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1 contributor

6932 lines (6932 sloc) | 352 KB | Raw | Blame

Kaggle Competition for House Prices: Advanced Regression Techniques

In [283]:
```
# Import libraries

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [284]:
```
df=pd.read_csv('train.csv')
```

In [285]:
```
df.head()
```

Out[285]:

	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	LandContour	Utilities	...	PoolArea	PoolQC	Fence	MiscFeature	MiscVal	Mo
0	1	60	RL	65.0	8450	Pave	NaN	Reg	Lvl	AllPub	...	0	NaN	NaN	NaN	0	2
1	2	20	RL	80.0	9600	Pave	NaN	Reg	Lvl	AllPub	...	0	NaN	NaN	NaN	0	5
2	3	60	RL	68.0	11250	Pave	NaN	IR1	Lvl	AllPub	...	0	NaN	NaN	NaN	0	9
3	4	70	RL	60.0	9550	Pave	NaN	IR1	Lvl	AllPub	...	0	NaN	NaN	NaN	0	2
4	5	60	RL	84.0	14260	Pave	NaN	IR1	Lvl	AllPub	...	0	NaN	NaN	NaN	0	12

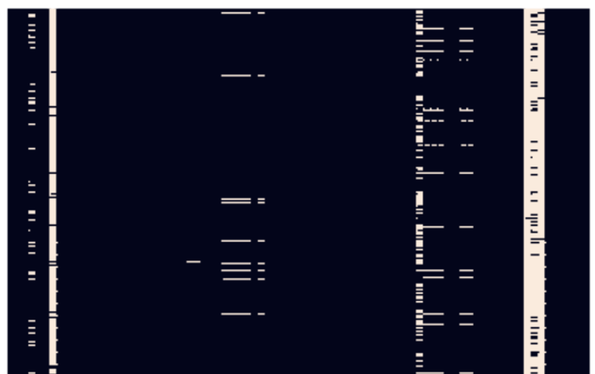
5 rows × 81 columns

In [286]:
```
df['MSZoning'].value_counts()
```

Out[286]:
```
RL         1151
RM          218
FV           65
RH           16
C (all)      10
Name: MSZoning, dtype: int64
```

In [287]:
```
sns.heatmap(df.isnull(),yticklabels=False,cbar=False)
```

Out[287]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x19fc85955c0>
```



In [288]:
```
df.shape
```

Out[288]: (1460, 81)

In [289]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1460 entries, 0 to 1459
Data columns (total 81 columns):
Id               1460 non-null int64
MSSubClass       1460 non-null int64
MSZoning         1460 non-null object
LotFrontage      1201 non-null float64
LotArea          1460 non-null int64
Street           1460 non-null object
Alley            91 non-null object
LotShape         1460 non-null object
LandContour      1460 non-null object
Utilities        1460 non-null object
LotConfig        1460 non-null object
LandSlope        1460 non-null object
Neighborhood     1460 non-null object
Condition1       1460 non-null object
Condition2       1460 non-null object
BldgType         1460 non-null object
HouseStyle       1460 non-null object
OverallQual      1460 non-null int64
OverallCond      1460 non-null int64
YearBuilt        1460 non-null int64
YearRemodAdd     1460 non-null int64
RoofStyle        1460 non-null object
RoofMatl         1460 non-null object
Exterior1st      1460 non-null object
Exterior2nd      1460 non-null object
MasVnrType       1452 non-null object
MasVnrArea       1452 non-null float64
ExterQual        1460 non-null object
ExterCond        1460 non-null object
Foundation       1460 non-null object
BsmtQual         1423 non-null object
BsmtCond         1423 non-null object
BsmtExposure     1422 non-null object
BsmtFinType1     1423 non-null object
BsmtFinSF1       1460 non-null int64
BsmtFinType2     1422 non-null object
BsmtFinSF2       1460 non-null int64
BsmtUnfSF        1460 non-null int64
TotalBsmtSF      1460 non-null int64
Heating          1460 non-null object
HeatingQC        1460 non-null object
```

```
CentralAir       1460 non-null object
Electrical       1459 non-null object
1stFlrSF         1460 non-null int64
2ndFlrSF         1460 non-null int64
LowQualFinSF     1460 non-null int64
GrLivArea        1460 non-null int64
BsmtFullBath     1460 non-null int64
BsmtHalfBath     1460 non-null int64
FullBath         1460 non-null int64
HalfBath         1460 non-null int64
BedroomAbvGr     1460 non-null int64
KitchenAbvGr     1460 non-null int64
KitchenQual      1460 non-null object
TotRmsAbvGrd     1460 non-null int64
Functional       1460 non-null object
Fireplaces       1460 non-null int64
FireplaceQu      770 non-null object
GarageType       1379 non-null object
GarageYrBlt      1379 non-null float64
GarageFinish     1379 non-null object
GarageCars       1460 non-null int64
GarageArea       1460 non-null int64
GarageQual       1379 non-null object
GarageCond       1379 non-null object
PavedDrive       1460 non-null object
WoodDeckSF       1460 non-null int64
OpenPorchSF      1460 non-null int64
EnclosedPorch    1460 non-null int64
3SsnPorch        1460 non-null int64
ScreenPorch      1460 non-null int64
PoolArea         1460 non-null int64
PoolQC           7 non-null object
Fence            281 non-null object
MiscFeature      54 non-null object
MiscVal          1460 non-null int64
MoSold           1460 non-null int64
YrSold           1460 non-null int64
SaleType         1460 non-null object
SaleCondition    1460 non-null object
SalePrice        1460 non-null int64
dtypes: float64(3), int64(35), object(43)
memory usage: 924.0+ KB
```

In [290]:
```
## Fill Missing Values

df['LotFrontage']=df['LotFrontage'].fillna(df['LotFrontage'].mean())
```

In [291]:
```
df.drop(['Alley'],axis=1,inplace=True)
```

In [292]:
```
df['BsmtCond']=df['BsmtCond'].fillna(df['BsmtCond'].mode()[0])
df['BsmtQual']=df['BsmtQual'].fillna(df['BsmtQual'].mode()[0])
```

In [293]:
```
df['FireplaceQu']=df['FireplaceQu'].fillna(df['FireplaceQu'].mode()[0])
df['GarageType']=df['GarageType'].fillna(df['GarageType'].mode()[0])
```

In [294]:
```
df.drop(['GarageYrBlt'],axis=1,inplace=True)
```

In [295]:
```
df['GarageFinish']=df['GarageFinish'].fillna(df['GarageFinish'].mode()[0])
df['GarageQual']=df['GarageQual'].fillna(df['GarageQual'].mode()[0])
df['GarageCond']=df['GarageCond'].fillna(df['GarageCond'].mode()[0])
```

In [296]:
```
df.drop(['PoolQC','Fence','MiscFeature'],axis=1,inplace=True)
```

In [297]:
```
df.shape
```

Out[297]:
```
(1460, 76)
```

In [298]:
```
df.drop(['Id'],axis=1,inplace=True)
```

In [299]:
```
df.isnull().sum()
```

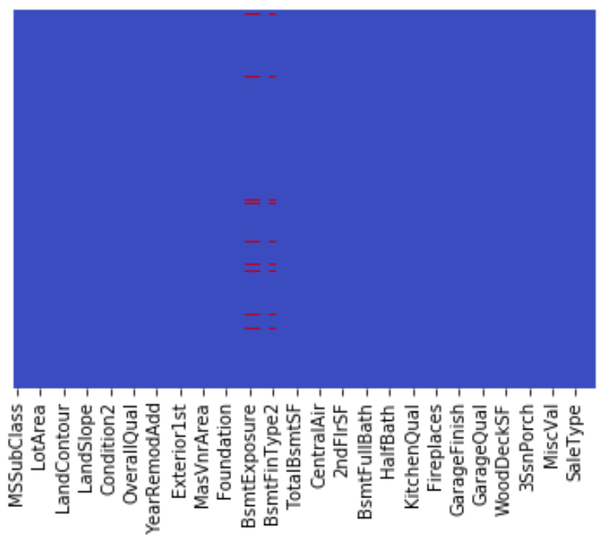
Out[299]:
```
MSSubClass       0
MSZoning         0
LotFrontage      0
LotArea          0
Street           0
LotShape         0
LandContour      0
Utilities        0
LotConfig        0
LandSlope        0
Neighborhood     0
Condition1       0
Condition2       0
BldgType         0
HouseStyle       0
OverallQual      0
OverallCond      0
YearBuilt        0
YearRemodAdd     0
RoofStyle        0
RoofMatl         0
Exterior1st      0
Exterior2nd      0
MasVnrType       8
MasVnrArea       8
ExterQual        0
ExterCond        0
Foundation       0
BsmtQual         0
BsmtCond         0
                ..
BsmtFullBath     0
BsmtHalfBath     0
FullBath         0
HalfBath         0
BedroomAbvGr     0
KitchenAbvGr     0
KitchenQual      0
```

```
TotRmsAbvGrd     0
Functional       0
Fireplaces       0
FireplaceQu      0
GarageType       0
GarageFinish     0
GarageCars       0
GarageArea       0
GarageQual       0
GarageCond       0
PavedDrive       0
WoodDeckSF       0
OpenPorchSF      0
EnclosedPorch    0
3SsnPorch        0
ScreenPorch      0
PoolArea         0
MiscVal          0
MoSold           0
YrSold           0
SaleType         0
SaleCondition    0
SalePrice        0
Length: 75, dtype: int64
```

In [300]:
```
df['MasVnrType']=df['MasVnrType'].fillna(df['MasVnrType'].mode()[0])
df['MasVnrArea']=df['MasVnrArea'].fillna(df['MasVnrArea'].mode()[0])
```

In [301]:
```
sns.heatmap(df.isnull(),yticklabels=False,cbar=False,cmap='coolwarm')
```

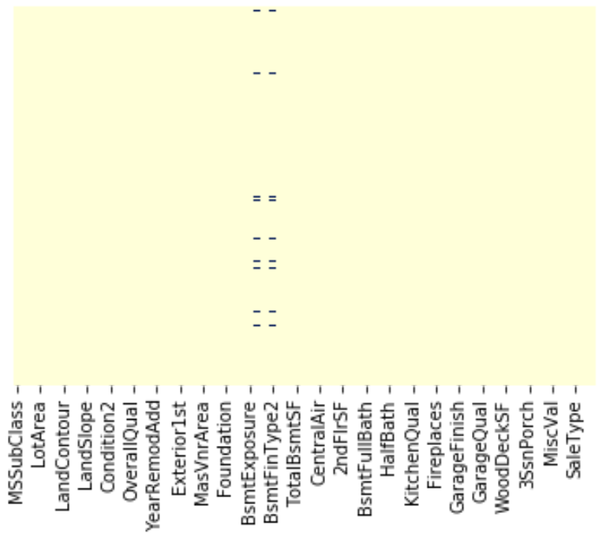
Out[301]: <matplotlib.axes._subplots.AxesSubplot at 0x19fc8780ef0>



In [302]:
```
df['BsmtExposure']=df['BsmtExposure'].fillna(df['BsmtExposure'].mode()[0])
```

In [303]:
```
sns.heatmap(df.isnull(),yticklabels=False,cbar=False,cmap='YlGnBu')
```

Out[303]: <matplotlib.axes._subplots.AxesSubplot at 0x19fc9271f28>



In [304]:
```
df['BsmtFinType2']=df['BsmtFinType2'].fillna(df['BsmtFinType2'].mode()[0])
```

In [305]:
```
df.dropna(inplace=True)
```

In [306]:
```
df.shape
```

Out[306]: (1422, 75)

In [192]:
```
df.head()
```

Out[192]:

	MSSubClass	MSZoning	LotFrontage	LotArea	Street	LotShape	LandContour	Utilities	LotConfig	LandSlope	...	EnclosedPorch	3SsnPorch	ScreenPor
0	60	RL	65.0	8450	Pave	Reg	Lvl	AllPub	Inside	Gtl	...	0	0	0
1	20	RL	80.0	9600	Pave	Reg	Lvl	AllPub	FR2	Gtl	...	0	0	0
2	60	RL	68.0	11250	Pave	IR1	Lvl	AllPub	Inside	Gtl	...	0	0	0
3	70	RL	60.0	9550	Pave	IR1	Lvl	AllPub	Corner	Gtl	...	272	0	0
4	60	RL	84.0	14260	Pave	IR1	Lvl	AllPub	FR2	Gtl	...	0	0	0

5 rows × 75 columns

In [ ]:
```
##HAndle Categorical Features
```

In [307]:
```
columns=['MSZoning','Street','LotShape','LandContour','Utilities','LotConfig','LandSlope','Neighborhood',
         'Condition2','BldgType','Condition1','HouseStyle','SaleType',
        'SaleCondition','ExterCond',
         'ExterQual','Foundation','BsmtQual','BsmtCond','BsmtExposure','BsmtFinType1','BsmtFinType2',
        'RoofStyle','RoofMatl','Exterior1st','Exterior2nd','MasVnrType','Heating','HeatingQC',
         'CentralAir',
         'Electrical','KitchenQual','Functional',
```

```
'FireplaceQu', 'GarageType', 'GarageFinish', 'GarageQual', 'GarageCond', 'PavedDrive']
```

In [308]:
```
len(columns)
```

Out[308]: 39

In [309]:
```
def category_onehot_multcols(multcolumns):
    df_final=final_df
    i=0
    for fields in multcolumns:

        print(fields)
        df1=pd.get_dummies(final_df[fields],drop_first=True)

        final_df.drop([fields],axis=1,inplace=True)
        if i==0:
            df_final=df1.copy()
        else:

            df_final=pd.concat([df_final,df1],axis=1)
        i=i+1


    df_final=pd.concat([final_df,df_final],axis=1)

    return df_final
```

In [310]:
```
main_df=df.copy()
```

In [311]:
```
## Combine Test Data

test_df=pd.read_csv('formulatedtest.csv')
```

In [312]:
```
test_df.shape
```

Out[312]: (1459, 74)

In [313]:
```
test_df.head()
```

Out[313]:

	MSSubClass	MSZoning	LotFrontage	LotArea	Street	LotShape	LandContour	Utilities	LotConfig	LandSlope	...	OpenPorchSF	EnclosedPorch	3SsnPo
0	20	RH	80.0	11622	Pave	Reg	Lvl	AllPub	Inside	Gtl	...	0	0	0
1	20	RL	81.0	14267	Pave	IR1	Lvl	AllPub	Corner	Gtl	...	36	0	0
2	60	RL	74.0	13830	Pave	IR1	Lvl	AllPub	Inside	Gtl	...	34	0	0
3	60	RL	78.0	9978	Pave	IR1	Lvl	AllPub	Inside	Gtl	...	36	0	0
4	120	RL	43.0	5005	Pave	IR1	HLS	AllPub	Inside	Gtl	...	82	0	0

5 rows × 74 columns

In [314]:
```
final_df=pd.concat([df,test_df],axis=0)
```

```
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\ipykernel_launcher.py:1: FutureWarning: Sorting becaus
e non-concatenation axis is not aligned. A future version
of pandas will change to not sort by default.

To accept the future behavior, pass 'sort=False'.

To retain the current behavior and silence the warning, pass 'sort=True'.

  """Entry point for launching an IPython kernel.
```

In [316]:
```
final_df['SalePrice']
```

Out[316]:
```
0       208500.0
1       181500.0
2       223500.0
3       140000.0
4       250000.0
5       143000.0
6       307000.0
7       200000.0
8       129900.0
9       118000.0
10      129500.0
11      345000.0
12      144000.0
13      279500.0
14      157000.0
15      132000.0
16      149000.0
18      159000.0
19      139000.0
20      325300.0
21      139400.0
22      230000.0
23      129900.0
24      154000.0
25      256300.0
26      134800.0
27      306000.0
28      207500.0
29       68500.0
30       40000.0
          ...
1429         NaN
1430         NaN
1431         NaN
1432         NaN
1433         NaN
1434         NaN
1435         NaN
1436         NaN
1437         NaN
1438         NaN
1439         NaN
1440         NaN
1441         NaN
1442         NaN
```

```
1443         NaN
1444         NaN
1445         NaN
1446         NaN
1447         NaN
1448         NaN
1449         NaN
1450         NaN
1451         NaN
1452         NaN
1453         NaN
1454         NaN
1455         NaN
1456         NaN
1457         NaN
1458         NaN
Name: SalePrice, Length: 2881, dtype: float64
```

In [317]:
```
final_df.shape
```

Out[317]: (2881, 75)

In [318]:
```
final_df=category_onehot_multcols(columns)
```

```
MSZoning
Street
LotShape
LandContour
Utilities
LotConfig
LandSlope
Neighborhood
Condition2
BldgType
Condition1
HouseStyle
SaleType
SaleCondition
ExterCond
ExterQual
Foundation
BsmtQual
BsmtCond
BsmtExposure
BsmtFinType1
BsmtFinType2
RoofStyle
RoofMatl
Exterior1st
Exterior2nd
MasVnrType
Heating
HeatingQC
CentralAir
Electrical
KitchenQual
```

