Predicting house prices with machine learning

September 9, 2021

1 Data pre-processing

```
[4]: import pandas as pd
     import numpy as np
```

```
[5]: train=open('/Users/kaharbawa/Documents/ANAL 535 ML II/train.csv')
     test= open('/Users/kaharbawa/Documents/ANAL 535 ML II/test.csv')
```

```
[6]: train=pd.read_csv(train)
     test=pd.read_csv(test)
```

```
[9]: train[:2]
```

```
[9]:    Id  MSSubClass MSZoning  LotFrontage  LotArea Street Alley LotShape  \
     0   1          60       RL         65.0     8450   Pave   NaN      Reg
     1   2          20       RL         80.0     9600   Pave   NaN      Reg

       LandContour Utilities  … PoolArea PoolQC Fence MiscFeature MiscVal MoSold  \
     0         Lvl    AllPub  …        0    NaN   NaN         NaN       0      2
     1         Lvl    AllPub  …        0    NaN   NaN         NaN       0      5

       YrSold  SaleType  SaleCondition  SalePrice
     0   2008        WD         Normal     208500
     1   2007        WD         Normal     181500

     [2 rows x 81 columns]
```

```
[8]:  test[:2]
```

```
[8]:      Id  MSSubClass MSZoning  LotFrontage  LotArea Street Alley LotShape  \
     0  1461          20       RH         80.0    11622   Pave   NaN      Reg
     1  1462          20       RL         81.0    14267   Pave   NaN      IR1

       LandContour Utilities  … ScreenPorch PoolArea PoolQC  Fence MiscFeature  \
     0         Lvl    AllPub  …         120        0    NaN  MnPrv         NaN
     1         Lvl    AllPub  …           0        0    NaN    NaN        Gar2
```

```
     MiscVal MoSold  YrSold  SaleType  SaleCondition
0          0       6    2010        WD         Normal
1      12500       6    2010        WD         Normal

[2 rows x 80 columns]
```

[7]:
```python
target=train['SalePrice']
train.drop(['SalePrice','Id'], axis=1, inplace=True)
combined=train.append(test)
```

[8]:
```python
combined.head()
```

[8]:
```
   MSSubClass MSZoning  LotFrontage  LotArea Street Alley LotShape  \
0          60       RL         65.0     8450   Pave   NaN      Reg
1          20       RL         80.0     9600   Pave   NaN      Reg
2          60       RL         68.0    11250   Pave   NaN      IR1
3          70       RL         60.0     9550   Pave   NaN      IR1
4          60       RL         84.0    14260   Pave   NaN      IR1

  LandContour Utilities LotConfig  … PoolArea PoolQC Fence MiscFeature  \
0         Lvl    AllPub    Inside  …        0    NaN   NaN         NaN
1         Lvl    AllPub       FR2  …        0    NaN   NaN         NaN
2         Lvl    AllPub    Inside  …        0    NaN   NaN         NaN
3         Lvl    AllPub    Corner  …        0    NaN   NaN         NaN
4         Lvl    AllPub       FR2  …        0    NaN   NaN         NaN

   MiscVal MoSold  YrSold  SaleType  SaleCondition  Id
0        0       2    2008        WD         Normal NaN
1        0       5    2007        WD         Normal NaN
2        0       9    2008        WD         Normal NaN
3        0       2    2006        WD        Abnorml NaN
4        0      12    2008        WD         Normal NaN

[5 rows x 80 columns]
```

[9]:
```python
target.head()
```

[9]:
```
0    208500
1    181500
2    223500
3    140000
4    250000
Name: SalePrice, dtype: int64
```

