoch 642/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.7105
Epoch 643/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.3973
Epoch 644/1000
10/10 [==============================] - 0s 23ms/step - loss: 53.0714
Epoch 645/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.3339
Epoch 646/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.8149
Epoch 647/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.1766
Epoch 648/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1188
Epoch 649/1000
10/10 [==============================] - 0s 22ms/step - loss: 52.0914
Epoch 650/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.3706
Epoch 651/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.1198
Epoch 652/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.8447
Epoch 653/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.3667

```
Epoch 654/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.3026
Epoch 655/1000
10/10 [==============================] - 0s 20ms/step - loss: 54.1079
Epoch 656/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.2748
Epoch 657/1000
10/10 [==============================] - 0s 19ms/step - loss: 56.6373
Epoch 658/1000
10/10 [==============================] - 0s 19ms/step - loss: 54.5616
Epoch 659/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.5924
Epoch 660/1000
10/10 [==============================] - 0s 33ms/step - loss: 50.7654
Epoch 661/1000
10/10 [==============================] - 0s 31ms/step - loss: 54.0246
Epoch 662/1000
10/10 [==============================] - 0s 34ms/step - loss: 51.8242
Epoch 663/1000
10/10 [==============================] - 0s 35ms/step - loss: 51.4750
Epoch 664/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.3823
Epoch 665/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.4514
Epoch 666/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.6837
Epoch 667/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1482
Epoch 668/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.6516
Epoch 669/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.1459
Epoch 670/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.3872
Epoch 671/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.6334
Epoch 672/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.4843
Epoch 673/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.5785
Epoch 674/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.9091
Epoch 675/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.6144
Epoch 676/1000
10/10 [==============================] - 0s 22ms/step - loss: 52.3050
Epoch 677/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.9294
Epoch 678/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.4779
Epoch 679/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.7876
Epoch 680/1000
10/10 [==============================] - 0s 23ms/step - loss: 52.5000
Epoch 681/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.8229
Epoch 682/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.4891
Epoch 683/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.2513
Epoch 684/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.8920
Epoch 685/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.6123
Epoch 686/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.2476
Epoch 687/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.8515
Epoch 688/1000
10/10 [==============================] - 0s 20ms/step - loss: 57.7220
Epoch 689/1000
10/10 [==============================] - 0s 20ms/step - loss: 55.1351
Epoch 690/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.4482
Epoch 691/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.5240
Epoch 692/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.7579
Epoch 693/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.0262
Epoch 694/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.9617
Epoch 695/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1080
Epoch 696/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.7259
Epoch 697/1000
```