```
Functional
FireplaceQu
GarageType
GarageFinish
GarageQual
GarageCond
PavedDrive
```

In [319]:
```
final_df.shape
```

Out[319]: (2881, 235)

In [320]:
```
final_df =final_df.loc[:,~final_df.columns.duplicated()]
```

In [321]:
```
final_df.shape
```

Out[321]: (2881, 175)

In [256]:
```
final_df
```

Out[256]:

	1stFlrSF	2ndFlrSF	3SsnPorch	BedroomAbvGr	BsmtFinSF1	BsmtFinSF2	BsmtFullBath	BsmtHalfBath	BsmtUnfSF	EnclosedPorch	...	Min1	Min2
0	856	854	0	3	706.0	0.0	1.0	0.0	150.0	0	...	0	0
1	1262	0	0	3	978.0	0.0	0.0	1.0	284.0	0	...	0	0
2	920	866	0	3	486.0	0.0	1.0	0.0	434.0	0	...	0	0
3	961	756	0	3	216.0	0.0	1.0	0.0	540.0	272	...	0	0
4	1145	1053	0	4	655.0	0.0	1.0	0.0	490.0	0	...	0	0
5	796	566	320	1	732.0	0.0	1.0	0.0	64.0	0	...	0	0
6	1694	0	0	3	1369.0	0.0	1.0	0.0	317.0	0	...	0	0
7	1107	983	0	3	859.0	32.0	1.0	0.0	216.0	228	...	0	0
8	1022	752	0	2	0.0	0.0	0.0	0.0	952.0	205	...	1	0
9	1077	0	0	2	851.0	0.0	1.0	0.0	140.0	0	...	0	0
10	1040	0	0	3	906.0	0.0	1.0	0.0	134.0	0	...	0	0
11	1182	1142	0	4	998.0	0.0	1.0	0.0	177.0	0	...	0	0
12	912	0	0	2	737.0	0.0	1.0	0.0	175.0	0	...	0	0
13	1494	0	0	3	0.0	0.0	0.0	0.0	1494.0	0	...	0	0
14	1253	0	0	2	733.0	0.0	1.0	0.0	520.0	176	...	0	0
15	854	0	0	2	0.0	0.0	0.0	0.0	832.0	0	...	0	0
16	1004	0	0	2	578.0	0.0	1.0	0.0	426.0	0	...	0	0
18	1114	0	0	3	646.0	0.0	1.0	0.0	468.0	0	...	0	0
19	1339	0	0	3	504.0	0.0	0.0	0.0	525.0	0	...	1	0
20	1158	1218	0	4	0.0	0.0	0.0	0.0	1158.0	0	...	0	0

21	1108	0	0	3	0.0	0.0	0.0	0.0	637.0	205	...	0	0	
22	1795	0	0	3	0.0	0.0	0.0	0.0	1777.0	0	...	0	0	
23	1060	0	0	3	840.0	0.0	1.0	0.0	200.0	0	...	0	0	
24	1060	0	0	3	188.0	668.0	1.0	0.0	204.0	0	...	0	0	
25	1600	0	0	3	0.0	0.0	0.0	0.0	1566.0	0	...	0	0	
26	900	0	0	3	234.0	486.0	0.0	1.0	180.0	0	...	0	0	
27	1704	0	0	3	1218.0	0.0	1.0	0.0	486.0	0	...	0	0	
28	1600	0	0	2	1277.0	0.0	1.0	0.0	207.0	0	...	0	0	
29	520	0	0	1	0.0	0.0	0.0	0.0	520.0	87	...	0	0	
30	649	668	0	3	0.0	0.0	0.0	0.0	649.0	172	...	0	0	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1429	641	0	0	2	0.0	0.0	0.0	0.0	641.0	70	...	0	0	
1430	967	671	0	4	0.0	0.0	0.0	0.0	967.0	0	...	0	0	
1431	729	0	0	2	0.0	0.0	0.0	0.0	0.0	23	...	0	0	
1432	1060	336	0	4	0.0	0.0	0.0	0.0	660.0	0	...	0	1	
1433	576	360	0	2	0.0	0.0	0.0	0.0	216.0	0	...	0	0	
1434	1778	0	0	2	1573.0	0.0	2.0	0.0	0.0	0	...	0	0	
1435	1646	0	0	2	1564.0	0.0	1.0	1.0	30.0	0	...	0	0	
1436	1625	0	0	3	776.0	0.0	0.0	1.0	849.0	0	...	0	0	
1437	1664	0	0	4	0.0	0.0	0.0	0.0	1664.0	0	...	0	0	
1438	1491	0	0	3	0.0	0.0	0.0	0.0	1491.0	0	...	0	0	
1439	1210	0	0	3	576.0	0.0	1.0	0.0	552.0	0	...	0	0	
1440	1650	0	0	2	909.0	0.0	1.0	0.0	723.0	0	...	0	0	
1441	1403	0	0	2	1136.0	116.0	1.0	0.0	129.0	0	...	0	0	
1442	1960	0	0	3	1350.0	0.0	1.0	0.0	378.0	0	...	0	0	
1443	1838	0	0	3	1455.0	0.0	1.0	0.0	383.0	0	...	0	0	
1444	1600	0	0	3	0.0	0.0	0.0	0.0	0.0	135	...	0	0	
1445	1368	0	0	2	1243.0	0.0	2.0	0.0	45.0	0	...	0	0	
1446	616	688	0	3	0.0	0.0	0.0	0.0	264.0	0	...	0	0	
1447	874	0	0	3	441.0	0.0	1.0	0.0	423.0	0	...	0	0	
1448	1652	0	0	4	149.0	0.0	0.0	0.0	1503.0	0	...	0	0	
1449	630	0	0	1	522.0	0.0	1.0	0.0	108.0	0	...	0	0	
1450	546	546	0	3	252.0	0.0	0.0	0.0	294.0	0	...	0	0	

1451	1360	0	0	3	119.0	344.0	1.0	0.0	641.0	0	...	0	0
1452	546	546	0	3	408.0	0.0	0.0	0.0	138.0	0	...	0	0
1453	546	546	0	3	0.0	0.0	0.0	0.0	546.0	0	...	0	0
1454	546	546	0	3	0.0	0.0	0.0	0.0	546.0	0	...	0	0
1455	546	546	0	3	252.0	0.0	0.0	0.0	294.0	0	...	0	0
1456	1224	0	0	4	1224.0	0.0	1.0	0.0	0.0	0	...	0	0
1457	970	0	0	3	337.0	0.0	0.0	1.0	575.0	0	...	0	0
1458	996	1004	0	3	758.0	0.0	0.0	0.0	238.0	0	...	0	0

2881 rows × 175 columns

In [322]:
```
df_Train=final_df.iloc[:1422,:]
df_Test=final_df.iloc[1422:,:]
```

In [324]:
```
df_Train.head()
```

Out[324]:

	1stFlrSF	2ndFlrSF	3SsnPorch	BedroomAbvGr	BsmtFinSF1	BsmtFinSF2	BsmtFullBath	BsmtHalfBath	BsmtUnfSF	EnclosedPorch	...	Min1	Min2	Typ
0	856	854	0	3	706.0	0.0	1.0	0.0	150.0	0	...	0	0	1
1	1262	0	0	3	978.0	0.0	0.0	1.0	284.0	0	...	0	0	1
2	920	866	0	3	486.0	0.0	1.0	0.0	434.0	0	...	0	0	1
3	961	756	0	3	216.0	0.0	1.0	0.0	540.0	272	...	0	0	1
4	1145	1053	0	4	655.0	0.0	1.0	0.0	490.0	0	...	0	0	1

5 rows × 175 columns

In [325]:
```
df_Test.head()
```

Out[325]:

	1stFlrSF	2ndFlrSF	3SsnPorch	BedroomAbvGr	BsmtFinSF1	BsmtFinSF2	BsmtFullBath	BsmtHalfBath	BsmtUnfSF	EnclosedPorch	...	Min1	Min2	Typ
0	896	0	0	2	468.0	144.0	0.0	0.0	270.0	0	...	0	0	1
1	1329	0	0	3	923.0	0.0	0.0	0.0	406.0	0	...	0	0	1
2	928	701	0	3	791.0	0.0	0.0	0.0	137.0	0	...	0	0	1
3	926	678	0	3	602.0	0.0	0.0	0.0	324.0	0	...	0	0	1
4	1280	0	0	2	263.0	0.0	0.0	0.0	1017.0	0	...	0	0	1

5 rows × 175 columns

In [327]:
```
df_Train.shape
```

Out[327]: (1422, 175)

In [326]:
```
df_Test.drop(['SalePrice'],axis=1,inplace=True)
```

In [328]:
```
X_train=df_Train.drop(['SalePrice'],axis=1)
y_train=df_Train['SalePrice']
```

Prediciton and selecting the Algorithm

In [329]:
```
import xgboost
classifier=xgboost.XGBRegressor()
```

In [147]:
```
import xgboost
regressor=xgboost.XGBRegressor()
```

In [260]:
```
booster=['gbtree','gblinear']
base_score=[0.25,0.5,0.75,1]
```

In [261]:
```
## Hyper Parameter Optimization


n_estimators = [100, 500, 900, 1100, 1500]
max_depth = [2, 3, 5, 10, 15]
booster=['gbtree','gblinear']
learning_rate=[0.05,0.1,0.15,0.20]
min_child_weight=[1,2,3,4]

# Define the grid of hyperparameters to search
hyperparameter_grid = {
    'n_estimators': n_estimators,
    'max_depth':max_depth,
    'learning_rate':learning_rate,
    'min_child_weight':min_child_weight,
    'booster':booster,
    'base_score':base_score
    }
```

In [262]:
```
# Set up the random search with 4-fold cross validation
random_cv = RandomizedSearchCV(estimator=regressor,
            param_distributions=hyperparameter_grid,
            cv=5, n_iter=50,
            scoring = 'neg_mean_absolute_error',n_jobs = 4,
            verbose = 5,
            return_train_score = True,
            random_state=42)
```

In [263]:
```
random_cv.fit(X_train,y_train)
```

```
Fitting 5 folds for each of 50 candidates, totalling 250 fits
[Parallel(n_jobs=4)]: Using backend LokyBackend with 4 concurrent workers.
[Parallel(n_jobs=4)]: Done  10 tasks      | elapsed:   17.4s
[Parallel(n_jobs=4)]: Done  64 tasks      | elapsed:  2.6min
[Parallel(n_jobs=4)]: Done 154 tasks      | elapsed:  5.3min
```

```
[Parallel(n_jobs=4)]: Done 250 out of 250 | elapsed:  7.9min finished
```

Out[263]:
```
RandomizedSearchCV(cv=5, error_score='raise-deprecating',
          estimator=XGBRegressor(base_score=0.5, booster='gbtree', colsample_bylevel=1,
       colsample_bytree=1, gamma=0, learning_rate=0.05, max_delta_step=0,
       max_depth=3, min_child_weight=1, missing=None, n_estimators=900,
       n_jobs=1, nthread=None, objective='reg:linear', random_state=0,
       reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
       silent=True, subsample=1),
          fit_params=None, iid='warn', n_iter=50, n_jobs=4,
          param_distributions={'n_estimators': [100, 500, 900, 1100, 1500], 'max_depth': [2, 3, 5, 10, 15], 'learning_rate': [0.05, 0.1,
0.15, 0.2], 'min_child_weight': [1, 2, 3, 4], 'booster': ['gbtree', 'gblinear'], 'base_score': [0.25, 0.5, 0.75, 1]},
          pre_dispatch='2*n_jobs', random_state=42, refit=True,
          return_train_score=True, scoring='neg_mean_absolute_error',
          verbose=5)
```

In [264]:
```
random_cv.best_estimator_
```

Out[264]:
```
XGBRegressor(base_score=0.25, booster='gbtree', colsample_bylevel=1,
       colsample_bytree=1, gamma=0, learning_rate=0.1, max_delta_step=0,
       max_depth=2, min_child_weight=1, missing=None, n_estimators=900,
       n_jobs=1, nthread=None, objective='reg:linear', random_state=0,
       reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
       silent=True, subsample=1)
```

In [99]:
```
random_cv.best_estimator_
```

Out[99]:
```
XGBRegressor(base_score=0.5, booster='gbtree', colsample_bylevel=1,
       colsample_bytree=1, gamma=0, learning_rate=0.05, max_delta_step=0,
       max_depth=3, min_child_weight=1, missing=None, n_estimators=900,
       n_jobs=1, nthread=None, objective='reg:linear', random_state=0,
       reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
       silent=True, subsample=1)
```

In [353]:
```
regressor=xgboost.XGBRegressor(base_score=0.25, booster='gbtree', colsample_bylevel=1,
       colsample_bytree=1, gamma=0, learning_rate=0.1, max_delta_step=0,
       max_depth=2, min_child_weight=1, missing=None, n_estimators=900,
       n_jobs=1, nthread=None, objective='reg:linear', random_state=0,
       reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
       silent=True, subsample=1)
```

In [354]:
```
regressor.fit(X_train,y_train)
```

Out[354]:
```
XGBRegressor(base_score=0.25, booster='gbtree', colsample_bylevel=1,
       colsample_bytree=1, gamma=0, learning_rate=0.1, max_delta_step=0,
       max_depth=2, min_child_weight=1, missing=None, n_estimators=900,
       n_jobs=1, nthread=None, objective='reg:linear', random_state=0,
       reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
       silent=True, subsample=1)
```

In [224]:
```
import pickle
filename = 'finalized_model.pkl'
pickle.dump(classifier, open(filename, 'wb'))
```

In [280]:
```
df_Test.drop(['SalePrice'],axis=1,inplace=True)
```

```
C:\Users\krish_naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\pandas\core\frame.py:3697: SettingWithCopyWarning:
```

```
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\pandas\core\frame.py:3697: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy
  errors=errors)
```

In [282]:
```
df_Test.shape
```

Out[282]:
```
(1459, 174)
```

In [347]:
```
df_Test.head()
```

Out[347]:

	1stFlrSF	2ndFlrSF	3SsnPorch	BedroomAbvGr	BsmtFinSF1	BsmtFinSF2	BsmtFullBath	BsmtHalfBath	BsmtUnfSF	EnclosedPorch	...	Min2	Typ	Attch
0	896	0	0	2	468.0	144.0	0.0	0.0	270.0	0	...	0	1	1
1	1329	0	0	3	923.0	0.0	0.0	0.0	406.0	0	...	0	1	1
2	928	701	0	3	791.0	0.0	0.0	0.0	137.0	0	...	0	1	1
3	926	678	0	3	602.0	0.0	0.0	0.0	324.0	0	...	0	1	1
4	1280	0	0	2	263.0	0.0	0.0	0.0	1017.0	0	...	0	1	1

5 rows × 175 columns

In [349]:
```
df_Test.drop(['SalePrice'],axis=1).head()
```

Out[349]:

	1stFlrSF	2ndFlrSF	3SsnPorch	BedroomAbvGr	BsmtFinSF1	BsmtFinSF2	BsmtFullBath	BsmtHalfBath	BsmtUnfSF	EnclosedPorch	...	Min1	Min2	Typ
0	896	0	0	2	468.0	144.0	0.0	0.0	270.0	0	...	0	0	1
1	1329	0	0	3	923.0	0.0	0.0	0.0	406.0	0	...	0	0	1
2	928	701	0	3	791.0	0.0	0.0	0.0	137.0	0	...	0	0	1
3	926	678	0	3	602.0	0.0	0.0	0.0	324.0	0	...	0	0	1
4	1280	0	0	2	263.0	0.0	0.0	0.0	1017.0	0	...	0	0	1

5 rows × 174 columns

In [355]:
```
y_pred=regressor.predict(df_Test.drop(['SalePrice'],axis=1))
```

In [356]:
```
y_pred
```

Out[356]:
```
array([119179.125, 158328.88 , 183704.81 , ..., 165757.22 , 118693.11 ,
       230294.19 ], dtype=float32)
```

In [391]:
```
##Create Sample Submission file and Submit using ANN
pred=pd.DataFrame(ann_pred)
sub_df=pd.read_csv('sample_submission.csv')
datasets=pd.concat([sub_df['Id'],pred],axis=1)
datasets.columns=['Id','SalePrice']
datasets.to_csv('sample_submission.csv',index=False)
```

Step2

In [335]:
```
pred.columns=['SalePrice']
```

In [336]:
```
temp_df=df_Train['SalePrice'].copy()
```

In [337]:
```
temp_df.column=['SalePrice']
```

In [338]:
```
df_Train.drop(['SalePrice'],axis=1,inplace=True)
```

In [339]:
```
df_Train=pd.concat([df_Train,temp_df],axis=1)
```

In [253]:
```
df_Test.head()
```

Out[253]:

	1stFlrSF	2ndFlrSF	3SsnPorch	BedroomAbvGr	BsmtFinSF1	BsmtFinSF2	BsmtFullBath	BsmtHalfBath	BsmtUnfSF	EnclosedPorch	...	Min2	Typ	Attch
0	896	0	0	2	468.0	144.0	0.0	0.0	270.0	0	...	0	1	1
1	1329	0	0	3	923.0	0.0	0.0	0.0	406.0	0	...	0	1	1
2	928	701	0	3	791.0	0.0	0.0	0.0	137.0	0	...	0	1	1
3	926	678	0	3	602.0	0.0	0.0	0.0	324.0	0	...	0	1	1
4	1280	0	0	2	263.0	0.0	0.0	0.0	1017.0	0	...	0	1	1

5 rows × 175 columns

In [340]:
```
df_Test=pd.concat([df_Test,pred],axis=1)
```

In [276]:
```

```

Out[276]: (5, 175)

In [341]:
```
df_Train=pd.concat([df_Train,df_Test],axis=0)
```

In [343]:
```
df_Train.shape
```

Out[343]: (2881, 175)

In [345]:
```
X_train=df_Train.drop(['SalePrice'],axis=1)
y_train=df_Train['SalePrice']
```

Artificial Neural Network Implementation

In [389]:
```
# Importing the Keras libraries and packages
import keras
from keras.models import Sequential
from keras.layers import Dense
```

```
from keras.layers import LeakyReLU,PReLU,ELU
from keras.layers import Dropout


# Initialising the ANN
classifier = Sequential()

# Adding the input layer and the first hidden layer
classifier.add(Dense(output_dim = 50, init = 'he_uniform',activation='relu',input_dim = 174))

# Adding the second hidden layer
classifier.add(Dense(output_dim = 25, init = 'he_uniform',activation='relu'))

# Adding the third hidden layer
classifier.add(Dense(output_dim = 50, init = 'he_uniform',activation='relu'))
# Adding the output layer
classifier.add(Dense(output_dim = 1, init = 'he_uniform'))

# Compiling the ANN
classifier.compile(loss=root_mean_squared_error, optimizer='Adamax')

# Fitting the ANN to the Training set
model_history=classifier.fit(X_train.values, y_train.values,validation_split=0.20, batch_size = 10, nb_epoch = 1000)
```

```
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\ipykernel_launcher.py:13: UserWarning: Update your `De
nse` call to the Keras 2 API: `Dense(activation="relu", input_dim=174, units=50, kernel_initializer="he_uniform")`
  del sys.path[0]
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\ipykernel_launcher.py:16: UserWarning: Update your `De
nse` call to the Keras 2 API: `Dense(activation="relu", units=25, kernel_initializer="he_uniform")`
  app.launch_new_instance()
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\ipykernel_launcher.py:19: UserWarning: Update your `De
nse` call to the Keras 2 API: `Dense(activation="relu", units=50, kernel_initializer="he_uniform")`
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\ipykernel_launcher.py:21: UserWarning: Update your `De
nse` call to the Keras 2 API: `Dense(units=1, kernel_initializer="he_uniform")`
C:\Users\krish.naik\AppData\Local\Continuum\anaconda3\envs\myenv\lib\site-packages\ipykernel_launcher.py:27: UserWarning: The `nb_epoch`
argument in `fit` has been renamed `epochs`.
```

```
Train on 2304 samples, validate on 577 samples
Epoch 1/1000
2304/2304 [==============================] - 2s 1ms/step - loss: 113530.5093 - val_loss: 56624.8765
Epoch 2/1000
2304/2304 [==============================] - 1s 447us/step - loss: 62615.1298 - val_loss: 50444.1900
Epoch 3/1000
2304/2304 [==============================] - 1s 464us/step - loss: 56279.5739 - val_loss: 44504.8296
Epoch 4/1000
2304/2304 [==============================] - 1s 455us/step - loss: 50261.0310 - val_loss: 39335.5723
Epoch 5/1000
2304/2304 [==============================] - 1s 440us/step - loss: 44449.5163 - val_loss: 35396.5539
Epoch 6/1000
2304/2304 [==============================] - 1s 461us/step - loss: 40090.4315 - val_loss: 35178.2237
Epoch 7/1000
2304/2304 [==============================] - 1s 461us/step - loss: 37493.4126 - val_loss: 31983.3301
Epoch 8/1000
2304/2304 [==============================] - 1s 433us/step - loss: 36462.1401 - val_loss: 34241.1639
Epoch 9/1000
2304/2304 [==============================] - 1s 451us/step - loss: 35635.4539 - val_loss: 32087.6040
Epoch 10/1000
```