[79]:
```python
combined.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
Int64Index: 2919 entries, 0 to 1458
Data columns (total 80 columns):
 #   Column         Non-Null Count   Dtype
---  ------         --------------   -----
 0   MSSubClass     2919 non-null    int64
 1   MSZoning       2915 non-null    object
 2   LotFrontage    2433 non-null    float64
 3   LotArea        2919 non-null    int64
 4   Street         2919 non-null    object
 5   Alley          198 non-null     object
 6   LotShape       2919 non-null    object
 7   LandContour    2919 non-null    object
 8   Utilities      2917 non-null    object
 9   LotConfig      2919 non-null    object
 10  LandSlope      2919 non-null    object
 11  Neighborhood   2919 non-null    object
 12  Condition1     2919 non-null    object
 13  Condition2     2919 non-null    object
 14  BldgType       2919 non-null    object
 15  HouseStyle     2919 non-null    object
 16  OverallQual    2919 non-null    int64
 17  OverallCond    2919 non-null    int64
 18  YearBuilt      2919 non-null    int64
 19  YearRemodAdd   2919 non-null    int64
 20  RoofStyle      2919 non-null    object
 21  RoofMatl       2919 non-null    object
 22  Exterior1st    2918 non-null    object
 23  Exterior2nd    2918 non-null    object
 24  MasVnrType     2895 non-null    object
 25  MasVnrArea     2896 non-null    float64
 26  ExterQual      2919 non-null    object
 27  ExterCond      2919 non-null    object
 28  Foundation     2919 non-null    object
 29  BsmtQual       2838 non-null    object
 30  BsmtCond       2837 non-null    object
 31  BsmtExposure   2837 non-null    object
 32  BsmtFinType1   2840 non-null    object
 33  BsmtFinSF1     2918 non-null    float64
 34  BsmtFinType2   2839 non-null    object
 35  BsmtFinSF2     2918 non-null    float64
 36  BsmtUnfSF      2918 non-null    float64
 37  TotalBsmtSF    2918 non-null    float64
 38  Heating        2919 non-null    object
 39  HeatingQC      2919 non-null    object
 40  CentralAir     2919 non-null    object
 41  Electrical     2918 non-null    object
 42  1stFlrSF       2919 non-null    int64
 43  2ndFlrSF       2919 non-null    int64
```

```
44  LowQualFinSF   2919 non-null   int64
45  GrLivArea      2919 non-null   int64
46  BsmtFullBath   2917 non-null   float64
47  BsmtHalfBath   2917 non-null   float64
48  FullBath       2919 non-null   int64
49  HalfBath       2919 non-null   int64
50  BedroomAbvGr   2919 non-null   int64
51  KitchenAbvGr   2919 non-null   int64
52  KitchenQual    2918 non-null   object
53  TotRmsAbvGrd   2919 non-null   int64
54  Functional     2917 non-null   object
55  Fireplaces     2919 non-null   int64
56  FireplaceQu    1499 non-null   object
57  GarageType     2762 non-null   object
58  GarageYrBlt    2760 non-null   float64
59  GarageFinish   2760 non-null   object
60  GarageCars     2918 non-null   float64
61  GarageArea     2918 non-null   float64
62  GarageQual     2760 non-null   object
63  GarageCond     2760 non-null   object
64  PavedDrive     2919 non-null   object
65  WoodDeckSF     2919 non-null   int64
66  OpenPorchSF    2919 non-null   int64
67  EnclosedPorch  2919 non-null   int64
68  3SsnPorch      2919 non-null   int64
69  ScreenPorch    2919 non-null   int64
70  PoolArea       2919 non-null   int64
71  PoolQC         10 non-null     object
72  Fence          571 non-null    object
73  MiscFeature    105 non-null    object
74  MiscVal        2919 non-null   int64
75  MoSold         2919 non-null   int64
76  YrSold         2919 non-null   int64
77  SaleType       2918 non-null   object
78  SaleCondition  2919 non-null   object
79  Id             1459 non-null   float64
dtypes: float64(12), int64(25), object(43)
memory usage: 1.8+ MB
```

2 Descriptive statistics

clearly from the above output we can see that we have a lot of missing values in some of our features both from the training and test data. We shall drop the missing values going forward.

```
[10]: # Droping missing values
      def get_cols_with_no_nans(df,col_type):
```

```python
        if (col_type == 'num'):
            predictors = df.select_dtypes(exclude=['object'])
        elif (col_type == 'no_num'):
            predictors = df.select_dtypes(include=['object'])
        elif (col_type == 'all'):
            predictors = df
        else :
            print('Error : choose a type (num, no_num, all)')
            return 0
        cols_with_no_nans = []
        for col in predictors.columns:
            if not df[col].isnull().any():
                cols_with_no_nans.append(col)
        return cols_with_no_nans
```

[11]:
```python
# Call the function
num_cols = get_cols_with_no_nans(combined , 'num')
cat_cols = get_cols_with_no_nans(combined , 'no_num')
```

[12]:
```python
# How many columns we got
print ('Number of numerical columns with no nan values =',len(num_cols))
print ('Number of non-numerical columns with no nan values =',len(cat_cols))
```

Number of numerical columns with no nan values = 25
Number of non-numerical columns with no nan values = 20