10/10 [==============================] - 0s 21ms/step - loss: 50.8497
Epoch 698/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.8072
Epoch 699/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.8245
Epoch 700/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.2494
Epoch 701/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.1169
Epoch 702/1000
10/10 [==============================] - 0s 36ms/step - loss: 51.6580
Epoch 703/1000
10/10 [==============================] - 0s 37ms/step - loss: 51.5694
Epoch 704/1000
10/10 [==============================] - 0s 35ms/step - loss: 50.6962
Epoch 705/1000
10/10 [==============================] - 0s 35ms/step - loss: 53.5490
Epoch 706/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.5373
Epoch 707/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.1556
Epoch 708/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.5849
Epoch 709/1000
10/10 [==============================] - 0s 19ms/step - loss: 54.1276
Epoch 710/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.7886
Epoch 711/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.3390
Epoch 712/1000
10/10 [==============================] - 0s 22ms/step - loss: 52.6171
Epoch 713/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.9052
Epoch 714/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.6822
Epoch 715/1000
10/10 [==============================] - 0s 23ms/step - loss: 50.7158
Epoch 716/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.0341
Epoch 717/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.3994
Epoch 718/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.9140
Epoch 719/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1405
Epoch 720/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.8116
Epoch 721/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.2634
Epoch 722/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.3149
Epoch 723/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.2298
Epoch 724/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.7595
Epoch 725/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.1472
Epoch 726/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.9356
Epoch 727/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.4878
Epoch 728/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.1580
Epoch 729/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.9321
Epoch 730/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.4249
Epoch 731/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.5710
Epoch 732/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.1750
Epoch 733/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.1909
Epoch 734/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.7682
Epoch 735/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.0451
Epoch 736/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.5773
Epoch 737/1000
10/10 [==============================] - 0s 23ms/step - loss: 51.7526
Epoch 738/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1656
Epoch 739/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.9108
Epoch 740/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.3640

```
Epoch 741/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.5405
Epoch 742/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.4517
Epoch 743/1000
10/10 [==============================] - 0s 32ms/step - loss: 52.3061
Epoch 744/1000
10/10 [==============================] - 0s 32ms/step - loss: 52.3918
Epoch 745/1000
10/10 [==============================] - 0s 34ms/step - loss: 50.7932
Epoch 746/1000
10/10 [==============================] - 0s 36ms/step - loss: 53.0772
Epoch 747/1000
10/10 [==============================] - 0s 33ms/step - loss: 53.1179
Epoch 748/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.8004
Epoch 749/1000
10/10 [==============================] - 0s 22ms/step - loss: 52.8589
Epoch 750/1000
10/10 [==============================] - 0s 23ms/step - loss: 53.7659
Epoch 751/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.2906
Epoch 752/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.2096
Epoch 753/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.3367
Epoch 754/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.7898
Epoch 755/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.0406
Epoch 756/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.2587
Epoch 757/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.3145
Epoch 758/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.9916
Epoch 759/1000
10/10 [==============================] - 0s 20ms/step - loss: 54.1475
Epoch 760/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.1249
Epoch 761/1000
10/10 [==============================] - 0s 18ms/step - loss: 51.8145
Epoch 762/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.3548
Epoch 763/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.3671
Epoch 764/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.1279
Epoch 765/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.3384
Epoch 766/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1438
Epoch 767/1000
10/10 [==============================] - 0s 21ms/step - loss: 54.2841
Epoch 768/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.6089
Epoch 769/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.6115
Epoch 770/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.1943
Epoch 771/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.2431
Epoch 772/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.0954
Epoch 773/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.9378
Epoch 774/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.8150
Epoch 775/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.8946
Epoch 776/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.2150
Epoch 777/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.9425
Epoch 778/1000
10/10 [==============================] - 0s 22ms/step - loss: 53.1089
Epoch 779/1000
10/10 [==============================] - 0s 25ms/step - loss: 52.7562
Epoch 780/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.5318
Epoch 781/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.6485
Epoch 782/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.4583
Epoch 783/1000
10/10 [==============================] - 0s 31ms/step - loss: 51.7148
Epoch 784/1000
```