```
2304/2304 [==============================] - 1s 442us/step - loss: 35851.5885 - val_loss: 32125.1113
Epoch 11/1000
2304/2304 [==============================] - 1s 463us/step - loss: 35622.6530 - val_loss: 31914.6602
Epoch 12/1000
2304/2304 [==============================] - 1s 445us/step - loss: 35187.7144 - val_loss: 31882.3983
Epoch 13/1000
2304/2304 [==============================] - 1s 427us/step - loss: 35196.1213 - val_loss: 32342.4395
Epoch 14/1000
2304/2304 [==============================] - 1s 424us/step - loss: 34929.6660 - val_loss: 31565.0875
Epoch 15/1000
2304/2304 [==============================] - 1s 429us/step - loss: 34672.9052 - val_loss: 32177.3833
Epoch 16/1000
2304/2304 [==============================] - 1s 439us/step - loss: 34501.2563 - val_loss: 31293.5959
Epoch 17/1000
2304/2304 [==============================] - 1s 459us/step - loss: 34804.2316 - val_loss: 31182.3204
Epoch 18/1000
2304/2304 [==============================] - 2s 778us/step - loss: 34455.4584 - val_loss: 31376.9020
Epoch 19/1000
2304/2304 [==============================] - 1s 467us/step - loss: 34377.8071 - val_loss: 31301.4047
Epoch 20/1000
2304/2304 [==============================] - 1s 477us/step - loss: 34164.2543 - val_loss: 31142.9020
Epoch 21/1000
2304/2304 [==============================] - 1s 469us/step - loss: 34009.0316 - val_loss: 31243.3016
Epoch 22/1000
2304/2304 [==============================] - 1s 422us/step - loss: 33660.4401 - val_loss: 31494.8445
Epoch 23/1000
2304/2304 [==============================] - 1s 413us/step - loss: 33812.4372 - val_loss: 31299.1932
Epoch 24/1000
2304/2304 [==============================] - 1s 419us/step - loss: 33589.9288 - val_loss: 31848.2731
Epoch 25/1000
2304/2304 [==============================] - 1s 432us/step - loss: 33607.1809 - val_loss: 30390.6748
Epoch 26/1000
2304/2304 [==============================] - 1s 426us/step - loss: 33473.9579 - val_loss: 30910.1593
Epoch 27/1000
2304/2304 [==============================] - 1s 433us/step - loss: 33236.2349 - val_loss: 30219.5441
Epoch 28/1000
2304/2304 [==============================] - 1s 420us/step - loss: 33243.2710 - val_loss: 30179.0993
Epoch 29/1000
2304/2304 [==============================] - 1s 430us/step - loss: 32929.2295 - val_loss: 30128.3545
Epoch 30/1000
2304/2304 [==============================] - 1s 420us/step - loss: 32963.0511 - val_loss: 30510.0357
Epoch 31/1000
2304/2304 [==============================] - 1s 418us/step - loss: 32787.1626 - val_loss: 29853.5188
Epoch 32/1000
2304/2304 [==============================] - 1s 427us/step - loss: 32766.8486 - val_loss: 30704.6890
Epoch 33/1000
2304/2304 [==============================] - 1s 425us/step - loss: 32790.5330 - val_loss: 30381.5674
Epoch 34/1000
2304/2304 [==============================] - 1s 436us/step - loss: 32740.6885 - val_loss: 29614.6660
Epoch 35/1000
2304/2304 [==============================] - 1s 420us/step - loss: 32658.3221 - val_loss: 30323.1913
Epoch 36/1000
2304/2304 [==============================] - 1s 416us/step - loss: 32570.0888 - val_loss: 30407.4534
Epoch 37/1000
2304/2304 [==============================] - 1s 423us/step - loss: 32189.7531 - val_loss: 30379.3509
Epoch 38/1000
2304/2304 [==============================] - 1s 432us/step - loss: 32140.4911 - val_loss: 29347.5356
```

```
2304/2304 [==============================] - 1s 432us/step - loss: 32140.4911 - val_loss: 29547.5356
Epoch 39/1000
2304/2304 [==============================] - 1s 427us/step - loss: 31913.3835 - val_loss: 29861.8741
Epoch 40/1000
2304/2304 [==============================] - 1s 421us/step - loss: 32135.0634 - val_loss: 29108.2475
Epoch 41/1000
2304/2304 [==============================] - 1s 423us/step - loss: 32026.9856 - val_loss: 29142.3169
Epoch 42/1000
2304/2304 [==============================] - 1s 425us/step - loss: 31792.7488 - val_loss: 29323.2182
Epoch 43/1000
2304/2304 [==============================] - 1s 422us/step - loss: 31622.7127 - val_loss: 29028.4757
Epoch 44/1000
2304/2304 [==============================] - 1s 426us/step - loss: 31769.7568 - val_loss: 29493.1864
Epoch 45/1000
2304/2304 [==============================] - 1s 433us/step - loss: 31732.7656 - val_loss: 29812.4935
Epoch 46/1000
2304/2304 [==============================] - 1s 416us/step - loss: 31434.8387 - val_loss: 28903.6488
Epoch 47/1000
2304/2304 [==============================] - 1s 414us/step - loss: 31234.3539 - val_loss: 28895.0965
Epoch 48/1000
2304/2304 [==============================] - 1s 448us/step - loss: 31151.4855 - val_loss: 28861.3638
Epoch 49/1000
2304/2304 [==============================] - 1s 444us/step - loss: 31274.5573 - val_loss: 29427.3137
Epoch 50/1000
2304/2304 [==============================] - 1s 436us/step - loss: 31510.8220 - val_loss: 28567.3384
Epoch 51/1000
2304/2304 [==============================] - 1s 423us/step - loss: 31460.1977 - val_loss: 28814.4977
Epoch 52/1000
2304/2304 [==============================] - 1s 415us/step - loss: 31085.8429 - val_loss: 28524.2395
Epoch 53/1000
2304/2304 [==============================] - 1s 426us/step - loss: 30989.9977 - val_loss: 28568.5788
Epoch 54/1000
2304/2304 [==============================] - 1s 438us/step - loss: 31092.4584 - val_loss: 28378.7455
Epoch 55/1000
2304/2304 [==============================] - 1s 433us/step - loss: 30932.9268 - val_loss: 30094.5473
Epoch 56/1000
2304/2304 [==============================] - 1s 430us/step - loss: 30684.4676 - val_loss: 28414.4087
Epoch 57/1000
2304/2304 [==============================] - 1s 422us/step - loss: 30493.6564 - val_loss: 29508.0253
Epoch 58/1000
2304/2304 [==============================] - 1s 429us/step - loss: 30652.6024 - val_loss: 28326.5143
Epoch 59/1000
2304/2304 [==============================] - 1s 426us/step - loss: 30778.1669 - val_loss: 28056.4234
Epoch 60/1000
2304/2304 [==============================] - 1s 424us/step - loss: 30424.7307 - val_loss: 28010.0378
Epoch 61/1000
2304/2304 [==============================] - 1s 425us/step - loss: 30072.8579 - val_loss: 28027.6187
Epoch 62/1000
2304/2304 [==============================] - 1s 437us/step - loss: 30334.3219 - val_loss: 28459.9857
Epoch 63/1000
2304/2304 [==============================] - 1s 437us/step - loss: 30427.8750 - val_loss: 29863.5684
Epoch 64/1000
2304/2304 [==============================] - 1s 430us/step - loss: 30285.2018 - val_loss: 28957.1549
Epoch 65/1000
2304/2304 [==============================] - 1s 417us/step - loss: 30310.4877 - val_loss: 28183.0357
Epoch 66/1000
2304/2304 [==============================] - 1s 405us/step - loss: 30276.2501 - val_loss: 27665.3018
```

```
Epoch 67/1000
2304/2304 [==============================] - 1s 442us/step - loss: 29832.1718 - val_loss: 27712.5372
Epoch 68/1000
2304/2304 [==============================] - 1s 438us/step - loss: 30272.4041 - val_loss: 27718.7824
Epoch 69/1000
2304/2304 [==============================] - 1s 445us/step - loss: 30113.7119 - val_loss: 28000.3839
Epoch 70/1000
2304/2304 [==============================] - 1s 442us/step - loss: 29942.6214 - val_loss: 27786.2428
Epoch 71/1000
2304/2304 [==============================] - 1s 449us/step - loss: 29859.0674 - val_loss: 27215.5401
Epoch 72/1000
2304/2304 [==============================] - 1s 471us/step - loss: 29209.5491 - val_loss: 27173.5760
Epoch 73/1000
2304/2304 [==============================] - 1s 457us/step - loss: 29919.4843 - val_loss: 27220.3691
Epoch 74/1000
2304/2304 [==============================] - 1s 450us/step - loss: 29509.6134 - val_loss: 27340.0882
Epoch 75/1000
2304/2304 [==============================] - 1s 434us/step - loss: 29708.4845 - val_loss: 27312.6990
Epoch 76/1000
2304/2304 [==============================] - 1s 473us/step - loss: 29519.9725 - val_loss: 27508.6494
Epoch 77/1000
2304/2304 [==============================] - 1s 471us/step - loss: 29357.4566 - val_loss: 26867.6287
Epoch 78/1000
2304/2304 [==============================] - 1s 461us/step - loss: 29159.6736 - val_loss: 26893.8640
Epoch 79/1000
2304/2304 [==============================] - 1s 452us/step - loss: 29366.9112 - val_loss: 26603.1912
Epoch 80/1000
2304/2304 [==============================] - 1s 451us/step - loss: 29120.4931 - val_loss: 26661.9235
Epoch 81/1000
2304/2304 [==============================] - 1s 466us/step - loss: 28946.7935 - val_loss: 27871.8099
Epoch 82/1000
2304/2304 [==============================] - 1s 453us/step - loss: 29138.3855 - val_loss: 26531.3914
Epoch 83/1000
2304/2304 [==============================] - 1s 446us/step - loss: 28846.1910 - val_loss: 28481.5947
Epoch 84/1000
2304/2304 [==============================] - 1s 461us/step - loss: 29017.1691 - val_loss: 26508.0993
Epoch 85/1000
2304/2304 [==============================] - 1s 458us/step - loss: 28775.6919 - val_loss: 26779.5843
Epoch 86/1000
2304/2304 [==============================] - 1s 459us/step - loss: 29089.2547 - val_loss: 27172.3217
Epoch 87/1000
2304/2304 [==============================] - 1s 471us/step - loss: 28686.1871 - val_loss: 26091.4350
Epoch 88/1000
2304/2304 [==============================] - 1s 461us/step - loss: 28698.4660 - val_loss: 26102.4028
Epoch 89/1000
2304/2304 [==============================] - 1s 447us/step - loss: 28699.3697 - val_loss: 26289.4353
Epoch 90/1000
2304/2304 [==============================] - 1s 448us/step - loss: 28489.5871 - val_loss: 27897.5505
Epoch 91/1000
2304/2304 [==============================] - 1s 467us/step - loss: 28665.1914 - val_loss: 25854.9589
Epoch 92/1000
2304/2304 [==============================] - 1s 465us/step - loss: 28285.7090 - val_loss: 25977.9663
Epoch 93/1000
2304/2304 [==============================] - 1s 462us/step - loss: 28285.7983 - val_loss: 25438.4628
Epoch 94/1000
2304/2304 [==============================] - 1s 461us/step - loss: 28321.3720 - val_loss: 25585.6818
Epoch 95/1000
```

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Epoch 95/1000
2304/2304 [==============================] - 1s 442us/step - loss: 28190.3902 - val_loss: 25334.2817
Epoch 96/1000
2304/2304 [==============================] - 1s 449us/step - loss: 28360.6425 - val_loss: 25095.3392
Epoch 97/1000
2304/2304 [==============================] - 1s 468us/step - loss: 28196.4608 - val_loss: 24977.6499
Epoch 98/1000
2304/2304 [==============================] - 1s 460us/step - loss: 28143.1103 - val_loss: 24957.5144
Epoch 99/1000
2304/2304 [==============================] - ETA: 0s - loss: 28541.725 - 1s 465us/step - loss: 28404.1788 - val_loss: 25377.6330
Epoch 100/1000
2304/2304 [==============================] - 1s 439us/step - loss: 27923.1122 - val_loss: 25035.9833
Epoch 101/1000
2304/2304 [==============================] - 1s 445us/step - loss: 28224.6294 - val_loss: 24864.9644
Epoch 102/1000
2304/2304 [==============================] - 1s 450us/step - loss: 27838.1132 - val_loss: 26435.8536
Epoch 103/1000
2304/2304 [==============================] - 1s 457us/step - loss: 27936.2079 - val_loss: 24885.9012
Epoch 104/1000
2304/2304 [==============================] - ETA: 0s - loss: 27583.212 - 1s 450us/step - loss: 27619.0787 - val_loss: 24613.4044
Epoch 105/1000
2304/2304 [==============================] - 1s 448us/step - loss: 27628.1560 - val_loss: 24228.4823
Epoch 106/1000
2304/2304 [==============================] - 1s 463us/step - loss: 27878.6943 - val_loss: 24845.3175
Epoch 107/1000
2304/2304 [==============================] - 1s 465us/step - loss: 27493.7438 - val_loss: 24612.2324
Epoch 108/1000
2304/2304 [==============================] - 1s 449us/step - loss: 27134.2120 - val_loss: 25914.3079
Epoch 109/1000
2304/2304 [==============================] - 1s 438us/step - loss: 27448.0619 - val_loss: 23640.7174
Epoch 110/1000
2304/2304 [==============================] - 1s 442us/step - loss: 27225.6602 - val_loss: 24300.4790
Epoch 111/1000
2304/2304 [==============================] - 1s 452us/step - loss: 27457.5783 - val_loss: 23591.0836
Epoch 112/1000
2304/2304 [==============================] - 1s 450us/step - loss: 27562.5854 - val_loss: 23601.4916
Epoch 113/1000
2304/2304 [==============================] - 1s 442us/step - loss: 26970.8130 - val_loss: 23496.5879
Epoch 114/1000
2304/2304 [==============================] - 1s 456us/step - loss: 27141.8372 - val_loss: 24716.6597
Epoch 115/1000
2304/2304 [==============================] - 1s 443us/step - loss: 26687.5030 - val_loss: 25936.5065
Epoch 116/1000
2304/2304 [==============================] - 1s 458us/step - loss: 26811.0217 - val_loss: 23067.7963
Epoch 117/1000
2304/2304 [==============================] - 1s 445us/step - loss: 26862.9685 - val_loss: 23789.6916
Epoch 118/1000
2304/2304 [==============================] - 1s 459us/step - loss: 26478.2679 - val_loss: 24595.6749
Epoch 119/1000
2304/2304 [==============================] - 1s 464us/step - loss: 26766.5188 - val_loss: 23377.8840
Epoch 120/1000
2304/2304 [==============================] - 1s 461us/step - loss: 26545.6570 - val_loss: 22453.2940
Epoch 121/1000
2304/2304 [==============================] - 1s 467us/step - loss: 26442.3213 - val_loss: 22567.1628
Epoch 122/1000
2304/2304 [==============================] - 1s 465us/step - loss: 26011.6722 - val_loss: 24087.4123
Epoch 123/1000
```