[13]:
```python
combined[num_cols].shape, combined[cat_cols].shape
```
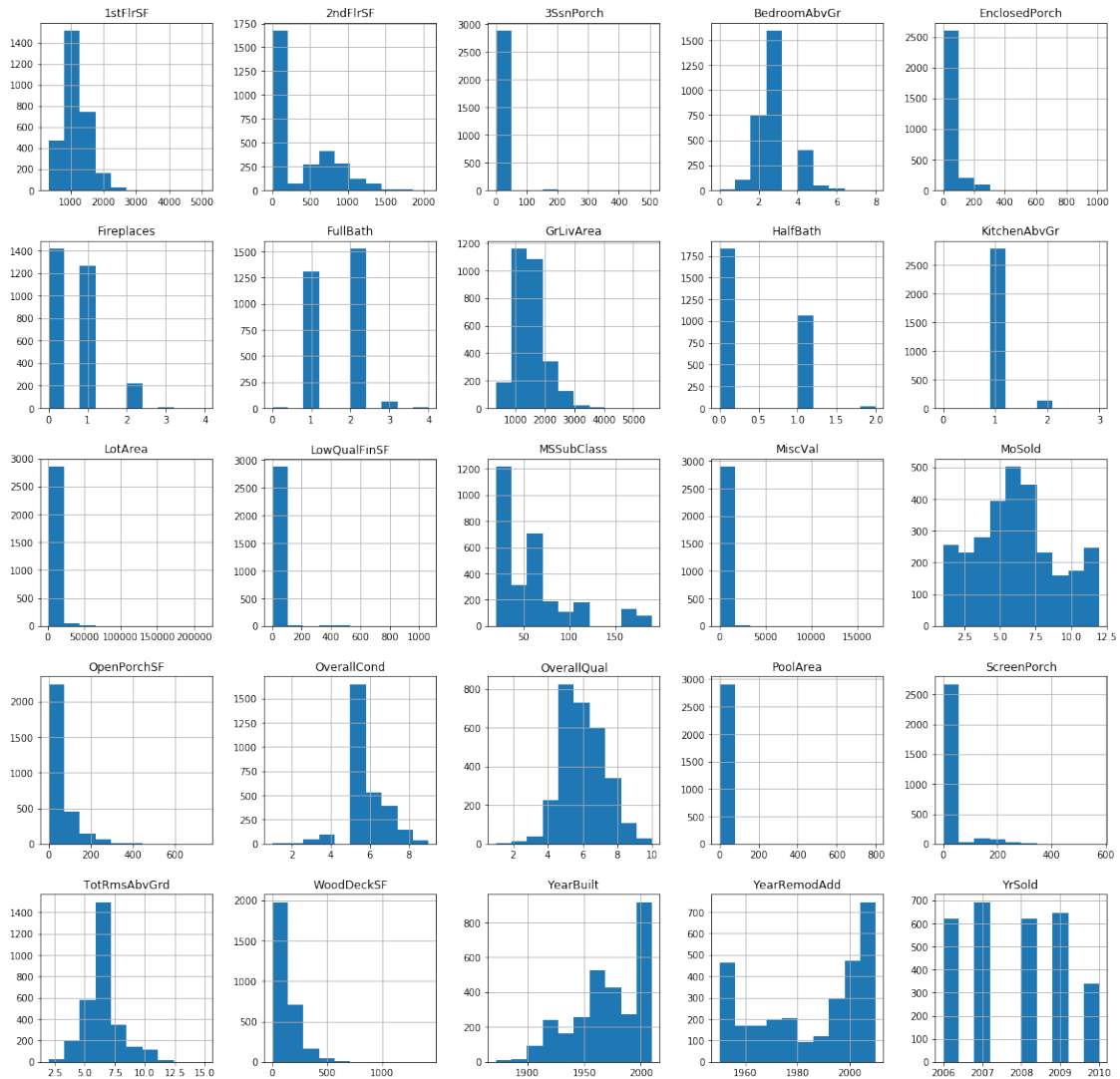
[13]: ((2919, 25), (2919, 20))

[14]:
```python
# we now have 45 colums (features) after droping features with missing values.
```
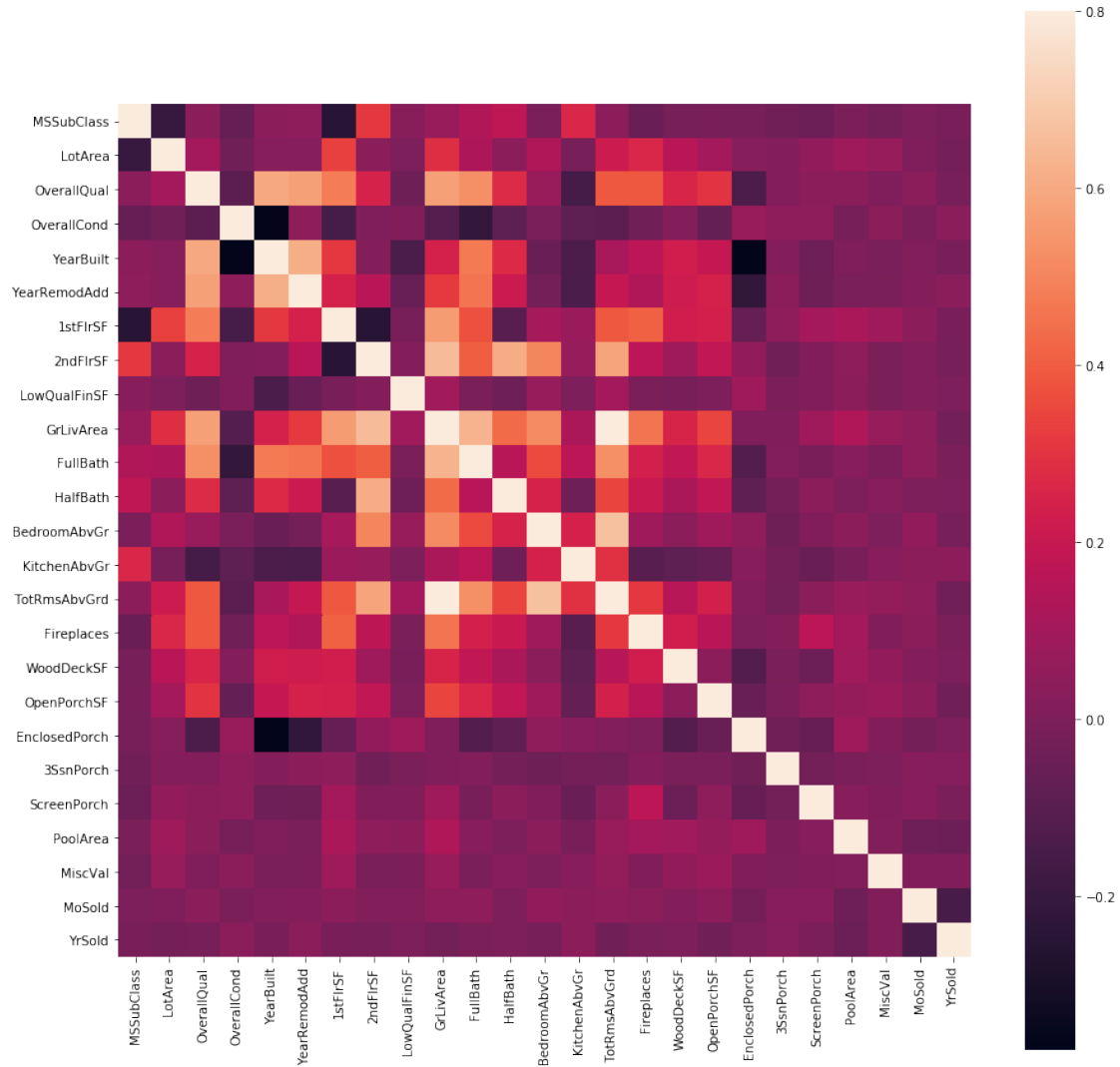
[16]:
```python
# Graphs
import matplotlib.pyplot as plt
combined=combined[num_cols+cat_cols]
combined.hist(figsize=(20,20))
plt.show()
```

```
[17]: import seaborn as sb
      # How many of features are correlated
      train = train[num_cols + cat_cols]

      C_mat = combined.corr()
      fig = plt.figure(figsize = (15,15))
      sb.heatmap(C_mat, vmax = .8, square = True)
      plt.show()
      # Looks like 15 correlated features
```

```
[18]: import numpy as np
      # We will encode the categorical features using one hot encoding.
      def oneHotEncode(df,colNames):
          for col in colNames:
              if( df[col].dtype == np.dtype('object')):
                  dummies = pd.get_dummies(df[col],prefix=col)
                  df = pd.concat([df,dummies],axis=1)

                  #drop the encoded column
                  df.drop([col],axis = 1 , inplace=True)
          return df
```

```python
print('There were {} columns before encoding categorical features'.
 ↪format(combined.shape[1]))
combined = oneHotEncode(combined, cat_cols)
print('There are {} columns after encoding categorical features'.
 ↪format(combined.shape[1]))
```

```
There were 45 columns before encoding categorical features
There are 149 columns after encoding categorical features
```

```python
[45]: # Split data to train and test
      def split_combined():
          global combined
          train = combined[:1460]
          test = combined[1460:]

          return train , test

      train, test = split_combined()
```

```python
[46]: target.shape, train.shape
```

```
[46]: ((1460,), (1460, 149))
```

```python
[21]: train.shape
```

```
[21]: (1460, 149)
```