10/10 [==============================] - 0s 35ms/step - loss: 50.2697
Epoch 785/1000
10/10 [==============================] - 0s 39ms/step - loss: 53.0017
Epoch 786/1000
10/10 [==============================] - 0s 44ms/step - loss: 52.5395
Epoch 787/1000
10/10 [==============================] - 0s 22ms/step - loss: 50.1476
Epoch 788/1000
10/10 [==============================] - 0s 22ms/step - loss: 50.0725
Epoch 789/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.0465
Epoch 790/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.8882
Epoch 791/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.0868
Epoch 792/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.3130
Epoch 793/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.7352
Epoch 794/1000
10/10 [==============================] - 0s 22ms/step - loss: 53.3541
Epoch 795/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.1477
Epoch 796/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.0205
Epoch 797/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.6260
Epoch 798/1000
10/10 [==============================] - 0s 23ms/step - loss: 51.4678
Epoch 799/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.9289
Epoch 800/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.6384
Epoch 801/1000
10/10 [==============================] - 0s 23ms/step - loss: 53.3087
Epoch 802/1000
10/10 [==============================] - 0s 23ms/step - loss: 51.9880
Epoch 803/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.9216
Epoch 804/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.4453
Epoch 805/1000
10/10 [==============================] - 0s 24ms/step - loss: 53.3442
Epoch 806/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.9354
Epoch 807/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.8539
Epoch 808/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.7142
Epoch 809/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.3030
Epoch 810/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.0214
Epoch 811/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.0579
Epoch 812/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.9463
Epoch 813/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.8158
Epoch 814/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.2502
Epoch 815/1000
10/10 [==============================] - 0s 20ms/step - loss: 55.6484
Epoch 816/1000
10/10 [==============================] - 0s 18ms/step - loss: 50.3374
Epoch 817/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.7290
Epoch 818/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.2539
Epoch 819/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.9984
Epoch 820/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.7450
Epoch 821/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.0510
Epoch 822/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.5380
Epoch 823/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.1356
Epoch 824/1000
10/10 [==============================] - 0s 32ms/step - loss: 51.4529
Epoch 825/1000
10/10 [==============================] - 0s 31ms/step - loss: 52.1283
Epoch 826/1000
10/10 [==============================] - 0s 35ms/step - loss: 52.0872
Epoch 827/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1670

```
Epoch 828/1000
10/10 [==============================] - 0s 23ms/step - loss: 50.8307
Epoch 829/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.3746
Epoch 830/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.0866
Epoch 831/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.0653
Epoch 832/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.4461
Epoch 833/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.9762
Epoch 834/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.0239
Epoch 835/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.3165
Epoch 836/1000
10/10 [==============================] - 0s 22ms/step - loss: 50.5545
Epoch 837/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.4677
Epoch 838/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.7835
Epoch 839/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.5350
Epoch 840/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.4829
Epoch 841/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.5566
Epoch 842/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.4310
Epoch 843/1000
10/10 [==============================] - 0s 22ms/step - loss: 50.3088
Epoch 844/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.3258
Epoch 845/1000
10/10 [==============================] - 0s 24ms/step - loss: 52.5031
Epoch 846/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.5857
Epoch 847/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.5060
Epoch 848/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.3083
Epoch 849/1000
10/10 [==============================] - 0s 21ms/step - loss: 52.5102
Epoch 850/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.1860
Epoch 851/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.0564
Epoch 852/1000
10/10 [==============================] - 0s 22ms/step - loss: 53.3887
Epoch 853/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.1263
Epoch 854/1000
10/10 [==============================] - 0s 23ms/step - loss: 52.1128
Epoch 855/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.9099
Epoch 856/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.1766
Epoch 857/1000
10/10 [==============================] - 0s 22ms/step - loss: 49.8052
Epoch 858/1000
10/10 [==============================] - 0s 23ms/step - loss: 50.9357
Epoch 859/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.2936
Epoch 860/1000
10/10 [==============================] - 0s 21ms/step - loss: 49.7252
Epoch 861/1000
10/10 [==============================] - 0s 20ms/step - loss: 52.1742
Epoch 862/1000
10/10 [==============================] - 0s 21ms/step - loss: 54.0705
Epoch 863/1000
10/10 [==============================] - 0s 38ms/step - loss: 50.2935
Epoch 864/1000
10/10 [==============================] - 0s 34ms/step - loss: 51.2632
Epoch 865/1000
10/10 [==============================] - 0s 32ms/step - loss: 53.3275
Epoch 866/1000
10/10 [==============================] - 0s 33ms/step - loss: 53.8837
Epoch 867/1000
10/10 [==============================] - 0s 19ms/step - loss: 51.1664
Epoch 868/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.2077
Epoch 869/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.2729
Epoch 870/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1487
Epoch 871/1000
```