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2304/2304 [==============================] - 1s 451us/step - loss: 26506.6031 - val_loss: 22453.8540
Epoch 124/1000
2304/2304 [==============================] - 1s 454us/step - loss: 26042.1024 - val_loss: 22348.5490
Epoch 125/1000
2304/2304 [==============================] - 1s 466us/step - loss: 26685.7815 - val_loss: 21968.0753
Epoch 126/1000
2304/2304 [==============================] - 1s 454us/step - loss: 25654.7254 - val_loss: 22398.2175
Epoch 127/1000
2304/2304 [==============================] - 1s 468us/step - loss: 25909.7507 - val_loss: 21961.1548
Epoch 128/1000
2304/2304 [==============================] - 1s 480us/step - loss: 25938.8809 - val_loss: 21437.6150
Epoch 129/1000
2304/2304 [==============================] - 1s 476us/step - loss: 25268.5747 - val_loss: 21907.7049
Epoch 130/1000
2304/2304 [==============================] - 1s 470us/step - loss: 25609.2470 - val_loss: 21246.5780
Epoch 131/1000
2304/2304 [==============================] - 1s 465us/step - loss: 25023.4624 - val_loss: 24637.6923
Epoch 132/1000
2304/2304 [==============================] - 1s 520us/step - loss: 25366.8912 - val_loss: 21211.1705
Epoch 133/1000
2304/2304 [==============================] - 1s 479us/step - loss: 25424.9557 - val_loss: 21021.8191
Epoch 134/1000
2304/2304 [==============================] - 1s 464us/step - loss: 25343.5929 - val_loss: 21586.6650
Epoch 135/1000
2304/2304 [==============================] - 1s 462us/step - loss: 24995.2175 - val_loss: 21105.6569
Epoch 136/1000
2304/2304 [==============================] - 1s 465us/step - loss: 24986.7363 - val_loss: 20605.5033
Epoch 137/1000
2304/2304 [==============================] - 1s 449us/step - loss: 25225.4030 - val_loss: 20552.5941
Epoch 138/1000
2304/2304 [==============================] - 1s 452us/step - loss: 25014.9195 - val_loss: 21813.1205
Epoch 139/1000
2304/2304 [==============================] - 1s 452us/step - loss: 24983.0982 - val_loss: 20684.3204
Epoch 140/1000
2304/2304 [==============================] - 1s 464us/step - loss: 24864.2334 - val_loss: 20245.8430
Epoch 141/1000
2304/2304 [==============================] - 1s 466us/step - loss: 24915.6213 - val_loss: 19954.3808
Epoch 142/1000
2304/2304 [==============================] - 1s 451us/step - loss: 24832.0423 - val_loss: 22799.6597
Epoch 143/1000
2304/2304 [==============================] - 1s 434us/step - loss: 24758.2035 - val_loss: 20148.5544
Epoch 144/1000
2304/2304 [==============================] - 1s 461us/step - loss: 24726.4656 - val_loss: 19816.7254
Epoch 145/1000
2304/2304 [==============================] - 1s 449us/step - loss: 24342.4105 - val_loss: 21506.8392
Epoch 146/1000
2304/2304 [==============================] - 1s 494us/step - loss: 24704.4509 - val_loss: 19672.9874
Epoch 147/1000
2304/2304 [==============================] - 1s 483us/step - loss: 24873.8309 - val_loss: 19765.3019
Epoch 148/1000
2304/2304 [==============================] - 1s 442us/step - loss: 24126.7666 - val_loss: 21504.0878
Epoch 149/1000
2304/2304 [==============================] - 1s 449us/step - loss: 24424.1095 - val_loss: 21462.0763
Epoch 150/1000
2304/2304 [==============================] - 1s 450us/step - loss: 24470.7238 - val_loss: 19617.8413
Epoch 151/1000
```

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2304/2304 [==============================] - 1s 468us/step - loss: 24235.2767 - val_loss: 20478.6877
Epoch 152/1000
2304/2304 [==============================] - 1s 448us/step - loss: 23886.3026 - val_loss: 19679.8546
Epoch 153/1000
2304/2304 [==============================] - 1s 447us/step - loss: 24203.4083 - val_loss: 19225.7126
Epoch 154/1000
2304/2304 [==============================] - 1s 459us/step - loss: 24125.6937 - val_loss: 18712.8627
Epoch 155/1000
2304/2304 [==============================] - 1s 457us/step - loss: 23699.3783 - val_loss: 19005.6716
Epoch 156/1000
2304/2304 [==============================] - 1s 464us/step - loss: 23628.8058 - val_loss: 20574.2034
Epoch 157/1000
2304/2304 [==============================] - 1s 466us/step - loss: 23527.5995 - val_loss: 20440.9397
Epoch 158/1000
2304/2304 [==============================] - 1s 462us/step - loss: 23367.5987 - val_loss: 20027.8654
Epoch 159/1000
2304/2304 [==============================] - 1s 447us/step - loss: 23393.3923 - val_loss: 18406.9154
Epoch 160/1000
2304/2304 [==============================] - 1s 446us/step - loss: 23547.7516 - val_loss: 19510.1907
Epoch 161/1000
2304/2304 [==============================] - 1s 455us/step - loss: 23700.4968 - val_loss: 19711.2351
Epoch 162/1000
2304/2304 [==============================] - 1s 447us/step - loss: 23521.9805 - val_loss: 19353.0765
Epoch 163/1000
2304/2304 [==============================] - 1s 440us/step - loss: 23289.4974 - val_loss: 18495.0024
Epoch 164/1000
2304/2304 [==============================] - 1s 467us/step - loss: 23146.1177 - val_loss: 18525.8958
Epoch 165/1000
2304/2304 [==============================] - 1s 474us/step - loss: 23378.2289 - val_loss: 18674.6753
Epoch 166/1000
2304/2304 [==============================] - 1s 432us/step - loss: 22990.6150 - val_loss: 18405.3405
Epoch 167/1000
2304/2304 [==============================] - 1s 437us/step - loss: 23208.1085 - val_loss: 18444.8079
Epoch 168/1000
2304/2304 [==============================] - 1s 464us/step - loss: 23341.9950 - val_loss: 18214.6930
Epoch 169/1000
2304/2304 [==============================] - 1s 445us/step - loss: 22968.4293 - val_loss: 18287.0789
Epoch 170/1000
2304/2304 [==============================] - 1s 453us/step - loss: 23336.9285 - val_loss: 19328.6353
Epoch 171/1000
2304/2304 [==============================] - 1s 455us/step - loss: 23004.5811 - val_loss: 22645.0320
Epoch 172/1000
2304/2304 [==============================] - 1s 460us/step - loss: 23450.7607 - val_loss: 18237.4190
Epoch 173/1000
2304/2304 [==============================] - 1s 443us/step - loss: 23322.7922 - val_loss: 18528.1455
Epoch 174/1000
2304/2304 [==============================] - 1s 448us/step - loss: 22646.3451 - val_loss: 18115.4026
Epoch 175/1000
2304/2304 [==============================] - 1s 453us/step - loss: 22568.9873 - val_loss: 19539.2561
Epoch 176/1000
2304/2304 [==============================] - 1s 459us/step - loss: 23544.2008 - val_loss: 17933.2717
Epoch 177/1000
2304/2304 [==============================] - 1s 458us/step - loss: 22497.0116 - val_loss: 17354.5006
Epoch 178/1000
2304/2304 [==============================] - 1s 458us/step - loss: 22879.9811 - val_loss: 17579.1927
Epoch 179/1000
2304/2304 [==============================] - 1s 446us/step - loss: 22938.6665 - val_loss: 18413.8741
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Epoch 180/1000
2304/2304 [==============================] - 1s 446us/step - loss: 22665.2603 - val_loss: 19428.7250
Epoch 181/1000
2304/2304 [==============================] - 1s 461us/step - loss: 22319.2484 - val_loss: 17366.1969
Epoch 182/1000
2304/2304 [==============================] - 1s 453us/step - loss: 22669.5232 - val_loss: 18838.8342
Epoch 183/1000
2304/2304 [==============================] - 1s 452us/step - loss: 22451.1597 - val_loss: 18472.8874
Epoch 184/1000
2304/2304 [==============================] - 1s 461us/step - loss: 22706.7617 - val_loss: 18255.4424
Epoch 185/1000
2304/2304 [==============================] - 1s 463us/step - loss: 22957.0078 - val_loss: 17473.3416
Epoch 186/1000
2304/2304 [==============================] - 1s 446us/step - loss: 22531.9464 - val_loss: 16844.6493
Epoch 187/1000
2304/2304 [==============================] - 1s 474us/step - loss: 22240.5742 - val_loss: 17564.5887
Epoch 188/1000
2304/2304 [==============================] - 1s 471us/step - loss: 22642.6283 - val_loss: 17112.6908
Epoch 189/1000
2304/2304 [==============================] - 1s 462us/step - loss: 22320.6819 - val_loss: 17639.8543
Epoch 190/1000
2304/2304 [==============================] - 1s 445us/step - loss: 22117.3255 - val_loss: 17005.3269
Epoch 191/1000
2304/2304 [==============================] - 1s 463us/step - loss: 22249.5553 - val_loss: 18395.3013
Epoch 192/1000
2304/2304 [==============================] - 1s 456us/step - loss: 22401.0267 - val_loss: 16680.4410
Epoch 193/1000
2304/2304 [==============================] - 1s 466us/step - loss: 22384.8159 - val_loss: 17162.2615
Epoch 194/1000
2304/2304 [==============================] - 1s 475us/step - loss: 21983.3552 - val_loss: 18605.2577
Epoch 195/1000
2304/2304 [==============================] - 1s 445us/step - loss: 22257.2526 - val_loss: 17034.5954
Epoch 196/1000
2304/2304 [==============================] - 1s 465us/step - loss: 22122.9456 - val_loss: 17328.9022
Epoch 197/1000
2304/2304 [==============================] - 1s 471us/step - loss: 22467.4348 - val_loss: 17312.1251
Epoch 198/1000
2304/2304 [==============================] - 1s 480us/step - loss: 22034.0424 - val_loss: 16346.6881
Epoch 199/1000
2304/2304 [==============================] - 1s 441us/step - loss: 21772.8173 - val_loss: 16449.1762
Epoch 200/1000
2304/2304 [==============================] - 1s 466us/step - loss: 21616.0995 - val_loss: 19556.2224
Epoch 201/1000
2304/2304 [==============================] - 1s 464us/step - loss: 22326.2749 - val_loss: 16196.6720
Epoch 202/1000
2304/2304 [==============================] - 1s 452us/step - loss: 22678.2432 - val_loss: 16400.9500
Epoch 203/1000
2304/2304 [==============================] - 1s 462us/step - loss: 21954.1421 - val_loss: 17115.8815
Epoch 204/1000
2304/2304 [==============================] - 1s 455us/step - loss: 21574.3031 - val_loss: 16127.1571
Epoch 205/1000
2304/2304 [==============================] - 1s 480us/step - loss: 22338.9508 - val_loss: 19444.3208
Epoch 206/1000
2304/2304 [==============================] - 1s 448us/step - loss: 21852.7934 - val_loss: 19308.3233
Epoch 207/1000
2304/2304 [==============================] - 1s 473us/step - loss: 21872.5774 - val_loss: 17685.5849
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Epoch 208/1000
2304/2304 [==============================] - 1s 445us/step - loss: 21486.7361 - val_loss: 16639.5072
Epoch 209/1000
2304/2304 [==============================] - 1s 464us/step - loss: 21571.2908 - val_loss: 16761.9651
Epoch 210/1000
2304/2304 [==============================] - 1s 461us/step - loss: 21631.3609 - val_loss: 15658.4923
Epoch 211/1000
2304/2304 [==============================] - 1s 464us/step - loss: 21486.4054 - val_loss: 15814.1505
Epoch 212/1000
2304/2304 [==============================] - 1s 455us/step - loss: 21541.5087 - val_loss: 17495.6494
Epoch 213/1000
2304/2304 [==============================] - 1s 449us/step - loss: 22039.3132 - val_loss: 18907.8804
Epoch 214/1000
2304/2304 [==============================] - 1s 448us/step - loss: 21535.5008 - val_loss: 16334.5270
Epoch 215/1000
2304/2304 [==============================] - 1s 474us/step - loss: 21397.5464 - val_loss: 15527.8804
Epoch 216/1000
2304/2304 [==============================] - 1s 459us/step - loss: 20970.6127 - val_loss: 15893.2644
Epoch 217/1000
2304/2304 [==============================] - 1s 454us/step - loss: 21382.1890 - val_loss: 16356.3695
Epoch 218/1000
2304/2304 [==============================] - 1s 451us/step - loss: 21161.6115 - val_loss: 17358.3467
Epoch 219/1000
2304/2304 [==============================] - 1s 437us/step - loss: 21313.9134 - val_loss: 16149.4819
Epoch 220/1000
2304/2304 [==============================] - 1s 451us/step - loss: 21500.9419 - val_loss: 15796.3191
Epoch 221/1000
2304/2304 [==============================] - 1s 443us/step - loss: 21536.2349 - val_loss: 15471.1339
Epoch 222/1000
2304/2304 [==============================] - 1s 463us/step - loss: 21088.8941 - val_loss: 15343.0244
Epoch 223/1000
2304/2304 [==============================] - 1s 446us/step - loss: 21667.5794 - val_loss: 17580.5199
Epoch 224/1000
2304/2304 [==============================] - 1s 442us/step - loss: 20965.1858 - val_loss: 15803.6322
Epoch 225/1000
2304/2304 [==============================] - 1s 449us/step - loss: 21442.6807 - val_loss: 17598.5028
Epoch 226/1000
2304/2304 [==============================] - 1s 471us/step - loss: 21107.7338 - val_loss: 15927.4279
Epoch 227/1000
2304/2304 [==============================] - 1s 459us/step - loss: 20982.8748 - val_loss: 16270.2747
Epoch 228/1000
2304/2304 [==============================] - 1s 451us/step - loss: 21420.9400 - val_loss: 15423.4538
Epoch 229/1000
2304/2304 [==============================] - 1s 449us/step - loss: 20855.8819 - val_loss: 16644.8780
Epoch 230/1000
2304/2304 [==============================] - 1s 458us/step - loss: 20768.6303 - val_loss: 15575.5588
Epoch 231/1000
2304/2304 [==============================] - 1s 455us/step - loss: 21261.2271 - val_loss: 16437.3966
Epoch 232/1000
2304/2304 [==============================] - 1s 457us/step - loss: 21497.1832 - val_loss: 15420.6945
Epoch 233/1000
2304/2304 [==============================] - 1s 447us/step - loss: 20544.3840 - val_loss: 15224.6794
Epoch 234/1000
2304/2304 [==============================] - 1s 448us/step - loss: 21233.0104 - val_loss: 15038.2329
Epoch 235/1000
2304/2304 [==============================] - 1s 449us/step - loss: 21491.5446 - val_loss: 17434.5473
Epoch 236/1000
```

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2304/2304 [==============================] - 1s 454us/step - loss: 21326.1712 - val_loss: 16683.8884
Epoch 237/1000
2304/2304 [==============================] - 1s 450us/step - loss: 21116.4700 - val_loss: 15612.9380
Epoch 238/1000
2304/2304 [==============================] - 1s 463us/step - loss: 22033.4280 - val_loss: 15167.3380
Epoch 239/1000
2304/2304 [==============================] - 1s 449us/step - loss: 21327.5555 - val_loss: 15373.3279
Epoch 240/1000
2304/2304 [==============================] - 1s 444us/step - loss: 20829.2319 - val_loss: 15861.8656
Epoch 241/1000
2304/2304 [==============================] - 1s 445us/step - loss: 20925.8254 - val_loss: 15428.4299
Epoch 242/1000
2304/2304 [==============================] - 1s 510us/step - loss: 21137.2842 - val_loss: 19346.3964
Epoch 243/1000
2304/2304 [==============================] - 1s 495us/step - loss: 20912.4358 - val_loss: 15086.4801
Epoch 244/1000
2304/2304 [==============================] - 1s 451us/step - loss: 20783.2399 - val_loss: 17047.4020
Epoch 245/1000
2304/2304 [==============================] - 1s 438us/step - loss: 20600.0964 - val_loss: 16235.3380
Epoch 246/1000
2304/2304 [==============================] - 1s 459us/step - loss: 20756.1085 - val_loss: 15630.0819
Epoch 247/1000
2304/2304 [==============================] - 1s 487us/step - loss: 20794.2793 - val_loss: 15813.6791
Epoch 248/1000
2304/2304 [==============================] - 1s 463us/step - loss: 20578.2091 - val_loss: 14941.2435
Epoch 249/1000
2304/2304 [==============================] - 1s 459us/step - loss: 20526.0308 - val_loss: 17806.7003
Epoch 250/1000
2304/2304 [==============================] - 1s 583us/step - loss: 20334.8256 - val_loss: 18193.9887
Epoch 251/1000
2304/2304 [==============================] - 1s 530us/step - loss: 20293.9275 - val_loss: 17792.9437
Epoch 252/1000
2304/2304 [==============================] - 1s 451us/step - loss: 20567.1465 - val_loss: 15440.0669
Epoch 253/1000
2304/2304 [==============================] - 1s 450us/step - loss: 20427.0153 - val_loss: 14923.4824
Epoch 254/1000
2304/2304 [==============================] - 1s 461us/step - loss: 20450.5625 - val_loss: 16042.9484
Epoch 255/1000
2304/2304 [==============================] - 1s 455us/step - loss: 20198.3318 - val_loss: 16222.9939
Epoch 256/1000
2304/2304 [==============================] - 1s 448us/step - loss: 20533.8341 - val_loss: 16831.9639
Epoch 257/1000
2304/2304 [==============================] - 1s 509us/step - loss: 20154.9191 - val_loss: 14754.8845
Epoch 258/1000
2304/2304 [==============================] - 1s 469us/step - loss: 20387.4427 - val_loss: 15878.7856
Epoch 259/1000
2304/2304 [==============================] - 1s 435us/step - loss: 20359.2988 - val_loss: 16003.4819
Epoch 260/1000
2304/2304 [==============================] - 1s 461us/step - loss: 20531.9542 - val_loss: 16200.7362
Epoch 261/1000
2304/2304 [==============================] - 1s 454us/step - loss: 20018.3629 - val_loss: 15491.6521
Epoch 262/1000
2304/2304 [==============================] - 1s 481us/step - loss: 20267.9428 - val_loss: 15069.8928
Epoch 263/1000
2304/2304 [==============================] - 1s 479us/step - loss: 20530.1369 - val_loss: 15627.3145
Epoch 264/1000
```

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2304/2304 [==============================] - 1s 438us/step - loss: 20294.7257 - val_loss: 17765.7470
Epoch 265/1000
2304/2304 [==============================] - 1s 436us/step - loss: 20360.8740 - val_loss: 14508.3821
Epoch 266/1000
2304/2304 [==============================] - 1s 425us/step - loss: 20267.8221 - val_loss: 15420.8517
Epoch 267/1000
2304/2304 [==============================] - 1s 444us/step - loss: 19862.5230 - val_loss: 14701.4737
Epoch 268/1000
2304/2304 [==============================] - 1s 433us/step - loss: 19815.6728 - val_loss: 14743.0286
Epoch 269/1000
2304/2304 [==============================] - 1s 448us/step - loss: 19757.1898 - val_loss: 16036.5053
Epoch 270/1000
2304/2304 [==============================] - 1s 443us/step - loss: 19572.5032 - val_loss: 15336.2828
Epoch 271/1000
2304/2304 [==============================] - 1s 448us/step - loss: 19700.6566 - val_loss: 15040.9445
Epoch 272/1000
2304/2304 [==============================] - 1s 442us/step - loss: 19473.6894 - val_loss: 15602.6384
Epoch 273/1000
2304/2304 [==============================] - 1s 454us/step - loss: 19906.8170 - val_loss: 14509.2126
Epoch 274/1000
2304/2304 [==============================] - 1s 437us/step - loss: 19699.7736 - val_loss: 15772.0936
Epoch 275/1000
2304/2304 [==============================] - 1s 434us/step - loss: 20105.0729 - val_loss: 14584.7437
Epoch 276/1000
2304/2304 [==============================] - 1s 442us/step - loss: 20147.8612 - val_loss: 15057.5087
Epoch 277/1000
2304/2304 [==============================] - 1s 454us/step - loss: 19881.5120 - val_loss: 18572.5668
Epoch 278/1000
2304/2304 [==============================] - 1s 442us/step - loss: 19517.4842 - val_loss: 16397.4856
Epoch 279/1000
2304/2304 [==============================] - 1s 433us/step - loss: 19976.7596 - val_loss: 15108.0453
Epoch 280/1000
2304/2304 [==============================] - 1s 436us/step - loss: 19935.8306 - val_loss: 15692.7591
Epoch 281/1000
2304/2304 [==============================] - 1s 447us/step - loss: 19793.6322 - val_loss: 14389.2686
Epoch 282/1000
2304/2304 [==============================] - 1s 439us/step - loss: 19412.6952 - val_loss: 15312.0001
Epoch 283/1000
2304/2304 [==============================] - 1s 435us/step - loss: 20059.2136 - val_loss: 15273.2969
Epoch 284/1000
2304/2304 [==============================] - 1s 441us/step - loss: 19604.2384 - val_loss: 14420.2558
Epoch 285/1000
2304/2304 [==============================] - 1s 437us/step - loss: 19496.6790 - val_loss: 14708.9673
Epoch 286/1000
2304/2304 [==============================] - 1s 440us/step - loss: 20049.3460 - val_loss: 16034.7254
Epoch 287/1000
2304/2304 [==============================] - 1s 430us/step - loss: 19478.0735 - val_loss: 14571.8502
Epoch 288/1000
2304/2304 [==============================] - 1s 435us/step - loss: 19667.3767 - val_loss: 14611.5370
Epoch 289/1000
2304/2304 [==============================] - 1s 448us/step - loss: 19504.3439 - val_loss: 14015.6003
Epoch 290/1000
2304/2304 [==============================] - 1s 439us/step - loss: 19758.8318 - val_loss: 16997.5221
Epoch 291/1000
2304/2304 [==============================] - 1s 447us/step - loss: 19601.7732 - val_loss: 17615.9217
Epoch 292/1000
2304/2304 [==============================] - 1s 427us/step - loss: 19661.4567 - val_loss: 16816.5259
```