3   Neuron Network

```python
[47]: from tensorflow.keras.layers import Input, Dense
      from tensorflow.keras import Sequential

      # We Use 'relu' as the activation function for the hidden layers
      # We Use a 'normal' initializer as the kernal_intializer


      NN_model = Sequential()

      # The Input Layer :
      NN_model.add(Dense(128, kernel_initializer='normal',input_dim = train.shape[1],␣
       ↪activation='relu'))

      # The Hidden Layers :
      NN_model.add(Dense(256, kernel_initializer='normal',activation='relu'))
      NN_model.add(Dense(256, kernel_initializer='normal',activation='relu'))
      NN_model.add(Dense(256, kernel_initializer='normal',activation='relu'))
```

```
# The Output Layer :
NN_model.add(Dense(1, kernel_initializer='normal',activation='linear'))

# Compile the network :
NN_model.compile(loss='mean_absolute_error', optimizer='adam',␣
 ↪metrics=['mean_absolute_error'])
```

[48]:
```
NN_model.summary()
```

```
Model: "sequential_2"
_____
Layer (type)                 Output Shape              Param #
=================================================================
dense_10 (Dense)             (None, 128)               19200
_____
dense_11 (Dense)             (None, 256)               33024
_____
dense_12 (Dense)             (None, 256)               65792
_____
dense_13 (Dense)             (None, 256)               65792
_____
dense_14 (Dense)             (None, 1)                 257
=================================================================
Total params: 184,065
Trainable params: 184,065
Non-trainable params: 0
_____
```

[50]:
```
from tensorflow.keras.callbacks import ModelCheckpoint
# Define a checkpoint to save the data
checkpoint_name = '/Users/kaharbawa/Documents/MyCodes.h5'
checkpoint = ModelCheckpoint(checkpoint_name, monitor='val_loss', verbose = 1,␣
 ↪save_best_only = True, mode ='auto')
callbacks_list = [checkpoint]
```