10/10 [==============================] - 0s 21ms/step - loss: 50.8267
Epoch 872/1000
10/10 [==============================] - 0s 22ms/step - loss: 49.6771
Epoch 873/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.9978
Epoch 874/1000
10/10 [==============================] - 0s 19ms/step - loss: 56.0328
Epoch 875/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.6913
Epoch 876/1000
10/10 [==============================] - 0s 19ms/step - loss: 49.3781
Epoch 877/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.7553
Epoch 878/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.2590
Epoch 879/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.6957
Epoch 880/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.4818
Epoch 881/1000
10/10 [==============================] - 0s 23ms/step - loss: 48.7210
Epoch 882/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.2789
Epoch 883/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.7274
Epoch 884/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.7381
Epoch 885/1000
10/10 [==============================] - 0s 24ms/step - loss: 60.2379
Epoch 886/1000
10/10 [==============================] - 0s 21ms/step - loss: 60.1764
Epoch 887/1000
10/10 [==============================] - 0s 24ms/step - loss: 57.6495
Epoch 888/1000
10/10 [==============================] - 0s 23ms/step - loss: 54.5365
Epoch 889/1000
10/10 [==============================] - 0s 21ms/step - loss: 49.4831
Epoch 890/1000
10/10 [==============================] - 0s 19ms/step - loss: 53.8395
Epoch 891/1000
10/10 [==============================] - 0s 25ms/step - loss: 50.1445
Epoch 892/1000
10/10 [==============================] - 0s 20ms/step - loss: 53.2226
Epoch 893/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.4078
Epoch 894/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.2823
Epoch 895/1000
10/10 [==============================] - 0s 22ms/step - loss: 52.2646
Epoch 896/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.4356
Epoch 897/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.6690
Epoch 898/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.2901
Epoch 899/1000
10/10 [==============================] - 0s 24ms/step - loss: 51.5565
Epoch 900/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.7855
Epoch 901/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.5417
Epoch 902/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.5739
Epoch 903/1000
10/10 [==============================] - 0s 34ms/step - loss: 50.3535
Epoch 904/1000
10/10 [==============================] - 0s 33ms/step - loss: 48.5447
Epoch 905/1000
10/10 [==============================] - 0s 32ms/step - loss: 54.3943
Epoch 906/1000
10/10 [==============================] - 0s 34ms/step - loss: 54.2056
Epoch 907/1000
10/10 [==============================] - 0s 34ms/step - loss: 50.4899
Epoch 908/1000
10/10 [==============================] - 0s 35ms/step - loss: 49.8719
Epoch 909/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.3212
Epoch 910/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.1634
Epoch 911/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.1452
Epoch 912/1000
10/10 [==============================] - 0s 19ms/step - loss: 50.0679
Epoch 913/1000
10/10 [==============================] - 0s 20ms/step - loss: 48.7342
Epoch 914/1000
10/10 [==============================] - 0s 21ms/step - loss: 53.3097

```
Epoch 915/1000
10/10 [==============================] - 0s 22ms/step - loss: 51.4767
Epoch 916/1000
10/10 [==============================] - 0s 19ms/step - loss: 49.1694
Epoch 917/1000
10/10 [==============================] - 0s 20ms/step - loss: 46.9988
Epoch 918/1000
10/10 [==============================] - 0s 20ms/step - loss: 42.1825
Epoch 919/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.5957
Epoch 920/1000
10/10 [==============================] - 0s 22ms/step - loss: 49.5541
Epoch 921/1000
10/10 [==============================] - 0s 21ms/step - loss: 49.0801
Epoch 922/1000
10/10 [==============================] - 0s 21ms/step - loss: 48.5163
Epoch 923/1000
10/10 [==============================] - 0s 21ms/step - loss: 47.6162
Epoch 924/1000
10/10 [==============================] - 0s 21ms/step - loss: 50.8137
Epoch 925/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.3605
Epoch 926/1000
10/10 [==============================] - 0s 19ms/step - loss: 47.9573
Epoch 927/1000
10/10 [==============================] - 0s 20ms/step - loss: 47.4578
Epoch 928/1000
10/10 [==============================] - 0s 23ms/step - loss: 47.2967
Epoch 929/1000
10/10 [==============================] - 0s 21ms/step - loss: 48.1599
Epoch 930/1000
10/10 [==============================] - 0s 23ms/step - loss: 50.4490
Epoch 931/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.1985
Epoch 932/1000
10/10 [==============================] - 0s 20ms/step - loss: 47.2490
Epoch 933/1000
10/10 [==============================] - 0s 20ms/step - loss: 50.6435
Epoch 934/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.9588
Epoch 935/1000
10/10 [==============================] - 0s 22ms/step - loss: 47.0027
Epoch 936/1000
10/10 [==============================] - 0s 21ms/step - loss: 46.7351
Epoch 937/1000
10/10 [==============================] - 0s 20ms/step - loss: 54.6269