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Epoch 293/1000
2304/2304 [==============================] - 1s 442us/step - loss: 19131.7665 - val_loss: 14086.0776
Epoch 294/1000
2304/2304 [==============================] - 1s 444us/step - loss: 19576.5483 - val_loss: 14701.9938
Epoch 295/1000
2304/2304 [==============================] - 1s 461us/step - loss: 19444.5205 - val_loss: 14263.2803
Epoch 296/1000
2304/2304 [==============================] - 1s 451us/step - loss: 19304.4485 - val_loss: 14911.7827
Epoch 297/1000
2304/2304 [==============================] - 2s 687us/step - loss: 19703.8128 - val_loss: 16053.4814
Epoch 298/1000
2304/2304 [==============================] - 1s 462us/step - loss: 19346.9465 - val_loss: 14261.0299
Epoch 299/1000
2304/2304 [==============================] - 1s 434us/step - loss: 19704.9612 - val_loss: 14267.3405
Epoch 300/1000
2304/2304 [==============================] - 1s 436us/step - loss: 19352.9026 - val_loss: 14148.4302
Epoch 301/1000
2304/2304 [==============================] - 1s 438us/step - loss: 19498.7444 - val_loss: 14138.5259
Epoch 302/1000
2304/2304 [==============================] - 1s 438us/step - loss: 18726.3407 - val_loss: 15887.5956
Epoch 303/1000
2304/2304 [==============================] - 1s 446us/step - loss: 19946.6447 - val_loss: 16257.2649
Epoch 304/1000
2304/2304 [==============================] - 1s 457us/step - loss: 19362.7704 - val_loss: 13983.4914
Epoch 305/1000
2304/2304 [==============================] - 1s 450us/step - loss: 18790.8474 - val_loss: 14023.9126
Epoch 306/1000
2304/2304 [==============================] - 1s 441us/step - loss: 19160.9730 - val_loss: 14827.6932
Epoch 307/1000
2304/2304 [==============================] - 1s 441us/step - loss: 19190.6534 - val_loss: 18906.2787
Epoch 308/1000
2304/2304 [==============================] - 1s 449us/step - loss: 19401.0639 - val_loss: 14333.4869
Epoch 309/1000
2304/2304 [==============================] - 1s 441us/step - loss: 19238.1993 - val_loss: 19174.5764
Epoch 310/1000
2304/2304 [==============================] - 1s 450us/step - loss: 20029.8387 - val_loss: 14179.8829
Epoch 311/1000
2304/2304 [==============================] - 1s 435us/step - loss: 18918.1769 - val_loss: 15346.9258
Epoch 312/1000
2304/2304 [==============================] - 1s 435us/step - loss: 19041.3360 - val_loss: 15424.8321
Epoch 313/1000
2304/2304 [==============================] - 1s 435us/step - loss: 19119.5293 - val_loss: 14270.7577
Epoch 314/1000
2304/2304 [==============================] - 1s 446us/step - loss: 19292.8256 - val_loss: 14625.2434
Epoch 315/1000
2304/2304 [==============================] - 1s 443us/step - loss: 19020.3923 - val_loss: 15541.8373
Epoch 316/1000
2304/2304 [==============================] - 1s 442us/step - loss: 19109.0529 - val_loss: 14618.3543
Epoch 317/1000
2304/2304 [==============================] - 1s 446us/step - loss: 18554.5315 - val_loss: 14239.7411
Epoch 318/1000
2304/2304 [==============================] - 1s 441us/step - loss: 19012.3046 - val_loss: 14200.9190
Epoch 319/1000
2304/2304 [==============================] - 1s 444us/step - loss: 18846.4739 - val_loss: 14101.2692
Epoch 320/1000
2304/2304 [==============================] - 1s 447us/step - loss: 18813.7599 - val_loss: 14046.8665
```

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Epoch 321/1000
2304/2304 [==============================] - 1s 439us/step - loss: 18852.2364 - val_loss: 15203.3614
Epoch 322/1000
2304/2304 [==============================] - 1s 449us/step - loss: 19056.3984 - val_loss: 14890.5568
Epoch 323/1000
2304/2304 [==============================] - 1s 460us/step - loss: 18563.3026 - val_loss: 13836.5927
Epoch 324/1000
2304/2304 [==============================] - 1s 450us/step - loss: 19340.7887 - val_loss: 14266.8893
Epoch 325/1000
2304/2304 [==============================] - 1s 450us/step - loss: 19060.3305 - val_loss: 15360.9089
Epoch 326/1000
2304/2304 [==============================] - 1s 439us/step - loss: 18662.2458 - val_loss: 14017.1838
Epoch 327/1000
2304/2304 [==============================] - 1s 452us/step - loss: 18428.4088 - val_loss: 14745.7661
Epoch 328/1000
2304/2304 [==============================] - 1s 438us/step - loss: 19135.0274 - val_loss: 15207.9820
Epoch 329/1000
2304/2304 [==============================] - 1s 438us/step - loss: 18923.7394 - val_loss: 14965.7481
Epoch 330/1000
2304/2304 [==============================] - 1s 452us/step - loss: 18535.9474 - val_loss: 17499.9861
Epoch 331/1000
2304/2304 [==============================] - 1s 440us/step - loss: 19013.6725 - val_loss: 15235.5978
Epoch 332/1000
2304/2304 [==============================] - 1s 458us/step - loss: 18596.5386 - val_loss: 15663.1766
Epoch 333/1000
2304/2304 [==============================] - 1s 435us/step - loss: 18753.9279 - val_loss: 14441.8432
Epoch 334/1000
2304/2304 [==============================] - 1s 445us/step - loss: 18830.9042 - val_loss: 14302.3303
Epoch 335/1000
2304/2304 [==============================] - 1s 438us/step - loss: 18712.8998 - val_loss: 14407.8947
Epoch 336/1000
2304/2304 [==============================] - 1s 444us/step - loss: 18339.9842 - val_loss: 16368.5578
Epoch 337/1000
2304/2304 [==============================] - 1s 454us/step - loss: 18322.5995 - val_loss: 14554.7695
Epoch 338/1000
2304/2304 [==============================] - 1s 445us/step - loss: 18302.4392 - val_loss: 18285.9036
Epoch 339/1000
2304/2304 [==============================] - 1s 449us/step - loss: 18712.5002 - val_loss: 16307.5702
Epoch 340/1000
2304/2304 [==============================] - 1s 445us/step - loss: 18290.9863 - val_loss: 14239.9206
Epoch 341/1000
2304/2304 [==============================] - 1s 446us/step - loss: 18704.4309 - val_loss: 14550.0324
Epoch 342/1000
2304/2304 [==============================] - 1s 439us/step - loss: 18247.0918 - val_loss: 14879.0659
Epoch 343/1000
2304/2304 [==============================] - 1s 443us/step - loss: 18006.7334 - val_loss: 18404.3097
Epoch 344/1000
2304/2304 [==============================] - 1s 447us/step - loss: 18743.3766 - val_loss: 14351.7088
Epoch 345/1000
2304/2304 [==============================] - 1s 441us/step - loss: 18354.7083 - val_loss: 13809.4760
Epoch 346/1000
2304/2304 [==============================] - 1s 430us/step - loss: 18344.7377 - val_loss: 14164.0234
Epoch 347/1000
2304/2304 [==============================] - 1s 450us/step - loss: 17953.9372 - val_loss: 15203.0973
Epoch 348/1000
2304/2304 [==============================] - 1s 430us/step - loss: 18169.8337 - val_loss: 15557.0146
Epoch 349/1000
```

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2304/2304 [==============================] - 1s 456us/step - loss: 18846.4769 - val_loss: 13736.5097
Epoch 350/1000
2304/2304 [==============================] - 1s 432us/step - loss: 18310.2781 - val_loss: 15919.4781
Epoch 351/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17808.3110 - val_loss: 16368.7301
Epoch 352/1000
2304/2304 [==============================] - 1s 444us/step - loss: 18350.3996 - val_loss: 14352.2247
Epoch 353/1000
2304/2304 [==============================] - 1s 455us/step - loss: 18125.6151 - val_loss: 14588.8044
Epoch 354/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17982.2255 - val_loss: 15111.4960
Epoch 355/1000
2304/2304 [==============================] - 1s 441us/step - loss: 18200.9428 - val_loss: 16779.2044
Epoch 356/1000
2304/2304 [==============================] - 1s 437us/step - loss: 17829.2466 - val_loss: 15074.7010
Epoch 357/1000
2304/2304 [==============================] - 1s 448us/step - loss: 18016.9196 - val_loss: 14864.5632
Epoch 358/1000
2304/2304 [==============================] - 1s 430us/step - loss: 17915.1799 - val_loss: 24316.4935
Epoch 359/1000
2304/2304 [==============================] - 1s 439us/step - loss: 19223.4313 - val_loss: 14180.9230
Epoch 360/1000
2304/2304 [==============================] - 1s 426us/step - loss: 18647.8201 - val_loss: 13863.6924
Epoch 361/1000
2304/2304 [==============================] - 1s 436us/step - loss: 18664.2566 - val_loss: 15385.2874
Epoch 362/1000
2304/2304 [==============================] - 1s 444us/step - loss: 17911.7704 - val_loss: 14680.4609
Epoch 363/1000
2304/2304 [==============================] - 1s 452us/step - loss: 17927.6700 - val_loss: 14011.2587
Epoch 364/1000
2304/2304 [==============================] - 1s 452us/step - loss: 17879.9066 - val_loss: 14464.9448
Epoch 365/1000
2304/2304 [==============================] - 1s 437us/step - loss: 18198.5349 - val_loss: 15854.3383
Epoch 366/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17806.2551 - val_loss: 16639.1137
Epoch 367/1000
2304/2304 [==============================] - 1s 444us/step - loss: 17713.9328 - val_loss: 15978.6447
Epoch 368/1000
2304/2304 [==============================] - 1s 446us/step - loss: 18191.1775 - val_loss: 13860.3972
Epoch 369/1000
2304/2304 [==============================] - 1s 447us/step - loss: 17839.4774 - val_loss: 16243.3496
Epoch 370/1000
2304/2304 [==============================] - 1s 437us/step - loss: 18056.7944 - val_loss: 13988.9696
Epoch 371/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17830.5053 - val_loss: 13991.4631
Epoch 372/1000
2304/2304 [==============================] - 1s 434us/step - loss: 17826.4593 - val_loss: 14288.8727
Epoch 373/1000
2304/2304 [==============================] - 1s 446us/step - loss: 18230.0502 - val_loss: 13970.4442
Epoch 374/1000
2304/2304 [==============================] - 1s 437us/step - loss: 18149.2701 - val_loss: 13912.5779
Epoch 375/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17991.8544 - val_loss: 14408.1569
Epoch 376/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17852.9588 - val_loss: 13976.1019
Epoch 377/1000
```

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2304/2304 [==============================] - 1s 445us/step - loss: 17220.9854 - val_loss: 14601.7443
Epoch 378/1000
2304/2304 [==============================] - 1s 451us/step - loss: 18052.9831 - val_loss: 14810.8670
Epoch 379/1000
2304/2304 [==============================] - 1s 451us/step - loss: 17936.4085 - val_loss: 15385.9314
Epoch 380/1000
2304/2304 [==============================] - 1s 436us/step - loss: 17604.2571 - val_loss: 22286.7142
Epoch 381/1000
2304/2304 [==============================] - 1s 438us/step - loss: 18617.3345 - val_loss: 16034.6185
Epoch 382/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17403.8869 - val_loss: 14999.4376
Epoch 383/1000
2304/2304 [==============================] - 1s 446us/step - loss: 17939.8127 - val_loss: 14766.4007
Epoch 384/1000
2304/2304 [==============================] - 1s 451us/step - loss: 18240.0339 - val_loss: 14057.3904
Epoch 385/1000
2304/2304 [==============================] - 1s 454us/step - loss: 17869.7416 - val_loss: 17336.3759
Epoch 386/1000
2304/2304 [==============================] - 1s 439us/step - loss: 17826.6345 - val_loss: 15285.4909
Epoch 387/1000
2304/2304 [==============================] - 1s 437us/step - loss: 17667.2922 - val_loss: 14430.3984
Epoch 388/1000
2304/2304 [==============================] - 1s 451us/step - loss: 17571.7256 - val_loss: 14216.6904
Epoch 389/1000
2304/2304 [==============================] - 1s 432us/step - loss: 17352.5210 - val_loss: 13842.0403
Epoch 390/1000
2304/2304 [==============================] - 1s 439us/step - loss: 17804.1591 - val_loss: 14489.6196
Epoch 391/1000
2304/2304 [==============================] - 1s 436us/step - loss: 17290.5272 - val_loss: 15556.0982
Epoch 392/1000
2304/2304 [==============================] - 1s 443us/step - loss: 17562.2438 - val_loss: 14057.2289
Epoch 393/1000
2304/2304 [==============================] - 1s 450us/step - loss: 17475.4925 - val_loss: 14393.1716
Epoch 394/1000
2304/2304 [==============================] - 1s 421us/step - loss: 17683.2711 - val_loss: 13867.6408
Epoch 395/1000
2304/2304 [==============================] - 1s 444us/step - loss: 18206.1145 - val_loss: 14119.2243
Epoch 396/1000
2304/2304 [==============================] - 1s 439us/step - loss: 17573.8009 - val_loss: 14654.6191
Epoch 397/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17220.1603 - val_loss: 17501.2350
Epoch 398/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17444.1953 - val_loss: 15443.5200
Epoch 399/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17212.9262 - val_loss: 14271.1408
Epoch 400/1000
2304/2304 [==============================] - 1s 445us/step - loss: 18024.3335 - val_loss: 14294.3726
Epoch 401/1000
2304/2304 [==============================] - 1s 436us/step - loss: 17486.2469 - val_loss: 13969.2431
Epoch 402/1000
2304/2304 [==============================] - 1s 435us/step - loss: 17356.3129 - val_loss: 14932.2968
Epoch 403/1000
2304/2304 [==============================] - 1s 444us/step - loss: 17733.6313 - val_loss: 15349.2541
Epoch 404/1000
2304/2304 [==============================] - 1s 444us/step - loss: 17096.2496 - val_loss: 14960.6332
Epoch 405/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17120.7252 - val_loss: 14787.6082
```

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Epoch 406/1000
2304/2304 [==============================] - 1s 430us/step - loss: 17491.6736 - val_loss: 19178.5432
Epoch 407/1000
2304/2304 [==============================] - 1s 439us/step - loss: 17724.7867 - val_loss: 14122.0443
Epoch 408/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17579.8739 - val_loss: 14003.0985
Epoch 409/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17608.8391 - val_loss: 17843.3101
Epoch 410/1000
2304/2304 [==============================] - 1s 435us/step - loss: 17523.1099 - val_loss: 14959.4707
Epoch 411/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16910.8874 - val_loss: 13747.2737
Epoch 412/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17539.3152 - val_loss: 14720.9098
Epoch 413/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17267.5506 - val_loss: 14258.4516
Epoch 414/1000
2304/2304 [==============================] - 1s 437us/step - loss: 17315.9268 - val_loss: 13593.2258
Epoch 415/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17380.5531 - val_loss: 14079.7826
Epoch 416/1000
2304/2304 [==============================] - 1s 446us/step - loss: 16996.8228 - val_loss: 15113.6179
Epoch 417/1000
2304/2304 [==============================] - 1s 436us/step - loss: 17600.8175 - val_loss: 18986.0353
Epoch 418/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17023.1818 - val_loss: 14341.5397
Epoch 419/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17573.1886 - val_loss: 14370.9430
Epoch 420/1000
2304/2304 [==============================] - 1s 444us/step - loss: 17225.8739 - val_loss: 15407.3638
Epoch 421/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17412.0493 - val_loss: 19036.0672
Epoch 422/1000
2304/2304 [==============================] - 1s 446us/step - loss: 17108.0607 - val_loss: 15606.9727
Epoch 423/1000
2304/2304 [==============================] - 1s 446us/step - loss: 17136.4948 - val_loss: 15391.9444
Epoch 424/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17093.5108 - val_loss: 14448.2228
Epoch 425/1000
2304/2304 [==============================] - 1s 439us/step - loss: 16837.8037 - val_loss: 16118.2474
Epoch 426/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17296.2004 - val_loss: 13944.9400
Epoch 427/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17272.2626 - val_loss: 13772.1651
Epoch 428/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17281.5558 - val_loss: 13642.4159
Epoch 429/1000
2304/2304 [==============================] - 1s 443us/step - loss: 17101.2987 - val_loss: 15898.3358
Epoch 430/1000
2304/2304 [==============================] - 1s 441us/step - loss: 16709.3143 - val_loss: 19334.2600
Epoch 431/1000
2304/2304 [==============================] - 1s 432us/step - loss: 16868.6854 - val_loss: 16250.8959
Epoch 432/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17385.3112 - val_loss: 13705.7346
Epoch 433/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17247.9291 - val_loss: 14623.1077
```

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Epoch 434/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17188.4737 - val_loss: 13852.3366
Epoch 435/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16656.4663 - val_loss: 14797.9058
Epoch 436/1000
2304/2304 [==============================] - 1s 434us/step - loss: 17156.8052 - val_loss: 13735.2475
Epoch 437/1000
2304/2304 [==============================] - 1s 433us/step - loss: 17050.5127 - val_loss: 17040.0685
Epoch 438/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16785.3803 - val_loss: 15292.6484
Epoch 439/1000
2304/2304 [==============================] - 1s 439us/step - loss: 16491.9697 - val_loss: 15786.6080
Epoch 440/1000
2304/2304 [==============================] - 1s 435us/step - loss: 17464.6337 - val_loss: 15852.0196
Epoch 441/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17213.6505 - val_loss: 15082.6042
Epoch 442/1000
2304/2304 [==============================] - 1s 450us/step - loss: 17345.8611 - val_loss: 14912.8041
Epoch 443/1000
2304/2304 [==============================] - 1s 444us/step - loss: 16981.0900 - val_loss: 18065.5751
Epoch 444/1000
2304/2304 [==============================] - 1s 432us/step - loss: 17532.0109 - val_loss: 16386.4432
Epoch 445/1000
2304/2304 [==============================] - 1s 442us/step - loss: 17591.5213 - val_loss: 14487.9600
Epoch 446/1000
2304/2304 [==============================] - 1s 435us/step - loss: 17624.2621 - val_loss: 16752.8077
Epoch 447/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16998.9168 - val_loss: 13496.9836
Epoch 448/1000
2304/2304 [==============================] - 1s 430us/step - loss: 16836.7056 - val_loss: 14631.2539
Epoch 449/1000
2304/2304 [==============================] - 1s 439us/step - loss: 16696.3389 - val_loss: 16631.2494
Epoch 450/1000
2304/2304 [==============================] - 1s 434us/step - loss: 16983.9090 - val_loss: 15312.0523
Epoch 451/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16810.2610 - val_loss: 14278.9533
Epoch 452/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17404.3263 - val_loss: 15086.4043
Epoch 453/1000
2304/2304 [==============================] - 1s 441us/step - loss: 17100.2959 - val_loss: 13936.6329
Epoch 454/1000
2304/2304 [==============================] - 1s 445us/step - loss: 16667.1507 - val_loss: 18293.9448
Epoch 455/1000
2304/2304 [==============================] - ETA: 0s - loss: 17168.9288- ETA: 0s - - 1s 438us/step - loss: 17086.7000 - val_loss: 13579.2
260
Epoch 456/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16701.5239 - val_loss: 14569.9128
Epoch 457/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16879.7268 - val_loss: 13863.3398
Epoch 458/1000
2304/2304 [==============================] - 1s 436us/step - loss: 16426.4349 - val_loss: 17490.6424
Epoch 459/1000
2304/2304 [==============================] - 1s 440us/step - loss: 17047.0664 - val_loss: 14906.5276
Epoch 460/1000
2304/2304 [==============================] - 1s 448us/step - loss: 17470.8861 - val_loss: 14052.3652
Epoch 461/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16674.0154 - val_loss: 17727.5517
```