[51]:
```
# Train the model
hist = NN_model.fit(train, target, epochs=250, batch_size=32, validation_split␣
 ↪= 0.2, callbacks=callbacks_list)
```

```
Train on 1168 samples, validate on 292 samples
Epoch 1/250
 832/1168 [====================>…] - ETA: 0s - loss: 155239.0146 -
mean_absolute_error: 155239.0156
Epoch 00001: val_loss improved from inf to 52783.98108, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 343us/sample - loss: 128478.5849
```

```
- mean_absolute_error: 128478.5781 - val_loss: 52783.9811 -
val_mean_absolute_error: 52783.9805
Epoch 2/250
 672/1168 [================>…] - ETA: 0s - loss: 55352.2924 -
mean_absolute_error: 55352.2930
Epoch 00002: val_loss improved from 52783.98108 to 47707.56475, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 121us/sample - loss: 52077.3593
- mean_absolute_error: 52077.3633 - val_loss: 47707.5647 -
val_mean_absolute_error: 47707.5703
Epoch 3/250
 704/1168 [================>…] - ETA: 0s - loss: 46907.0437 -
mean_absolute_error: 46907.0391
Epoch 00003: val_loss did not improve from 47707.56475
1168/1168 [==============================] - 0s 86us/sample - loss: 45860.2397 -
mean_absolute_error: 45860.2422 - val_loss: 50140.1920 -
val_mean_absolute_error: 50140.1953
Epoch 4/250
 608/1168 [=============>…] - ETA: 0s - loss: 43118.4603 -
mean_absolute_error: 43118.4570
Epoch 00004: val_loss improved from 47707.56475 to 41528.14838, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 150us/sample - loss: 41902.4106
- mean_absolute_error: 41902.4062 - val_loss: 41528.1484 -
val_mean_absolute_error: 41528.1484
Epoch 5/250
1120/1168 [===========================>..] - ETA: 0s - loss: 38390.5434 -
mean_absolute_error: 38390.5430
Epoch 00005: val_loss improved from 41528.14838 to 39698.84241, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 135us/sample - loss: 38544.0323
- mean_absolute_error: 38544.0312 - val_loss: 39698.8424 -
val_mean_absolute_error: 39698.8398
Epoch 6/250
 640/1168 [===============>…] - ETA: 0s - loss: 36328.9940 -
mean_absolute_error: 36328.9922
Epoch 00006: val_loss did not improve from 39698.84241
1168/1168 [==============================] - 0s 92us/sample - loss: 37554.8553 -
mean_absolute_error: 37554.8594 - val_loss: 41136.5752 -
val_mean_absolute_error: 41136.5742
Epoch 7/250
 736/1168 [================>…] - ETA: 0s - loss: 35088.1043 -
mean_absolute_error: 35088.1055
Epoch 00007: val_loss improved from 39698.84241 to 39246.20698, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 112us/sample - loss: 34691.3697
- mean_absolute_error: 34691.3711 - val_loss: 39246.2070 -
val_mean_absolute_error: 39246.2031
```

```
Epoch 8/250
  800/1168 [==================>…] - ETA: 0s - loss: 33782.4791 -
mean_absolute_error: 33782.4766
Epoch 00008: val_loss did not improve from 39246.20698
1168/1168 [==============================] - 0s 78us/sample - loss: 33910.9962 -
mean_absolute_error: 33910.9961 - val_loss: 39380.3196 -
val_mean_absolute_error: 39380.3203
Epoch 9/250
  672/1168 [===============>…] - ETA: 0s - loss: 34037.6523 -
mean_absolute_error: 34037.6562
Epoch 00009: val_loss improved from 39246.20698 to 36159.34182, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 121us/sample - loss: 32732.9671
- mean_absolute_error: 32732.9648 - val_loss: 36159.3418 -
val_mean_absolute_error: 36159.3438
Epoch 10/250
  704/1168 [================>…] - ETA: 0s - loss: 32205.5449 -
mean_absolute_error: 32205.5430
Epoch 00010: val_loss improved from 36159.34182 to 36025.50985, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 111us/sample - loss: 33625.6393
- mean_absolute_error: 33625.6328 - val_loss: 36025.5098 -
val_mean_absolute_error: 36025.5078
Epoch 11/250
  736/1168 [================>…] - ETA: 0s - loss: 31571.6086 -
mean_absolute_error: 31571.6055
Epoch 00011: val_loss did not improve from 36025.50985
1168/1168 [==============================] - 0s 80us/sample - loss: 32565.4184 -
mean_absolute_error: 32565.4180 - val_loss: 36168.9882 -
val_mean_absolute_error: 36168.9844
Epoch 12/250
  832/1168 [===================>…] - ETA: 0s - loss: 31467.2011 -
mean_absolute_error: 31467.2012
Epoch 00012: val_loss improved from 36025.50985 to 35202.24181, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 104us/sample - loss: 32078.8120
- mean_absolute_error: 32078.8184 - val_loss: 35202.2418 -
val_mean_absolute_error: 35202.2383
Epoch 13/250
  640/1168 [==============>…] - ETA: 0s - loss: 32010.1166 -
mean_absolute_error: 32010.1152
Epoch 00013: val_loss improved from 35202.24181 to 34765.00797, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 125us/sample - loss: 32000.7608
- mean_absolute_error: 32000.7676 - val_loss: 34765.0080 -
val_mean_absolute_error: 34765.0117
Epoch 14/250
  864/1168 [===================>…] - ETA: 0s - loss: 32083.0754 -
```