Epoch 938/1000
10/10 [==============================] - 0s 22ms/step - loss: 48.0544
Epoch 939/1000
10/10 [==============================] - 0s 21ms/step - loss: 47.5817
Epoch 940/1000
10/10 [==============================] - 0s 19ms/step - loss: 47.2123
Epoch 941/1000
10/10 [==============================] - 0s 19ms/step - loss: 46.8352
Epoch 942/1000
10/10 [==============================] - 0s 20ms/step - loss: 46.6781
Epoch 943/1000
10/10 [==============================] - 0s 21ms/step - loss: 46.5011
Epoch 944/1000
10/10 [==============================] - 0s 20ms/step - loss: 49.8943
Epoch 945/1000
10/10 [==============================] - 0s 20ms/step - loss: 51.1765
Epoch 946/1000
10/10 [==============================] - 0s 32ms/step - loss: 60.4908
Epoch 947/1000
10/10 [==============================] - 0s 31ms/step - loss: 62.2465
Epoch 948/1000
10/10 [==============================] - 0s 32ms/step - loss: 57.0691
Epoch 949/1000
10/10 [==============================] - 0s 32ms/step - loss: 55.1115
Epoch 950/1000
10/10 [==============================] - 0s 19ms/step - loss: 52.6488
Epoch 951/1000
10/10 [==============================] - 0s 21ms/step - loss: 51.4361
Epoch 952/1000
10/10 [==============================] - 0s 21ms/step - loss: 49.9294
Epoch 953/1000
10/10 [==============================] - 0s 20ms/step - loss: 46.6129
Epoch 954/1000
10/10 [==============================] - 0s 20ms/step - loss: 45.3933
Epoch 955/1000
10/10 [==============================] - 0s 21ms/step - loss: 44.8344
Epoch 956/1000
10/10 [==============================] - 0s 19ms/step - loss: 44.7031
Epoch 957/1000
10/10 [==============================] - 0s 20ms/step - loss: 44.5470
Epoch 958/1000
```

```
10/10 [==============================] - 0s 19ms/step - loss: 44.3926
Epoch 959/1000
10/10 [==============================] - 0s 21ms/step - loss: 44.3833
Epoch 960/1000
10/10 [==============================] - 0s 20ms/step - loss: 44.3023
Epoch 961/1000
10/10 [==============================] - 0s 21ms/step - loss: 44.1941
Epoch 962/1000
10/10 [==============================] - 0s 21ms/step - loss: 44.1499
Epoch 963/1000
10/10 [==============================] - 0s 19ms/step - loss: 44.0704
Epoch 964/1000
10/10 [==============================] - 0s 19ms/step - loss: 44.0620
Epoch 965/1000
10/10 [==============================] - 0s 20ms/step - loss: 44.0396
Epoch 966/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.9970
Epoch 967/1000
10/10 [==============================] - 0s 20ms/step - loss: 43.9826
Epoch 968/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.9410
Epoch 969/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.9187
Epoch 970/1000
10/10 [==============================] - 0s 19ms/step - loss: 43.8332
Epoch 971/1000
10/10 [==============================] - 0s 20ms/step - loss: 43.7686
Epoch 972/1000
10/10 [==============================] - 0s 22ms/step - loss: 43.8168
Epoch 973/1000
10/10 [==============================] - 0s 22ms/step - loss: 43.7281
Epoch 974/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.6449
Epoch 975/1000
10/10 [==============================] - 0s 22ms/step - loss: 43.5379
Epoch 976/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.4592
Epoch 977/1000
10/10 [==============================] - 0s 24ms/step - loss: 43.3882
Epoch 978/1000
10/10 [==============================] - 0s 20ms/step - loss: 43.2773
Epoch 979/1000
10/10 [==============================] - 0s 21ms/step - loss: 43.1622
Epoch 980/1000
10/10 [==============================] - 0s 19ms/step - loss: 43.0427
Epoch 981/1000
10/10 [==============================] - 0s 19ms/step - loss: 42.8262
Epoch 982/1000
10/10 [==============================] - 0s 20ms/step - loss: 42.5796
Epoch 983/1000
10/10 [==============================] - 0s 19ms/step - loss: 42.3188
Epoch 984/1000
10/10 [==============================] - 0s 20ms/step - loss: 41.9594
Epoch 985/1000
10/10 [==============================] - 0s 20ms/step - loss: 41.5526
Epoch 986/1000
10/10 [==============================] - 0s 20ms/step - loss: 40.5720
Epoch 987/1000
10/10 [==============================] - 0s 23ms/step - loss: 39.5736
Epoch 988/1000
10/10 [==============================] - 0s 35ms/step - loss: 37.4200
Epoch 989/1000
10/10 [==============================] - 0s 37ms/step - loss: 34.0482
Epoch 990/1000
10/10 [==============================] - 0s 38ms/step - loss: 23.3976
Epoch 991/1000
10/10 [==============================] - 0s 37ms/step - loss: 40.1060
Epoch 992/1000
10/10 [==============================] - 0s 21ms/step - loss: 37.3300
Epoch 993/1000
10/10 [==============================] - 0s 21ms/step - loss: 38.2648
Epoch 994/1000
10/10 [==============================] - 0s 20ms/step - loss: 36.4711
Epoch 995/1000
10/10 [==============================] - 0s 21ms/step - loss: 33.0472
Epoch 996/1000
10/10 [==============================] - 0s 20ms/step - loss: 24.4774
Epoch 997/1000
10/10 [==============================] - 0s 23ms/step - loss: 23.4596
Epoch 998/1000
10/10 [==============================] - 0s 19ms/step - loss: 19.5127
Epoch 999/1000
10/10 [==============================] - 0s 21ms/step - loss: 17.1911
Epoch 1000/1000
10/10 [==============================] - 0s 20ms/step - loss: 17.8438
```