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Epoch 462/1000
2304/2304 [==============================] - 1s 444us/step - loss: 17145.5984 - val_loss: 14692.3786
Epoch 463/1000
2304/2304 [==============================] - 1s 439us/step - loss: 17166.9755 - val_loss: 14124.9136
Epoch 464/1000
2304/2304 [==============================] - 1s 444us/step - loss: 16679.6169 - val_loss: 19373.4150
Epoch 465/1000
2304/2304 [==============================] - 1s 450us/step - loss: 16774.5541 - val_loss: 14200.0199
Epoch 466/1000
2304/2304 [==============================] - 1s 434us/step - loss: 16595.9005 - val_loss: 14423.6457
Epoch 467/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16689.2204 - val_loss: 14240.4985
Epoch 468/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16708.0954 - val_loss: 14334.9017
Epoch 469/1000
2304/2304 [==============================] - 1s 449us/step - loss: 17191.4972 - val_loss: 13775.6621
Epoch 470/1000
2304/2304 [==============================] - 1s 435us/step - loss: 17505.5673 - val_loss: 13765.9852
Epoch 471/1000
2304/2304 [==============================] - 1s 456us/step - loss: 17377.3753 - val_loss: 16874.4895
Epoch 472/1000
2304/2304 [==============================] - 1s 449us/step - loss: 16932.0075 - val_loss: 15280.1072
Epoch 473/1000
2304/2304 [==============================] - 1s 441us/step - loss: 16530.4014 - val_loss: 14520.9200
Epoch 474/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17395.5364 - val_loss: 13848.9501
Epoch 475/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16857.5059 - val_loss: 13565.6380
Epoch 476/1000
2304/2304 [==============================] - 1s 455us/step - loss: 16767.7075 - val_loss: 19872.7868
Epoch 477/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16884.9123 - val_loss: 13176.7210
Epoch 478/1000
2304/2304 [==============================] - 1s 435us/step - loss: 16330.7191 - val_loss: 14813.3151
Epoch 479/1000
2304/2304 [==============================] - 1s 463us/step - loss: 16560.1846 - val_loss: 13560.4959
Epoch 480/1000
2304/2304 [==============================] - 1s 452us/step - loss: 16994.8374 - val_loss: 13748.0220
Epoch 481/1000
2304/2304 [==============================] - 1s 453us/step - loss: 17105.0768 - val_loss: 13977.5572
Epoch 482/1000
2304/2304 [==============================] - 1s 457us/step - loss: 16926.7186 - val_loss: 15421.4735
Epoch 483/1000
2304/2304 [==============================] - ETA: 0s - loss: 17416.383 - 1s 442us/step - loss: 17520.7117 - val_loss: 14974.8713
Epoch 484/1000
2304/2304 [==============================] - 1s 438us/step - loss: 17241.7099 - val_loss: 16109.2987
Epoch 485/1000
2304/2304 [==============================] - 1s 467us/step - loss: 16878.6128 - val_loss: 13340.2037
Epoch 486/1000
2304/2304 [==============================] - 1s 460us/step - loss: 16567.2597 - val_loss: 13226.7989
Epoch 487/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17009.0485 - val_loss: 14334.8273
Epoch 488/1000
2304/2304 [==============================] - 1s 445us/step - loss: 17224.3196 - val_loss: 15182.8221
Epoch 489/1000
2304/2304 [==============================] - 1s 435us/step - loss: 16113.3428 - val_loss: 14707.3002
```

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Epoch 490/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16157.4614 - val_loss: 17262.7748
Epoch 491/1000
2304/2304 [==============================] - 1s 441us/step - loss: 16754.3682 - val_loss: 17514.4146
Epoch 492/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16435.4573 - val_loss: 13711.0666
Epoch 493/1000
2304/2304 [==============================] - 1s 435us/step - loss: 17039.9159 - val_loss: 15920.7148
Epoch 494/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16618.5890 - val_loss: 13543.7893
Epoch 495/1000
2304/2304 [==============================] - 1s 437us/step - loss: 17146.2448 - val_loss: 18693.5495
Epoch 496/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16916.5060 - val_loss: 13491.6188
Epoch 497/1000
2304/2304 [==============================] - 1s 440us/step - loss: 16322.7569 - val_loss: 14055.7516
Epoch 498/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16738.7356 - val_loss: 13729.1235
Epoch 499/1000
2304/2304 [==============================] - 1s 446us/step - loss: 17037.1458 - val_loss: 19032.3017
Epoch 500/1000
2304/2304 [==============================] - 1s 443us/step - loss: 17037.1399 - val_loss: 13309.6670
Epoch 501/1000
2304/2304 [==============================] - 1s 453us/step - loss: 16405.3647 - val_loss: 13464.1638
Epoch 502/1000
2304/2304 [==============================] - 1s 449us/step - loss: 17211.2725 - val_loss: 17083.4213
Epoch 503/1000
2304/2304 [==============================] - 1s 448us/step - loss: 17172.4802 - val_loss: 13478.5523
Epoch 504/1000
2304/2304 [==============================] - 1s 449us/step - loss: 16247.5303 - val_loss: 14198.8873
Epoch 505/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16671.5918 - val_loss: 13535.8521
Epoch 506/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16185.6086 - val_loss: 14095.6265
Epoch 507/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16207.7347 - val_loss: 14325.4418
Epoch 508/1000
2304/2304 [==============================] - 1s 416us/step - loss: 16652.1647 - val_loss: 14851.3673
Epoch 509/1000
2304/2304 [==============================] - 1s 413us/step - loss: 16606.8829 - val_loss: 14483.6561
Epoch 510/1000
2304/2304 [==============================] - 1s 416us/step - loss: 16154.6917 - val_loss: 13027.8321
Epoch 511/1000
2304/2304 [==============================] - 1s 422us/step - loss: 16352.7531 - val_loss: 13074.6578
Epoch 512/1000
2304/2304 [==============================] - 1s 416us/step - loss: 16269.5398 - val_loss: 15614.6946
Epoch 513/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16844.1695 - val_loss: 13532.4958
Epoch 514/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16391.5720 - val_loss: 13839.0900
Epoch 515/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16910.4774 - val_loss: 13006.5320
Epoch 516/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16441.9044 - val_loss: 13741.3823
Epoch 517/1000
2304/2304 [==============================] - 1s 439us/step - loss: 16175.2031 - val_loss: 13118.6830
Epoch 518/1000
```

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Epoch 518/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16029.5415 - val_loss: 13535.7123
Epoch 519/1000
2304/2304 [==============================] - 1s 443us/step - loss: 16822.5800 - val_loss: 12918.1999
Epoch 520/1000
2304/2304 [==============================] - 1s 446us/step - loss: 16400.1417 - val_loss: 13436.6186
Epoch 521/1000
2304/2304 [==============================] - 1s 471us/step - loss: 16581.6498 - val_loss: 13149.8857
Epoch 522/1000
2304/2304 [==============================] - 1s 444us/step - loss: 16398.8991 - val_loss: 13370.1782
Epoch 523/1000
2304/2304 [==============================] - 1s 435us/step - loss: 16296.1482 - val_loss: 16340.5884
Epoch 524/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16327.9647 - val_loss: 13298.2406
Epoch 525/1000
2304/2304 [==============================] - 1s 445us/step - loss: 16280.1426 - val_loss: 13291.0479
Epoch 526/1000
2304/2304 [==============================] - 1s 440us/step - loss: 16098.8848 - val_loss: 13626.7445
Epoch 527/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16265.7438 - val_loss: 13826.5380
Epoch 528/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15989.9011 - val_loss: 14713.3395
Epoch 529/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15569.1148 - val_loss: 13209.5831
Epoch 530/1000
2304/2304 [==============================] - 1s 449us/step - loss: 16541.1532 - val_loss: 17341.2461
Epoch 531/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16239.2389 - val_loss: 13829.2114
Epoch 532/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16521.4224 - val_loss: 15856.1819
Epoch 533/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15968.5748 - val_loss: 12955.7784
Epoch 534/1000
2304/2304 [==============================] - 1s 452us/step - loss: 16293.7703 - val_loss: 13159.6920
Epoch 535/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15915.4719 - val_loss: 15236.5337
Epoch 536/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16546.5183 - val_loss: 16853.1425
Epoch 537/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16415.3709 - val_loss: 22590.1958
Epoch 538/1000
2304/2304 [==============================] - 1s 440us/step - loss: 16038.1731 - val_loss: 15478.0320
Epoch 539/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16662.2867 - val_loss: 13633.4050
Epoch 540/1000
2304/2304 [==============================] - 1s 445us/step - loss: 16813.9251 - val_loss: 12660.4432
Epoch 541/1000
2304/2304 [==============================] - 1s 464us/step - loss: 16527.9992 - val_loss: 14913.9604
Epoch 542/1000
2304/2304 [==============================] - 1s 431us/step - loss: 16079.3291 - val_loss: 13788.1918
Epoch 543/1000
2304/2304 [==============================] - 1s 446us/step - loss: 16225.2902 - val_loss: 14426.3797
Epoch 544/1000
2304/2304 [==============================] - 1s 456us/step - loss: 15732.6024 - val_loss: 13636.5850
Epoch 545/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16214.2543 - val_loss: 21259.3888
Epoch 546/1000
```

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2304/2304 [==============================] - 1s 451us/step - loss: 16336.5275 - val_loss: 13642.9841
Epoch 547/1000
2304/2304 [==============================] - 1s 441us/step - loss: 16242.7494 - val_loss: 12891.3443
Epoch 548/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15609.3064 - val_loss: 15241.3289
Epoch 549/1000
2304/2304 [==============================] - 1s 454us/step - loss: 16055.6001 - val_loss: 15129.6870
Epoch 550/1000
2304/2304 [==============================] - 1s 456us/step - loss: 16056.1482 - val_loss: 13194.1173
Epoch 551/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16373.1419 - val_loss: 13835.9007
Epoch 552/1000
2304/2304 [==============================] - 1s 433us/step - loss: 16585.9757 - val_loss: 15642.5804
Epoch 553/1000
2304/2304 [==============================] - 1s 436us/step - loss: 16268.6899 - val_loss: 12619.5854
Epoch 554/1000
2304/2304 [==============================] - 1s 444us/step - loss: 16432.3227 - val_loss: 14910.7167
Epoch 555/1000
2304/2304 [==============================] - 1s 432us/step - loss: 15964.3666 - val_loss: 13346.9381
Epoch 556/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15907.5030 - val_loss: 12983.0486
Epoch 557/1000
2304/2304 [==============================] - 1s 436us/step - loss: 15918.8584 - val_loss: 13650.5844
Epoch 558/1000
2304/2304 [==============================] - 1s 445us/step - loss: 16200.4612 - val_loss: 12951.2539
Epoch 559/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15835.6661 - val_loss: 14813.2323
Epoch 560/1000
2304/2304 [==============================] - 1s 435us/step - loss: 16570.0578 - val_loss: 14454.0631
Epoch 561/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16869.6169 - val_loss: 13610.7718
Epoch 562/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16840.4261 - val_loss: 13181.9136
Epoch 563/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15979.8033 - val_loss: 13446.4118
Epoch 564/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15563.6671 - val_loss: 13199.9821
Epoch 565/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15908.4225 - val_loss: 15984.1726
Epoch 566/1000
2304/2304 [==============================] - 1s 446us/step - loss: 16004.9399 - val_loss: 13905.7834
Epoch 567/1000
2304/2304 [==============================] - 1s 446us/step - loss: 16389.2974 - val_loss: 13452.7645
Epoch 568/1000
2304/2304 [==============================] - 1s 436us/step - loss: 15584.9971 - val_loss: 14775.5267
Epoch 569/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15664.2811 - val_loss: 13648.0294
Epoch 570/1000
2304/2304 [==============================] - 1s 434us/step - loss: 16375.2549 - val_loss: 13240.0203
Epoch 571/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15903.5278 - val_loss: 14575.3229
Epoch 572/1000
2304/2304 [==============================] - 1s 445us/step - loss: 16540.2915 - val_loss: 12986.2193
Epoch 573/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15546.8738 - val_loss: 12724.5387
Epoch 574/1000
2304/2304 [==============================] - 1s 447us/step - loss: 15573.6981 - val_loss: 14370.9492
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2304/2304 [==============================] - 1s 447us/step - loss: 15573.6981 - val_loss: 14370.9492
Epoch 575/1000
2304/2304 [==============================] - 1s 444us/step - loss: 15998.9777 - val_loss: 14381.9216
Epoch 576/1000
2304/2304 [==============================] - 1s 451us/step - loss: 16236.6067 - val_loss: 13139.3926
Epoch 577/1000
2304/2304 [==============================] - 1s 453us/step - loss: 16401.3169 - val_loss: 12909.4291
Epoch 578/1000
2304/2304 [==============================] - 1s 449us/step - loss: 15951.6085 - val_loss: 13372.4539
Epoch 579/1000
2304/2304 [==============================] - ETA: 0s - loss: 15390.301 - 1s 447us/step - loss: 15447.2109 - val_loss: 16080.7027
Epoch 580/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15932.6666 - val_loss: 13824.2292
Epoch 581/1000
2304/2304 [==============================] - 1s 444us/step - loss: 15664.1162 - val_loss: 14778.0713
Epoch 582/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15933.7029 - val_loss: 13003.9517
Epoch 583/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15956.3189 - val_loss: 16177.6614
Epoch 584/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15874.3583 - val_loss: 13080.2921
Epoch 585/1000
2304/2304 [==============================] - 1s 441us/step - loss: 16791.4277 - val_loss: 14088.6852
Epoch 586/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15705.0799 - val_loss: 18454.0310
Epoch 587/1000
2304/2304 [==============================] - 1s 447us/step - loss: 15808.1309 - val_loss: 16820.5833
Epoch 588/1000
2304/2304 [==============================] - 1s 464us/step - loss: 16183.8922 - val_loss: 14711.2256
Epoch 589/1000
2304/2304 [==============================] - 1s 455us/step - loss: 15707.8248 - val_loss: 13111.5689
Epoch 590/1000
2304/2304 [==============================] - 1s 439us/step - loss: 16598.3475 - val_loss: 15295.8216
Epoch 591/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15327.5790 - val_loss: 13901.1989
Epoch 592/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15704.7646 - val_loss: 13032.4837
Epoch 593/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15951.6286 - val_loss: 13004.5162
Epoch 594/1000
2304/2304 [==============================] - 1s 457us/step - loss: 15690.0711 - val_loss: 12766.9858
Epoch 595/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15764.8322 - val_loss: 14098.1799
Epoch 596/1000
2304/2304 [==============================] - 1s 450us/step - loss: 16039.9761 - val_loss: 14123.3657
Epoch 597/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16197.0552 - val_loss: 13257.4783
Epoch 598/1000
2304/2304 [==============================] - 1s 455us/step - loss: 15653.8917 - val_loss: 13044.1128
Epoch 599/1000
2304/2304 [==============================] - 1s 461us/step - loss: 16027.9724 - val_loss: 14400.0111
Epoch 600/1000
2304/2304 [==============================] - 1s 463us/step - loss: 15569.4053 - val_loss: 14585.1445
Epoch 601/1000
2304/2304 [==============================] - 1s 453us/step - loss: 16236.5629 - val_loss: 14213.7991
Epoch 602/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15410.8726 - val_loss: 13744.9428
```

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Epoch 603/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15623.0107 - val_loss: 13769.4555
Epoch 604/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15422.4580 - val_loss: 13720.9273
Epoch 605/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15629.3536 - val_loss: 13780.4440
Epoch 606/1000
2304/2304 [==============================] - ETA: 0s - loss: 15512.328 - 1s 449us/step - loss: 15667.5894 - val_loss: 15107.2038
Epoch 607/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15842.8541 - val_loss: 15396.6564
Epoch 608/1000
2304/2304 [==============================] - 1s 449us/step - loss: 16343.3226 - val_loss: 16418.3831
Epoch 609/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15627.2895 - val_loss: 13080.5057
Epoch 610/1000
2304/2304 [==============================] - 1s 429us/step - loss: 16138.2899 - val_loss: 13839.8605
Epoch 611/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15795.7646 - val_loss: 14323.5030
Epoch 612/1000
2304/2304 [==============================] - 1s 438us/step - loss: 16000.4406 - val_loss: 14379.4820
Epoch 613/1000
2304/2304 [==============================] - 1s 432us/step - loss: 15908.1178 - val_loss: 12850.5682
Epoch 614/1000
2304/2304 [==============================] - 1s 447us/step - loss: 16145.5608 - val_loss: 13584.1879
Epoch 615/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15431.5824 - val_loss: 13392.1331
Epoch 616/1000
2304/2304 [==============================] - 1s 442us/step - loss: 16703.4658 - val_loss: 14792.3624
Epoch 617/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15772.0554 - val_loss: 15436.8464
Epoch 618/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15374.9280 - val_loss: 13229.2396
Epoch 619/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15145.3295 - val_loss: 14809.5443
Epoch 620/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15543.2908 - val_loss: 16547.6276
Epoch 621/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15959.9643 - val_loss: 16376.9515
Epoch 622/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15781.9054 - val_loss: 15017.2809
Epoch 623/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15574.1608 - val_loss: 12977.8039
Epoch 624/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15664.0746 - val_loss: 16512.8301
Epoch 625/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15434.6600 - val_loss: 13110.2442
Epoch 626/1000
2304/2304 [==============================] - 1s 444us/step - loss: 15833.0265 - val_loss: 13771.7392
Epoch 627/1000
2304/2304 [==============================] - 1s 444us/step - loss: 15141.2832 - val_loss: 12895.8720
Epoch 628/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15806.2560 - val_loss: 12599.8844
Epoch 629/1000
2304/2304 [==============================] - 1s 456us/step - loss: 15253.5951 - val_loss: 15702.9138
Epoch 630/1000
2304/2304 [==============================] - ETA: 0s - loss: 16220.005 - 1s 446us/step - loss: 16211.7160 - val_loss: 13587.7423
Epoch 631/1000
```

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Epoch 631/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15374.0106 - val_loss: 16109.5302
Epoch 632/1000
2304/2304 [==============================] - 1s 433us/step - loss: 15973.8315 - val_loss: 14559.4370
Epoch 633/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15757.8239 - val_loss: 14605.0098
Epoch 634/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15382.4610 - val_loss: 15446.6752
Epoch 635/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15981.6069 - val_loss: 14574.5966
Epoch 636/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15255.1359 - val_loss: 16051.3238
Epoch 637/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15448.6940 - val_loss: 13010.1859
Epoch 638/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15537.2544 - val_loss: 14263.5028
Epoch 639/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15717.0864 - val_loss: 13682.7131
Epoch 640/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15358.8598 - val_loss: 13410.3975
Epoch 641/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15642.4729 - val_loss: 13778.9329
Epoch 642/1000
2304/2304 [==============================] - 1s 445us/step - loss: 16350.4903 - val_loss: 21586.3186
Epoch 643/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15697.2444 - val_loss: 13705.7611
Epoch 644/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15046.5153 - val_loss: 16719.6757
Epoch 645/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15784.5210 - val_loss: 13796.9106
Epoch 646/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15669.4205 - val_loss: 12644.5263
Epoch 647/1000
2304/2304 [==============================] - 1s 436us/step - loss: 15642.5598 - val_loss: 13163.1053
Epoch 648/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15469.4455 - val_loss: 14157.4993
Epoch 649/1000
2304/2304 [==============================] - 1s 431us/step - loss: 15148.3762 - val_loss: 12870.2361
Epoch 650/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15614.2960 - val_loss: 12830.4788
Epoch 651/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15455.5890 - val_loss: 14309.9376
Epoch 652/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15504.0487 - val_loss: 12620.4909
Epoch 653/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15521.0770 - val_loss: 13617.4397
Epoch 654/1000
2304/2304 [==============================] - 1s 436us/step - loss: 15487.8799 - val_loss: 13259.1685
Epoch 655/1000
2304/2304 [==============================] - 1s 433us/step - loss: 15204.8147 - val_loss: 13958.5722
Epoch 656/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15702.2916 - val_loss: 13165.9372
Epoch 657/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15200.5446 - val_loss: 14146.9903
Epoch 658/1000
2304/2304 [==============================] - 1s 424us/step - loss: 15479.8287 - val_loss: 13355.3974
Epoch 659/1000
```