mean_absolute_error: 32083.0742
Epoch 00014: val_loss did not improve from 34765.00797
1168/1168 [==============================] - 0s 74us/sample - loss: 32840.7049 -
mean_absolute_error: 32840.7031 - val_loss: 35498.8957 -
val_mean_absolute_error: 35498.9023
Epoch 15/250
 704/1168 [=================>…] - ETA: 0s - loss: 34441.9511 -
mean_absolute_error: 34441.9492
Epoch 00015: val_loss did not improve from 34765.00797
1168/1168 [==============================] - 0s 99us/sample - loss: 33027.8598 -
mean_absolute_error: 33027.8594 - val_loss: 35102.0847 -
val_mean_absolute_error: 35102.0859
Epoch 16/250
 608/1168 [==============>…] - ETA: 0s - loss: 31983.6922 -
mean_absolute_error: 31983.6934
Epoch 00016: val_loss improved from 34765.00797 to 34269.78435, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 121us/sample - loss: 33850.6846
- mean_absolute_error: 33850.6875 - val_loss: 34269.7844 -
val_mean_absolute_error: 34269.7891
Epoch 17/250
 736/1168 [=================>…] - ETA: 0s - loss: 32578.9357 -
mean_absolute_error: 32578.9355
Epoch 00017: val_loss did not improve from 34269.78435
1168/1168 [==============================] - 0s 83us/sample - loss: 35887.4233 -
mean_absolute_error: 35887.4219 - val_loss: 35436.8008 -
val_mean_absolute_error: 35436.7969
Epoch 18/250
 768/1168 [==================>…] - ETA: 0s - loss: 31925.5329 -
mean_absolute_error: 31925.5332
Epoch 00018: val_loss did not improve from 34269.78435
1168/1168 [==============================] - 0s 81us/sample - loss: 32457.5060 -
mean_absolute_error: 32457.5078 - val_loss: 35823.1813 -
val_mean_absolute_error: 35823.1797
Epoch 19/250
 704/1168 [=================>…] - ETA: 0s - loss: 32656.2390 -
mean_absolute_error: 32656.2363
Epoch 00019: val_loss improved from 34269.78435 to 34247.51423, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 135us/sample - loss: 31744.5869
- mean_absolute_error: 31744.5859 - val_loss: 34247.5142 -
val_mean_absolute_error: 34247.5156
Epoch 20/250
 608/1168 [==============>…] - ETA: 0s - loss: 31064.1382 -
mean_absolute_error: 31064.1387
Epoch 00020: val_loss did not improve from 34247.51423
1168/1168 [==============================] - 0s 94us/sample - loss: 32093.8836 -
mean_absolute_error: 32093.8867 - val_loss: 34808.3695 -

val_mean_absolute_error: 34808.3711
Epoch 21/250
 640/1168 [==============>…] - ETA: 0s - loss: 31067.8403 -
mean_absolute_error: 31067.8379
Epoch 00021: val_loss improved from 34247.51423 to 34152.17230, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 125us/sample - loss: 32365.9114
- mean_absolute_error: 32365.9082 - val_loss: 34152.1723 -
val_mean_absolute_error: 34152.1719
Epoch 22/250
 800/1168 [===================>…] - ETA: 0s - loss: 32092.6759 -
mean_absolute_error: 32092.6719
Epoch 00022: val_loss did not improve from 34152.17230
1168/1168 [==============================] - 0s 85us/sample - loss: 31883.4185 -
mean_absolute_error: 31883.4141 - val_loss: 34690.0455 -
val_mean_absolute_error: 34690.0469
Epoch 23/250
 736/1168 [=================>…] - ETA: 0s - loss: 31261.2874 -
mean_absolute_error: 31261.2871
Epoch 00023: val_loss did not improve from 34152.17230
1168/1168 [==============================] - 0s 82us/sample - loss: 31776.4711 -
mean_absolute_error: 31776.4688 - val_loss: 38688.5477 -
val_mean_absolute_error: 38688.5430
Epoch 24/250
 704/1168 [=================>…] - ETA: 0s - loss: 31990.6094 -
mean_absolute_error: 31990.6074
Epoch 00024: val_loss did not improve from 34152.17230
1168/1168 [==============================] - 0s 84us/sample - loss: 32122.6751 -
mean_absolute_error: 32122.6738 - val_loss: 35869.7930 -
val_mean_absolute_error: 35869.7969
Epoch 25/250
 736/1168 [=================>…] - ETA: 0s - loss: 31042.9605 -
mean_absolute_error: 31042.9531
Epoch 00025: val_loss did not improve from 34152.17230
1168/1168 [==============================] - 0s 83us/sample - loss: 31208.8011 -
mean_absolute_error: 31208.7988 - val_loss: 36447.2992 -
val_mean_absolute_error: 36447.2969
Epoch 26/250
 832/1168 [===================>…] - ETA: 0s - loss: 30573.3477 -
mean_absolute_error: 30573.3477
Epoch 00026: val_loss did not improve from 34152.17230
1168/1168 [==============================] - 0s 72us/sample - loss: 30815.9010 -
mean_absolute_error: 30815.9004 - val_loss: 34891.8291 -
val_mean_absolute_error: 34891.8281
Epoch 27/250
 768/1168 [=================>…] - ETA: 0s - loss: 30683.6741 -
mean_absolute_error: 30683.6719
Epoch 00027: val_loss did not improve from 34152.17230