Out[ ]: <keras.src.callbacks.History at 0x7fdb401d8c40>

In [ ]:
```
prediction=model.predict_generator(test_generator)
```

```
<ipython-input-34-4eafd1643ada>:1: UserWarning:

`Model.predict_generator` is deprecated and will be removed in a future version. Please use `Model.predict`, which s
upports generators.
```

In [ ]:
```
model.save('google_stock_predictor.h5')
```

```
/usr/local/lib/python3.10/dist-packages/keras/src/engine/training.py:3103: UserWarning:

You are saving your model as an HDF5 file via `model.save()`. This file format is considered legacy. We recommend us
ing instead the native Keras format, e.g. `model.save('my_model.keras')`.
```

In [ ]:
```
prediction
```

Out[ ]:
```
array([[116.22369 ],
       [124.54144 ],
       [110.69947 ],
       [123.50763 ],
       [111.277855],
       [123.82708 ],
       [117.903625],
       [106.282845],
       [113.115036],
       [120.070946],
       [122.3454  ],
       [123.33102 ],
       [112.96076 ],
       [125.80366 ],
       [109.25858 ],
       [120.56331 ],
       [110.253204],
       [112.63285 ],
       [119.41672 ],
       [129.44653 ],
       [121.697845],
       [128.34279 ],
       [112.80332 ],
       [126.81964 ],
       [ 99.51719 ],
       [122.17634 ],
       [124.40352 ],
       [118.831985],
       [134.55847 ],
       [122.39879 ],
       [136.6259  ],
       [128.92517 ],
       [135.2617  ],
       [101.71405 ],
       [124.99825 ]], dtype=float32)
```

In [ ]:
```
#reshaping back to 1-D
close_train=close_train.reshape((-1))
close_test=close_test.reshape((-1))
prediction=prediction.reshape((-1))
```

In [ ]:
```
prediction
```

Out[ ]:
```
array([116.22369 , 124.54144 , 110.69947 , 123.50763 , 111.277855,
       123.82708 , 117.903625, 106.282845, 113.115036, 120.070946,
       122.3454  , 123.33102 , 112.96076 , 125.80366 , 109.25858 ,
       120.56331 , 110.253204, 112.63285 , 119.41672 , 129.44653 ,
       121.697845, 128.34279 , 112.80332 , 126.81964 ,  99.51719 ,
       122.17634 , 124.40352 , 118.831985, 134.55847 , 122.39879 ,
       136.6259  , 128.92517 , 135.2617  , 101.71405 , 124.99825 ],
      dtype=float32)
```

Google Stock Prediction

In [ ]:
```
#training
trace1=go.Scatter(
    x=date_train,
    y=close_train,
    mode='lines',
    name='Train'
)
#testing
trace2=go.Scatter(
    x=date_test,
    y=close_test,
    mode='lines',
    name='Test'
)
#prediction
```

```
trace3=go.Scatter(
        x=date_test,
        y=prediction,
        mode='lines',
        name='Prediction'
)
layout=go.Layout(
        title="Google Stock Prediction",
        xaxis={'title':'Date'},
        yaxis={'title':'Close'}
)
fig=go.Figure(
        data=[trace1,trace2,trace3],
        layout=layout
)
fig.show()
```