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2304/2304 [==============================] - 1s 447us/step - loss: 15440.6843 - val_loss: 13331.1294
Epoch 660/1000
2304/2304 [==============================] - 1s 427us/step - loss: 15174.4019 - val_loss: 12858.8573
Epoch 661/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15110.9219 - val_loss: 12799.9921
Epoch 662/1000
2304/2304 [==============================] - ETA: 0s - loss: 15598.324 - 1s 448us/step - loss: 15515.2419 - val_loss: 12942.6975
Epoch 663/1000
2304/2304 [==============================] - 1s 449us/step - loss: 16275.1000 - val_loss: 16717.4047
Epoch 664/1000
2304/2304 [==============================] - 1s 441us/step - loss: 16169.6125 - val_loss: 12684.8459
Epoch 665/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15119.5771 - val_loss: 17778.7259
Epoch 666/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15477.4023 - val_loss: 13685.2982
Epoch 667/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15982.5753 - val_loss: 14503.3253
Epoch 668/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15682.8486 - val_loss: 15272.2460
Epoch 669/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15223.0342 - val_loss: 12861.6631
Epoch 670/1000
2304/2304 [==============================] - 1s 458us/step - loss: 15199.3037 - val_loss: 12720.9584
Epoch 671/1000
2304/2304 [==============================] - 1s 432us/step - loss: 15367.5364 - val_loss: 12661.7466
Epoch 672/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15171.9637 - val_loss: 13398.3861
Epoch 673/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15272.5848 - val_loss: 13891.8174
Epoch 674/1000
2304/2304 [==============================] - 1s 457us/step - loss: 15364.4168 - val_loss: 13129.6698
Epoch 675/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15352.5513 - val_loss: 13137.0173
Epoch 676/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15420.8494 - val_loss: 14306.8728
Epoch 677/1000
2304/2304 [==============================] - 1s 436us/step - loss: 15816.9606 - val_loss: 13225.2205
Epoch 678/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15520.9441 - val_loss: 12961.2857
Epoch 679/1000
2304/2304 [==============================] - 1s 444us/step - loss: 16166.1388 - val_loss: 13093.5504
Epoch 680/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15809.7020 - val_loss: 12755.8231
Epoch 681/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15275.4096 - val_loss: 14574.4372
Epoch 682/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15262.1467 - val_loss: 15008.6220
Epoch 683/1000
2304/2304 [==============================] - 1s 436us/step - loss: 15541.8515 - val_loss: 12507.0198
Epoch 684/1000
2304/2304 [==============================] - 1s 449us/step - loss: 15458.2967 - val_loss: 12919.8445
Epoch 685/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15089.8102 - val_loss: 13483.9403
Epoch 686/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15078.7916 - val_loss: 13308.9251
Epoch 687/1000
```

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2304/2304 [==============================] - 1s 445us/step - loss: 14969.1277 - val_loss: 15465.7025
Epoch 688/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15335.7592 - val_loss: 12952.5697
Epoch 689/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15527.9751 - val_loss: 17052.4783
Epoch 690/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15339.5878 - val_loss: 14415.3618
Epoch 691/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15469.8665 - val_loss: 14247.9914
Epoch 692/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15702.3830 - val_loss: 17907.0751
Epoch 693/1000
2304/2304 [==============================] - 1s 432us/step - loss: 15765.4085 - val_loss: 13254.7512
Epoch 694/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15332.0656 - val_loss: 18456.6299
Epoch 695/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15447.8551 - val_loss: 12613.2257
Epoch 696/1000
2304/2304 [==============================] - 1s 445us/step - loss: 14687.8422 - val_loss: 13083.2457
Epoch 697/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15330.3883 - val_loss: 18014.6404
Epoch 698/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15781.9598 - val_loss: 16162.5326
Epoch 699/1000
2304/2304 [==============================] - 1s 444us/step - loss: 15493.8309 - val_loss: 17285.5977
Epoch 700/1000
2304/2304 [==============================] - 1s 445us/step - loss: 15423.0763 - val_loss: 12625.9207
Epoch 701/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15297.0811 - val_loss: 13373.4003
Epoch 702/1000
2304/2304 [==============================] - 1s 433us/step - loss: 15426.0078 - val_loss: 13488.4394
Epoch 703/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15466.9557 - val_loss: 14845.1572
Epoch 704/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15065.8811 - val_loss: 12732.2395
Epoch 705/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15026.7516 - val_loss: 13223.4333
Epoch 706/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15230.2854 - val_loss: 14756.2749
Epoch 707/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15406.9381 - val_loss: 13308.5025
Epoch 708/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15260.3629 - val_loss: 18116.0258
Epoch 709/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15283.3038 - val_loss: 13337.3922
Epoch 710/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15137.5314 - val_loss: 13265.3038
Epoch 711/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15759.4561 - val_loss: 14528.8233
Epoch 712/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15241.5850 - val_loss: 12762.3783
Epoch 713/1000
2304/2304 [==============================] - 1s 429us/step - loss: 14968.4679 - val_loss: 13901.8424
Epoch 714/1000
2304/2304 [==============================] - 1s 433us/step - loss: 15471.8470 - val_loss: 13121.6925
Epoch 715/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15340.8782 - val_loss: 16421.3447
```

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Epoch 716/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15203.0577 - val_loss: 13425.4123
Epoch 717/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15364.1613 - val_loss: 14678.5288
Epoch 718/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15190.8276 - val_loss: 13293.1317
Epoch 719/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15485.2657 - val_loss: 16684.7799
Epoch 720/1000
2304/2304 [==============================] - 1s 437us/step - loss: 16062.7201 - val_loss: 12756.5438
Epoch 721/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15582.1366 - val_loss: 13934.6589
Epoch 722/1000
2304/2304 [==============================] - 1s 436us/step - loss: 14930.4560 - val_loss: 14532.9120
Epoch 723/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15068.7575 - val_loss: 12634.7672
Epoch 724/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15363.4014 - val_loss: 13434.6976
Epoch 725/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15257.4327 - val_loss: 18779.9918
Epoch 726/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15877.7786 - val_loss: 13005.0797
Epoch 727/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15261.8529 - val_loss: 12943.7489
Epoch 728/1000
2304/2304 [==============================] - 1s 446us/step - loss: 15631.8654 - val_loss: 12685.7935
Epoch 729/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15082.9631 - val_loss: 12853.9259
Epoch 730/1000
2304/2304 [==============================] - 1s 445us/step - loss: 14789.6620 - val_loss: 13291.1079
Epoch 731/1000
2304/2304 [==============================] - 1s 442us/step - loss: 14779.1322 - val_loss: 12923.7221
Epoch 732/1000
2304/2304 [==============================] - 1s 448us/step - loss: 14957.5461 - val_loss: 14639.1517
Epoch 733/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15424.5130 - val_loss: 12906.5334
Epoch 734/1000
2304/2304 [==============================] - 1s 442us/step - loss: 15092.7149 - val_loss: 12938.7308
Epoch 735/1000
2304/2304 [==============================] - 1s 443us/step - loss: 14993.9403 - val_loss: 13545.9049
Epoch 736/1000
2304/2304 [==============================] - 1s 449us/step - loss: 14567.7017 - val_loss: 13553.1889
Epoch 737/1000
2304/2304 [==============================] - 1s 452us/step - loss: 15193.0467 - val_loss: 16555.1944
Epoch 738/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15208.2199 - val_loss: 13473.8713
Epoch 739/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15558.0719 - val_loss: 13306.9156
Epoch 740/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15205.8590 - val_loss: 13603.1274
Epoch 741/1000
2304/2304 [==============================] - 1s 435us/step - loss: 14711.1822 - val_loss: 17975.5598
Epoch 742/1000
2304/2304 [==============================] - 1s 434us/step - loss: 15439.0352 - val_loss: 18252.7317
Epoch 743/1000
2304/2304 [==============================] - 1s 438us/step - loss: 14858.0257 - val_loss: 13080.7335
```

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Epoch 744/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15334.4735 - val_loss: 12367.6314
Epoch 745/1000
2304/2304 [==============================] - 1s 443us/step - loss: 15592.4208 - val_loss: 12456.6742
Epoch 746/1000
2304/2304 [==============================] - 1s 444us/step - loss: 15372.3296 - val_loss: 13681.8867
Epoch 747/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15552.5056 - val_loss: 13359.9924
Epoch 748/1000
2304/2304 [==============================] - 1s 455us/step - loss: 15025.2245 - val_loss: 13198.7190
Epoch 749/1000
2304/2304 [==============================] - 1s 431us/step - loss: 15587.6711 - val_loss: 13291.3897
Epoch 750/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15234.3599 - val_loss: 13104.8654
Epoch 751/1000
2304/2304 [==============================] - 1s 439us/step - loss: 15286.4515 - val_loss: 13389.0263
Epoch 752/1000
2304/2304 [==============================] - 1s 437us/step - loss: 15011.1919 - val_loss: 13671.0663
Epoch 753/1000
2304/2304 [==============================] - 1s 431us/step - loss: 14678.4676 - val_loss: 13171.7875
Epoch 754/1000
2304/2304 [==============================] - 1s 446us/step - loss: 14898.6622 - val_loss: 16745.6186
Epoch 755/1000
2304/2304 [==============================] - 1s 442us/step - loss: 14864.0150 - val_loss: 14502.9875
Epoch 756/1000
2304/2304 [==============================] - 1s 433us/step - loss: 14996.6706 - val_loss: 14170.1225
Epoch 757/1000
2304/2304 [==============================] - 1s 445us/step - loss: 14958.4556 - val_loss: 13103.1940
Epoch 758/1000
2304/2304 [==============================] - 1s 429us/step - loss: 14827.0645 - val_loss: 12728.4479
Epoch 759/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15163.0861 - val_loss: 13287.7952
Epoch 760/1000
2304/2304 [==============================] - 1s 443us/step - loss: 14740.0526 - val_loss: 12897.9880
Epoch 761/1000
2304/2304 [==============================] - 1s 448us/step - loss: 14966.5553 - val_loss: 13621.3832
Epoch 762/1000
2304/2304 [==============================] - 1s 437us/step - loss: 14799.1578 - val_loss: 14286.3744
Epoch 763/1000
2304/2304 [==============================] - 1s 443us/step - loss: 14436.9415 - val_loss: 13498.1127
Epoch 764/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15144.7726 - val_loss: 12865.2890
Epoch 765/1000
2304/2304 [==============================] - 1s 447us/step - loss: 15369.3907 - val_loss: 13159.7846
Epoch 766/1000
2304/2304 [==============================] - 1s 439us/step - loss: 14932.8306 - val_loss: 13319.9050
Epoch 767/1000
2304/2304 [==============================] - 1s 443us/step - loss: 14700.5915 - val_loss: 12496.0247
Epoch 768/1000
2304/2304 [==============================] - 1s 432us/step - loss: 14422.4766 - val_loss: 12903.3622
Epoch 769/1000
2304/2304 [==============================] - 1s 441us/step - loss: 14772.8422 - val_loss: 12729.0690
Epoch 770/1000
2304/2304 [==============================] - ETA: 0s - loss: 15411.607 - 1s 442us/step - loss: 15346.0232 - val_loss: 14042.6256
Epoch 771/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15231.9011 - val_loss: 13969.7030
Epoch 772/1000
```

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2304/2304 [==============================] - 1s 436us/step - loss: 15155.9134 - val_loss: 14454.8772
Epoch 773/1000
2304/2304 [==============================] - 1s 422us/step - loss: 15267.4308 - val_loss: 13259.2004
Epoch 774/1000
2304/2304 [==============================] - 1s 438us/step - loss: 14596.1594 - val_loss: 13166.8524
Epoch 775/1000
2304/2304 [==============================] - 1s 420us/step - loss: 14974.0176 - val_loss: 15539.5823
Epoch 776/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15169.9119 - val_loss: 13228.7943
Epoch 777/1000
2304/2304 [==============================] - 1s 442us/step - loss: 14630.1758 - val_loss: 13663.6288
Epoch 778/1000
2304/2304 [==============================] - 1s 456us/step - loss: 14674.2638 - val_loss: 12558.5938
Epoch 779/1000
2304/2304 [==============================] - 1s 445us/step - loss: 14920.9787 - val_loss: 13532.3238
Epoch 780/1000
2304/2304 [==============================] - 1s 430us/step - loss: 15182.5596 - val_loss: 15951.0021
Epoch 781/1000
2304/2304 [==============================] - 1s 424us/step - loss: 14665.4194 - val_loss: 12908.2029
Epoch 782/1000
2304/2304 [==============================] - 1s 426us/step - loss: 14690.0533 - val_loss: 14167.9302
Epoch 783/1000
2304/2304 [==============================] - 1s 420us/step - loss: 14653.5695 - val_loss: 17030.5262
Epoch 784/1000
2304/2304 [==============================] - 1s 438us/step - loss: 15122.4909 - val_loss: 12568.5641
Epoch 785/1000
2304/2304 [==============================] - 1s 455us/step - loss: 15265.6583 - val_loss: 12658.0560
Epoch 786/1000
2304/2304 [==============================] - 1s 461us/step - loss: 14948.2878 - val_loss: 13892.8752
Epoch 787/1000
2304/2304 [==============================] - 1s 445us/step - loss: 14933.4436 - val_loss: 14457.1670
Epoch 788/1000
2304/2304 [==============================] - 1s 448us/step - loss: 15085.2040 - val_loss: 13747.4289
Epoch 789/1000
2304/2304 [==============================] - 1s 431us/step - loss: 15379.0492 - val_loss: 19403.6576
Epoch 790/1000
2304/2304 [==============================] - 1s 425us/step - loss: 15351.0965 - val_loss: 15456.3321
Epoch 791/1000
2304/2304 [==============================] - 1s 421us/step - loss: 14805.4371 - val_loss: 12852.0827
Epoch 792/1000
2304/2304 [==============================] - 1s 430us/step - loss: 14794.1490 - val_loss: 12984.7817
Epoch 793/1000
2304/2304 [==============================] - 1s 434us/step - loss: 14434.4702 - val_loss: 12845.6965
Epoch 794/1000
2304/2304 [==============================] - 1s 455us/step - loss: 14672.0893 - val_loss: 13594.8156
Epoch 795/1000
2304/2304 [==============================] - 1s 452us/step - loss: 14665.5351 - val_loss: 13367.0068
Epoch 796/1000
2304/2304 [==============================] - 1s 442us/step - loss: 14691.3304 - val_loss: 12902.3428
Epoch 797/1000
2304/2304 [==============================] - 1s 440us/step - loss: 15322.3794 - val_loss: 13206.3453
Epoch 798/1000
2304/2304 [==============================] - 1s 428us/step - loss: 14591.8013 - val_loss: 12691.5457
Epoch 799/1000
2304/2304 [==============================] - 1s 423us/step - loss: 14238.9320 - val_loss: 12883.0565
Epoch 800/1000
```

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2304/2304 [==============================] - 1s 422us/step - loss: 14562.4019 - val_loss: 13239.7346
Epoch 801/1000
2304/2304 [==============================] - 1s 422us/step - loss: 14895.1009 - val_loss: 12925.1134
Epoch 802/1000
2304/2304 [==============================] - 1s 426us/step - loss: 14640.8927 - val_loss: 12759.0829
Epoch 803/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14646.1457 - val_loss: 12718.9311
Epoch 804/1000
2304/2304 [==============================] - 1s 422us/step - loss: 14635.7928 - val_loss: 12636.7899
Epoch 805/1000
2304/2304 [==============================] - 1s 424us/step - loss: 13996.3517 - val_loss: 14381.3851
Epoch 806/1000
2304/2304 [==============================] - 1s 428us/step - loss: 14318.8125 - val_loss: 15468.8791
Epoch 807/1000
2304/2304 [==============================] - 1s 443us/step - loss: 14880.0421 - val_loss: 13126.8431
Epoch 808/1000
2304/2304 [==============================] - 1s 451us/step - loss: 15080.8034 - val_loss: 14136.3962
Epoch 809/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15469.5417 - val_loss: 12694.9700
Epoch 810/1000
2304/2304 [==============================] - 1s 445us/step - loss: 14256.0116 - val_loss: 12779.1585
Epoch 811/1000
2304/2304 [==============================] - 1s 422us/step - loss: 15062.1193 - val_loss: 13845.3082
Epoch 812/1000
2304/2304 [==============================] - 1s 437us/step - loss: 14080.0018 - val_loss: 13449.0193
Epoch 813/1000
2304/2304 [==============================] - 1s 419us/step - loss: 14612.0249 - val_loss: 13226.6961
Epoch 814/1000
2304/2304 [==============================] - 1s 419us/step - loss: 14793.5876 - val_loss: 12672.4397
Epoch 815/1000
2304/2304 [==============================] - 1s 424us/step - loss: 14473.2528 - val_loss: 12693.7991
Epoch 816/1000
2304/2304 [==============================] - 1s 456us/step - loss: 14533.8183 - val_loss: 13692.2471
Epoch 817/1000
2304/2304 [==============================] - 1s 428us/step - loss: 14729.4543 - val_loss: 13083.3531
Epoch 818/1000
2304/2304 [==============================] - 1s 423us/step - loss: 14497.7936 - val_loss: 13903.4400
Epoch 819/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14109.7411 - val_loss: 13386.7339
Epoch 820/1000
2304/2304 [==============================] - 1s 423us/step - loss: 14994.6687 - val_loss: 14384.5567
Epoch 821/1000
2304/2304 [==============================] - 1s 424us/step - loss: 14667.1439 - val_loss: 16717.5792
Epoch 822/1000
2304/2304 [==============================] - 1s 421us/step - loss: 15194.1799 - val_loss: 12673.5339
Epoch 823/1000
2304/2304 [==============================] - 1s 424us/step - loss: 14383.1840 - val_loss: 13179.6093
Epoch 824/1000
2304/2304 [==============================] - 1s 448us/step - loss: 14762.0785 - val_loss: 12920.0712
Epoch 825/1000
2304/2304 [==============================] - 1s 426us/step - loss: 14621.4354 - val_loss: 13191.5815
Epoch 826/1000
2304/2304 [==============================] - 1s 432us/step - loss: 14784.9669 - val_loss: 12863.7764
Epoch 827/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14490.9969 - val_loss: 12752.3748
Epoch 828/1000
2304/2304 [==============================] - 1s 420us/step - loss: 14351.1834 - val_loss: 12576.6446
```