13

```
1168/1168 [==============================] - 0s 80us/sample - loss: 30769.1025 -
mean_absolute_error: 30769.0996 - val_loss: 34861.5043 -
val_mean_absolute_error: 34861.5039
Epoch 28/250
  768/1168 [==================>…] - ETA: 0s - loss: 31790.7552 -
mean_absolute_error: 31790.7520
Epoch 00028: val_loss did not improve from 34152.17230
1168/1168 [==============================] - 0s 83us/sample - loss: 30868.3661 -
mean_absolute_error: 30868.3594 - val_loss: 34809.4110 -
val_mean_absolute_error: 34809.4102
Epoch 29/250
  704/1168 [=================>…] - ETA: 0s - loss: 32037.5105 -
mean_absolute_error: 32037.5078
Epoch 00029: val_loss improved from 34152.17230 to 33879.64266, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 125us/sample - loss: 31187.5611
- mean_absolute_error: 31187.5586 - val_loss: 33879.6427 -
val_mean_absolute_error: 33879.6445
Epoch 30/250
  672/1168 [================>…] - ETA: 0s - loss: 30656.0189 -
mean_absolute_error: 30656.0156
Epoch 00030: val_loss did not improve from 33879.64266
1168/1168 [==============================] - 0s 86us/sample - loss: 30841.4267 -
mean_absolute_error: 30841.4219 - val_loss: 33933.8530 -
val_mean_absolute_error: 33933.8516
Epoch 31/250
  672/1168 [================>…] - ETA: 0s - loss: 30272.0379 -
mean_absolute_error: 30272.0352
Epoch 00031: val_loss improved from 33879.64266 to 33683.85814, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 114us/sample - loss: 30634.7978
- mean_absolute_error: 30634.7949 - val_loss: 33683.8581 -
val_mean_absolute_error: 33683.8555
Epoch 32/250
  800/1168 [===================>…] - ETA: 0s - loss: 28133.9295 -
mean_absolute_error: 28133.9297
Epoch 00032: val_loss did not improve from 33683.85814
1168/1168 [==============================] - 0s 73us/sample - loss: 30247.0427 -
mean_absolute_error: 30247.0449 - val_loss: 34183.8638 -
val_mean_absolute_error: 34183.8633
Epoch 33/250
  864/1168 [====================>…] - ETA: 0s - loss: 28833.1928 -
mean_absolute_error: 28833.1953
Epoch 00033: val_loss did not improve from 33683.85814
1168/1168 [==============================] - 0s 75us/sample - loss: 30182.7370 -
mean_absolute_error: 30182.7363 - val_loss: 34910.8970 -
val_mean_absolute_error: 34910.8984
Epoch 34/250
```

```
 704/1168 [=================>…] - ETA: 0s - loss: 31071.3469 -
mean_absolute_error: 31071.3438
Epoch 00034: val_loss did not improve from 33683.85814
1168/1168 [==============================] - 0s 85us/sample - loss: 30793.9097 -
mean_absolute_error: 30793.9043 - val_loss: 35072.8215 -
val_mean_absolute_error: 35072.8203
Epoch 35/250
 864/1168 [====================>…] - ETA: 0s - loss: 32088.3371 -
mean_absolute_error: 32088.3359
Epoch 00035: val_loss improved from 33683.85814 to 33531.69719, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 101us/sample - loss: 31683.3742
- mean_absolute_error: 31683.3730 - val_loss: 33531.6972 -
val_mean_absolute_error: 33531.6992
Epoch 36/250
 800/1168 [==================>…] - ETA: 0s - loss: 30715.6905 -
mean_absolute_error: 30715.6895
Epoch 00036: val_loss did not improve from 33531.69719
1168/1168 [==============================] - 0s 78us/sample - loss: 30353.8243 -
mean_absolute_error: 30353.8262 - val_loss: 34468.4051 -
val_mean_absolute_error: 34468.4023
Epoch 37/250
 704/1168 [=================>…] - ETA: 0s - loss: 29844.6048 -
mean_absolute_error: 29844.6016
Epoch 00037: val_loss did not improve from 33531.69719
1168/1168 [==============================] - 0s 84us/sample - loss: 29948.4864 -
mean_absolute_error: 29948.4863 - val_loss: 34436.5104 -
val_mean_absolute_error: 34436.5117
Epoch 38/250
 768/1168 [=================>…] - ETA: 0s - loss: 29199.1560 -
mean_absolute_error: 29199.1504
Epoch 00038: val_loss did not improve from 33531.69719
1168/1168 [==============================] - 0s 82us/sample - loss: 29746.2732 -
mean_absolute_error: 29746.2715 - val_loss: 33810.1345 -
val_mean_absolute_error: 33810.1328
Epoch 39/250
 768/1168 [=================>…] - ETA: 0s - loss: 32082.6640 -
mean_absolute_error: 32082.6621
Epoch 00039: val_loss improved from 33531.69719 to 32692.27841, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 111us/sample - loss: 30771.8354
- mean_absolute_error: 30771.8359 - val_loss: 32692.2784 -
val_mean_absolute_error: 32692.2773
Epoch 40/250
 736/1168 [=================>…] - ETA: 0s - loss: 30001.1271 -
mean_absolute_error: 30001.1270
Epoch 00040: val_loss did not improve from 32692.27841
1168/1168 [==============================] - 0s 82us/sample - loss: 30184.5086 -
```