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Epoch 829/1000
2304/2304 [==============================] - 1s 428us/step - loss: 15036.8720 - val_loss: 12418.5804
Epoch 830/1000
2304/2304 [==============================] - 1s 413us/step - loss: 14464.0178 - val_loss: 12871.3090
Epoch 831/1000
2304/2304 [==============================] - 1s 415us/step - loss: 14654.7483 - val_loss: 13201.5221
Epoch 832/1000
2304/2304 [==============================] - 1s 424us/step - loss: 14462.2237 - val_loss: 13925.0163
Epoch 833/1000
2304/2304 [==============================] - 1s 423us/step - loss: 14949.5650 - val_loss: 13039.8272
Epoch 834/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14270.4275 - val_loss: 12572.5281
Epoch 835/1000
2304/2304 [==============================] - 1s 426us/step - loss: 14900.3856 - val_loss: 12620.9649
Epoch 836/1000
2304/2304 [==============================] - 1s 409us/step - loss: 14709.6670 - val_loss: 12989.1388
Epoch 837/1000
2304/2304 [==============================] - 1s 429us/step - loss: 14657.4319 - val_loss: 13228.2369
Epoch 838/1000
2304/2304 [==============================] - 1s 472us/step - loss: 14724.9100 - val_loss: 12757.6617
Epoch 839/1000
2304/2304 [==============================] - 1s 430us/step - loss: 14601.4974 - val_loss: 12417.1430
Epoch 840/1000
2304/2304 [==============================] - 1s 426us/step - loss: 14986.3101 - val_loss: 17222.0426
Epoch 841/1000
2304/2304 [==============================] - 1s 411us/step - loss: 15089.0709 - val_loss: 12555.9500
Epoch 842/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14993.7458 - val_loss: 14066.9829
Epoch 843/1000
2304/2304 [==============================] - 1s 415us/step - loss: 14532.6220 - val_loss: 18880.1531
Epoch 844/1000
2304/2304 [==============================] - 1s 415us/step - loss: 14584.9105 - val_loss: 13635.9832
Epoch 845/1000
2304/2304 [==============================] - 1s 422us/step - loss: 14396.5144 - val_loss: 12778.6250
Epoch 846/1000
2304/2304 [==============================] - 1s 437us/step - loss: 14060.4311 - val_loss: 13225.5006
Epoch 847/1000
2304/2304 [==============================] - 1s 429us/step - loss: 14654.3758 - val_loss: 13023.3650
Epoch 848/1000
2304/2304 [==============================] - 1s 420us/step - loss: 14654.8375 - val_loss: 13103.5657
Epoch 849/1000
2304/2304 [==============================] - 1s 431us/step - loss: 14830.6239 - val_loss: 13058.2414
Epoch 850/1000
2304/2304 [==============================] - 1s 413us/step - loss: 14764.2105 - val_loss: 13815.4281
Epoch 851/1000
2304/2304 [==============================] - 1s 419us/step - loss: 14613.9552 - val_loss: 13237.9735
Epoch 852/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14611.7756 - val_loss: 13520.5362
Epoch 853/1000
2304/2304 [==============================] - 1s 422us/step - loss: 14431.8364 - val_loss: 13894.3668
Epoch 854/1000
2304/2304 [==============================] - 1s 427us/step - loss: 15137.1521 - val_loss: 22284.5248
Epoch 855/1000
2304/2304 [==============================] - 1s 432us/step - loss: 14813.4715 - val_loss: 13260.7255
Epoch 856/1000
2304/2304 [==============================] - 1s 413us/step - loss: 14475.8784 - val_loss: 13210.7836
```

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Epoch 857/1000
2304/2304 [==============================] - 1s 427us/step - loss: 14933.4577 - val_loss: 12749.1952
Epoch 858/1000
2304/2304 [==============================] - 1s 412us/step - loss: 14291.2518 - val_loss: 14971.0328
Epoch 859/1000
2304/2304 [==============================] - 1s 441us/step - loss: 15208.3715 - val_loss: 15258.7614
Epoch 860/1000
2304/2304 [==============================] - 1s 435us/step - loss: 14987.8951 - val_loss: 13586.2548
Epoch 861/1000
2304/2304 [==============================] - 1s 430us/step - loss: 14492.0720 - val_loss: 17675.6073
Epoch 862/1000
2304/2304 [==============================] - 1s 425us/step - loss: 14506.5116 - val_loss: 12518.2817
Epoch 863/1000
2304/2304 [==============================] - 1s 429us/step - loss: 14188.5038 - val_loss: 13342.0729
Epoch 864/1000
2304/2304 [==============================] - 1s 435us/step - loss: 15359.8370 - val_loss: 16495.8379
Epoch 865/1000
2304/2304 [==============================] - 1s 435us/step - loss: 14965.1403 - val_loss: 13083.3793
Epoch 866/1000
2304/2304 [==============================] - 1s 439us/step - loss: 14175.7473 - val_loss: 13919.3206
Epoch 867/1000
2304/2304 [==============================] - 1s 438us/step - loss: 14389.9764 - val_loss: 13285.3221
Epoch 868/1000
2304/2304 [==============================] - 1s 439us/step - loss: 14221.4755 - val_loss: 16674.3418
Epoch 869/1000
2304/2304 [==============================] - 1s 418us/step - loss: 13982.3276 - val_loss: 14725.3013
Epoch 870/1000
2304/2304 [==============================] - 1s 370us/step - loss: 14150.5493 - val_loss: 12991.6504
Epoch 871/1000
2304/2304 [==============================] - 1s 369us/step - loss: 14241.1971 - val_loss: 14242.6713
Epoch 872/1000
2304/2304 [==============================] - 1s 372us/step - loss: 14235.1650 - val_loss: 13106.2846
Epoch 873/1000
2304/2304 [==============================] - 1s 382us/step - loss: 14888.9844 - val_loss: 13805.2642
Epoch 874/1000
2304/2304 [==============================] - 1s 380us/step - loss: 14627.0407 - val_loss: 13571.2920
Epoch 875/1000
2304/2304 [==============================] - 1s 371us/step - loss: 14100.9699 - val_loss: 13488.7944
Epoch 876/1000
2304/2304 [==============================] - 1s 428us/step - loss: 14497.7654 - val_loss: 12479.8602
Epoch 877/1000
2304/2304 [==============================] - 1s 449us/step - loss: 14594.8237 - val_loss: 12449.0825
Epoch 878/1000
2304/2304 [==============================] - 1s 437us/step - loss: 14203.2660 - val_loss: 12609.4652
Epoch 879/1000
2304/2304 [==============================] - 1s 436us/step - loss: 14727.8350 - val_loss: 12740.9682
Epoch 880/1000
2304/2304 [==============================] - 1s 438us/step - loss: 14200.1342 - val_loss: 12994.0223
Epoch 881/1000
2304/2304 [==============================] - 1s 425us/step - loss: 14441.8817 - val_loss: 16508.9571
Epoch 882/1000
2304/2304 [==============================] - 1s 444us/step - loss: 14590.5564 - val_loss: 12704.1016
Epoch 883/1000
2304/2304 [==============================] - 1s 437us/step - loss: 14141.6053 - val_loss: 14625.2396
Epoch 884/1000
2304/2304 [==============================] - 1s 377us/step - loss: 14457.2792 - val_loss: 13181.9282
Epoch 885/1000
```

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2304/2304 [==============================] - 1s 395us/step - loss: 14154.0893 - val_loss: 13142.0646
Epoch 886/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14099.0075 - val_loss: 12615.8368
Epoch 887/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14432.0832 - val_loss: 13688.7647
Epoch 888/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14763.6511 - val_loss: 12546.1383
Epoch 889/1000
2304/2304 [==============================] - 1s 400us/step - loss: 14257.1427 - val_loss: 15314.1020
Epoch 890/1000
2304/2304 [==============================] - 1s 407us/step - loss: 14685.3420 - val_loss: 12802.6904
Epoch 891/1000
2304/2304 [==============================] - 1s 398us/step - loss: 14311.2269 - val_loss: 13009.1204
Epoch 892/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14441.2347 - val_loss: 13246.5764
Epoch 893/1000
2304/2304 [==============================] - 1s 421us/step - loss: 13962.6542 - val_loss: 13388.3987
Epoch 894/1000
2304/2304 [==============================] - 1s 403us/step - loss: 14644.0992 - val_loss: 16022.9132
Epoch 895/1000
2304/2304 [==============================] - 1s 408us/step - loss: 14487.1708 - val_loss: 13156.4069
Epoch 896/1000
2304/2304 [==============================] - 1s 422us/step - loss: 14494.2526 - val_loss: 12960.4321
Epoch 897/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14206.2011 - val_loss: 13049.3552
Epoch 898/1000
2304/2304 [==============================] - 1s 408us/step - loss: 14461.0843 - val_loss: 13081.9360
Epoch 899/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14231.0203 - val_loss: 12909.8227
Epoch 900/1000
2304/2304 [==============================] - 1s 413us/step - loss: 14248.6927 - val_loss: 15215.5780
Epoch 901/1000
2304/2304 [==============================] - 1s 436us/step - loss: 14475.0888 - val_loss: 12317.9968
Epoch 902/1000
2304/2304 [==============================] - 1s 424us/step - loss: 14409.6735 - val_loss: 12467.8517
Epoch 903/1000
2304/2304 [==============================] - 1s 434us/step - loss: 14274.7537 - val_loss: 13747.5079
Epoch 904/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14452.9215 - val_loss: 12402.7182
Epoch 905/1000
2304/2304 [==============================] - 1s 410us/step - loss: 14406.0842 - val_loss: 13519.5157
Epoch 906/1000
2304/2304 [==============================] - 1s 419us/step - loss: 14147.5470 - val_loss: 15100.2449
Epoch 907/1000
2304/2304 [==============================] - 1s 421us/step - loss: 14430.0315 - val_loss: 13061.8966
Epoch 908/1000
2304/2304 [==============================] - 1s 392us/step - loss: 14037.1031 - val_loss: 15047.8518
Epoch 909/1000
2304/2304 [==============================] - 1s 404us/step - loss: 14497.5600 - val_loss: 12198.8537
Epoch 910/1000
2304/2304 [==============================] - 1s 411us/step - loss: 14366.8323 - val_loss: 14644.8727
Epoch 911/1000
2304/2304 [==============================] - 1s 408us/step - loss: 14138.7617 - val_loss: 13198.3730
Epoch 912/1000
2304/2304 [==============================] - 1s 387us/step - loss: 14551.6633 - val_loss: 12640.6007
Epoch 913/1000
```

```
2304/2304 [==============================] - 1s 395us/step - loss: 13842.8162 - val_loss: 13103.7514
Epoch 914/1000
2304/2304 [==============================] - ETA: 0s - loss: 14027.096 - 1s 406us/step - loss: 14014.5653 - val_loss: 13519.0226
Epoch 915/1000
2304/2304 [==============================] - 1s 406us/step - loss: 14198.5005 - val_loss: 13368.7286
Epoch 916/1000
2304/2304 [==============================] - 1s 399us/step - loss: 14822.5560 - val_loss: 15374.5320
Epoch 917/1000
2304/2304 [==============================] - 1s 402us/step - loss: 14289.0921 - val_loss: 14090.4929
Epoch 918/1000
2304/2304 [==============================] - 1s 414us/step - loss: 14206.7270 - val_loss: 13044.4802
Epoch 919/1000
2304/2304 [==============================] - 1s 413us/step - loss: 14460.7795 - val_loss: 13302.6180
Epoch 920/1000
2304/2304 [==============================] - 1s 433us/step - loss: 14155.9907 - val_loss: 13949.3602
Epoch 921/1000
2304/2304 [==============================] - 1s 446us/step - loss: 14249.6631 - val_loss: 13610.0707
Epoch 922/1000
2304/2304 [==============================] - 1s 423us/step - loss: 13840.5041 - val_loss: 13909.9199
Epoch 923/1000
2304/2304 [==============================] - 1s 417us/step - loss: 13814.5286 - val_loss: 12826.1274
Epoch 924/1000
2304/2304 [==============================] - 1s 419us/step - loss: 14904.2527 - val_loss: 13254.0662
Epoch 925/1000
2304/2304 [==============================] - 1s 401us/step - loss: 14411.9720 - val_loss: 12841.3170
Epoch 926/1000
2304/2304 [==============================] - 1s 406us/step - loss: 14629.6957 - val_loss: 15033.8485
Epoch 927/1000
2304/2304 [==============================] - 1s 416us/step - loss: 14348.2908 - val_loss: 14876.2320
Epoch 928/1000
2304/2304 [==============================] - 1s 420us/step - loss: 14075.3151 - val_loss: 13959.1821
Epoch 929/1000
2304/2304 [==============================] - 1s 409us/step - loss: 14288.5601 - val_loss: 12458.3268
Epoch 930/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14819.0479 - val_loss: 12861.2873
Epoch 931/1000
2304/2304 [==============================] - 1s 455us/step - loss: 13920.4318 - val_loss: 12759.2584
Epoch 932/1000
2304/2304 [==============================] - 1s 410us/step - loss: 14030.5567 - val_loss: 16690.3853
Epoch 933/1000
2304/2304 [==============================] - 1s 409us/step - loss: 14995.1577 - val_loss: 12408.4145
Epoch 934/1000
2304/2304 [==============================] - 1s 418us/step - loss: 14364.7210 - val_loss: 13108.9323
Epoch 935/1000
2304/2304 [==============================] - 1s 413us/step - loss: 14219.7713 - val_loss: 12570.9672
Epoch 936/1000
2304/2304 [==============================] - 1s 426us/step - loss: 14441.0540 - val_loss: 12885.1096
Epoch 937/1000
2304/2304 [==============================] - 1s 421us/step - loss: 14052.5804 - val_loss: 12657.4459
Epoch 938/1000
2304/2304 [==============================] - 1s 445us/step - loss: 13923.9323 - val_loss: 13260.1057
Epoch 939/1000
2304/2304 [==============================] - 1s 440us/step - loss: 14013.6045 - val_loss: 13729.9309
Epoch 940/1000
2304/2304 [==============================] - 1s 383us/step - loss: 13959.4256 - val_loss: 12934.7212
Epoch 941/1000
2304/2304 [==============================] - 1s 429us/step - loss: 14320.5392 - val_loss: 13995.1145
```

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Epoch 942/1000
2304/2304 [==============================] - ETA: 0s - loss: 14821.987 - 1s 402us/step - loss: 14817.3598 - val_loss: 12546.6118
Epoch 943/1000
2304/2304 [==============================] - 1s 400us/step - loss: 13632.6041 - val_loss: 12900.9206
Epoch 944/1000
2304/2304 [==============================] - 1s 392us/step - loss: 14375.1462 - val_loss: 12765.3758
Epoch 945/1000
2304/2304 [==============================] - 1s 378us/step - loss: 14128.5347 - val_loss: 14432.7357
Epoch 946/1000
2304/2304 [==============================] - 1s 371us/step - loss: 14197.4131 - val_loss: 13281.8154
Epoch 947/1000
2304/2304 [==============================] - 1s 373us/step - loss: 14080.5850 - val_loss: 12181.3528
Epoch 948/1000
2304/2304 [==============================] - 1s 384us/step - loss: 14324.9667 - val_loss: 12349.6915
Epoch 949/1000
2304/2304 [==============================] - 1s 399us/step - loss: 14012.5511 - val_loss: 13018.6412
Epoch 950/1000
2304/2304 [==============================] - 1s 390us/step - loss: 14255.0074 - val_loss: 15873.9080
Epoch 951/1000
2304/2304 [==============================] - 1s 412us/step - loss: 14717.7372 - val_loss: 12762.9510
Epoch 952/1000
2304/2304 [==============================] - 1s 383us/step - loss: 13974.3436 - val_loss: 12546.4765
Epoch 953/1000
2304/2304 [==============================] - 1s 372us/step - loss: 14234.0405 - val_loss: 13405.9529
Epoch 954/1000
2304/2304 [==============================] - 1s 369us/step - loss: 14021.4645 - val_loss: 12466.7760
Epoch 955/1000
2304/2304 [==============================] - 1s 369us/step - loss: 13925.6977 - val_loss: 13453.8253
Epoch 956/1000
2304/2304 [==============================] - 1s 369us/step - loss: 14474.5282 - val_loss: 12504.4543
Epoch 957/1000
2304/2304 [==============================] - 1s 372us/step - loss: 13990.5396 - val_loss: 12301.0943
Epoch 958/1000
2304/2304 [==============================] - 1s 371us/step - loss: 13936.6069 - val_loss: 13217.6736
Epoch 959/1000
2304/2304 [==============================] - 1s 374us/step - loss: 14229.4402 - val_loss: 12295.4087
Epoch 960/1000
2304/2304 [==============================] - 1s 373us/step - loss: 14244.5842 - val_loss: 12878.1249
Epoch 961/1000
2304/2304 [==============================] - 1s 382us/step - loss: 13966.3603 - val_loss: 13099.1012
Epoch 962/1000
2304/2304 [==============================] - 1s 377us/step - loss: 14448.5880 - val_loss: 13052.2593
Epoch 963/1000
2304/2304 [==============================] - 1s 377us/step - loss: 13804.9836 - val_loss: 13043.3453
Epoch 964/1000
2304/2304 [==============================] - 1s 377us/step - loss: 14432.2674 - val_loss: 12421.3675
Epoch 965/1000
2304/2304 [==============================] - 1s 389us/step - loss: 13866.9203 - val_loss: 12710.0364
Epoch 966/1000
2304/2304 [==============================] - 1s 383us/step - loss: 14118.5367 - val_loss: 12608.4325
Epoch 967/1000
2304/2304 [==============================] - 1s 383us/step - loss: 13863.9051 - val_loss: 12497.9934
Epoch 968/1000
2304/2304 [==============================] - 1s 382us/step - loss: 14055.5219 - val_loss: 12798.6343
Epoch 969/1000
2304/2304 [==============================] - 1s 382us/step - loss: 14203.0176 - val_loss: 12626.2237
```

```
Epoch 970/1000
2304/2304 [==============================] - 1s 370us/step - loss: 14280.9816 - val_loss: 12754.1671
Epoch 971/1000
2304/2304 [==============================] - 1s 373us/step - loss: 13951.1702 - val_loss: 12712.6477
Epoch 972/1000
2304/2304 [==============================] - 1s 383us/step - loss: 14304.2816 - val_loss: 17329.0146
Epoch 973/1000
2304/2304 [==============================] - 1s 371us/step - loss: 15169.8071 - val_loss: 12271.1659
Epoch 974/1000
2304/2304 [==============================] - 1s 384us/step - loss: 14481.7509 - val_loss: 13241.9281
Epoch 975/1000
2304/2304 [==============================] - 1s 374us/step - loss: 13924.4217 - val_loss: 13457.2602
Epoch 976/1000
2304/2304 [==============================] - 1s 374us/step - loss: 14402.3264 - val_loss: 12988.4250
Epoch 977/1000
2304/2304 [==============================] - 1s 373us/step - loss: 13917.5887 - val_loss: 14214.5680
Epoch 978/1000
2304/2304 [==============================] - 1s 374us/step - loss: 13851.6644 - val_loss: 14613.6863
Epoch 979/1000
2304/2304 [==============================] - 1s 375us/step - loss: 13638.6078 - val_loss: 12895.8128
Epoch 980/1000
2304/2304 [==============================] - 1s 371us/step - loss: 14048.2012 - val_loss: 15794.4410
Epoch 981/1000
2304/2304 [==============================] - 1s 377us/step - loss: 14248.7375 - val_loss: 12595.4897
Epoch 982/1000
2304/2304 [==============================] - 1s 378us/step - loss: 13976.9222 - val_loss: 12944.9743
Epoch 983/1000
2304/2304 [==============================] - 1s 380us/step - loss: 13878.1132 - val_loss: 14461.1452
Epoch 984/1000
2304/2304 [==============================] - 1s 377us/step - loss: 13750.8418 - val_loss: 13647.0555
Epoch 985/1000
2304/2304 [==============================] - 1s 383us/step - loss: 13821.2843 - val_loss: 15657.8466
Epoch 986/1000
2304/2304 [==============================] - 1s 387us/step - loss: 13951.3668 - val_loss: 12503.4262
Epoch 987/1000
2304/2304 [==============================] - 1s 374us/step - loss: 13732.6873 - val_loss: 12674.2793
Epoch 988/1000
2304/2304 [==============================] - 1s 384us/step - loss: 14143.0375 - val_loss: 12801.1951
Epoch 989/1000
2304/2304 [==============================] - 1s 376us/step - loss: 14586.6882 - val_loss: 13891.1528
Epoch 990/1000
2304/2304 [==============================] - 1s 376us/step - loss: 14043.9540 - val_loss: 12848.9969
Epoch 991/1000
2304/2304 [==============================] - 1s 383us/step - loss: 14709.4745 - val_loss: 13196.8980
Epoch 992/1000
2304/2304 [==============================] - 1s 379us/step - loss: 13989.1206 - val_loss: 13358.9111
Epoch 993/1000
2304/2304 [==============================] - 1s 373us/step - loss: 13895.6108 - val_loss: 12177.6148
Epoch 994/1000
2304/2304 [==============================] - 1s 377us/step - loss: 13983.3783 - val_loss: 12892.7427
Epoch 995/1000
2304/2304 [==============================] - 1s 377us/step - loss: 14490.0895 - val_loss: 14749.1190
Epoch 996/1000
2304/2304 [==============================] - 1s 376us/step - loss: 14125.6700 - val_loss: 13738.9878
Epoch 997/1000
2304/2304 [==============================] - 1s 388us/step - loss: 14066.8977 - val_loss: 12453.9828
Epoch 998/1000
```

```
Epoch 998/1000
2304/2304 [==============================] - 1s 388us/step - loss: 13551.5174 - val_loss: 14619.2152
Epoch 999/1000
2304/2304 [==============================] - 1s 386us/step - loss: 13681.4783 - val_loss: 12727.4434
Epoch 1000/1000
2304/2304 [==============================] - 1s 383us/step - loss: 14083.6308 - val_loss: 13065.0160
```

In [390]:
```
ann_pred=classifier.predict(df_Test.drop(['SalePrice'],axis=1).values)
```

In [382]:
```
from keras import backend as K
def root_mean_squared_error(y_true, y_pred):
        return K.sqrt(K.mean(K.square(y_pred - y_true)))
```