mean_absolute_error: 30184.5078 - val_loss: 33231.6824 -
val_mean_absolute_error: 33231.6797
Epoch 41/250
 896/1168 [=====================>…] - ETA: 0s - loss: 30575.4915 -
mean_absolute_error: 30575.4902
Epoch 00041: val_loss did not improve from 32692.27841
1168/1168 [==============================] - 0s 72us/sample - loss: 29526.9967 -
mean_absolute_error: 29526.9961 - val_loss: 33303.2532 -
val_mean_absolute_error: 33303.2461
Epoch 42/250
 928/1168 [=====================>…] - ETA: 0s - loss: 30323.6001 -
mean_absolute_error: 30323.6016
Epoch 00042: val_loss did not improve from 32692.27841
1168/1168 [==============================] - 0s 66us/sample - loss: 29964.0877 -
mean_absolute_error: 29964.0859 - val_loss: 35299.2802 -
val_mean_absolute_error: 35299.2812
Epoch 43/250
 768/1168 [=================>…] - ETA: 0s - loss: 33907.3436 -
mean_absolute_error: 33907.3398
Epoch 00043: val_loss did not improve from 32692.27841
1168/1168 [==============================] - 0s 84us/sample - loss: 32346.1071 -
mean_absolute_error: 32346.1055 - val_loss: 35919.7090 -
val_mean_absolute_error: 35919.7109
Epoch 44/250
 736/1168 [=================>…] - ETA: 0s - loss: 32144.5810 -
mean_absolute_error: 32144.5820
Epoch 00044: val_loss did not improve from 32692.27841
1168/1168 [==============================] - 0s 91us/sample - loss: 30599.6307 -
mean_absolute_error: 30599.6328 - val_loss: 34119.4879 -
val_mean_absolute_error: 34119.4883
Epoch 45/250
 672/1168 [===============>…] - ETA: 0s - loss: 29475.3535 -
mean_absolute_error: 29475.3535
Epoch 00045: val_loss improved from 32692.27841 to 32191.44785, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 119us/sample - loss: 29448.4035
- mean_absolute_error: 29448.4043 - val_loss: 32191.4479 -
val_mean_absolute_error: 32191.4492
Epoch 46/250
 896/1168 [=====================>…] - ETA: 0s - loss: 30861.9656 -
mean_absolute_error: 30861.9668
Epoch 00046: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 69us/sample - loss: 29732.2586 -
mean_absolute_error: 29732.2598 - val_loss: 36661.7276 -
val_mean_absolute_error: 36661.7305
Epoch 47/250
 960/1168 [=====================>…] - ETA: 0s - loss: 30258.8577 -
mean_absolute_error: 30258.8613

```
Epoch 00047: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 66us/sample - loss: 30151.8865 -
mean_absolute_error: 30151.8867 - val_loss: 34888.8101 -
val_mean_absolute_error: 34888.8125
Epoch 48/250
 736/1168 [================>…] - ETA: 0s - loss: 28193.4052 -
mean_absolute_error: 28193.4043
Epoch 00048: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 84us/sample - loss: 29787.6891 -
mean_absolute_error: 29787.6875 - val_loss: 33360.7427 -
val_mean_absolute_error: 33360.7422
Epoch 49/250
 864/1168 [====================>…] - ETA: 0s - loss: 29762.7806 -
mean_absolute_error: 29762.7773
Epoch 00049: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 71us/sample - loss: 29536.5982 -
mean_absolute_error: 29536.5918 - val_loss: 33385.5704 -
val_mean_absolute_error: 33385.5703
Epoch 50/250
 832/1168 [===================>…] - ETA: 0s - loss: 29709.3022 -
mean_absolute_error: 29709.3008
Epoch 00050: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 75us/sample - loss: 29781.2681 -
mean_absolute_error: 29781.2676 - val_loss: 36468.0219 -
val_mean_absolute_error: 36468.0195
Epoch 51/250
 704/1168 [================>…] - ETA: 0s - loss: 29554.8417 -
mean_absolute_error: 29554.8359
Epoch 00051: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 86us/sample - loss: 29825.8890 -
mean_absolute_error: 29825.8867 - val_loss: 33015.5004 -
val_mean_absolute_error: 33015.5039
Epoch 52/250
 800/1168 [==================>…] - ETA: 0s - loss: 29154.7438 -
mean_absolute_error: 29154.7480
Epoch 00052: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 81us/sample - loss: 29176.9578 -
mean_absolute_error: 29176.9629 - val_loss: 33229.2054 -
val_mean_absolute_error: 33229.2070
Epoch 53/250
 736/1168 [================>…] - ETA: 0s - loss: 28539.8126 -
mean_absolute_error: 28539.8145
Epoch 00053: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 91us/sample - loss: 29762.3333 -
mean_absolute_error: 29762.3320 - val_loss: 33550.7125 -
val_mean_absolute_error: 33550.7109
Epoch 54/250
 672/1168 [===============>…] - ETA: 0s - loss: 29177.8201 -
```

mean_absolute_error: 29177.8223
Epoch 00054: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 91us/sample - loss: 29166.0677 -
mean_absolute_error: 29166.0645 - val_loss: 32246.5001 -
val_mean_absolute_error: 32246.5000
Epoch 55/250
 768/1168 [=================>…] - ETA: 0s - loss: 29534.4198 -
mean_absolute_error: 29534.4199
Epoch 00055: val_loss did not improve from 32191.44785
1168/1168 [==============================] - 0s 79us/sample - loss: 29087.1648 -
mean_absolute_error: 29087.1641 - val_loss: 32746.5761 -
val_mean_absolute_error: 32746.5762
Epoch 56/250
 832/1168 [===================>…] - ETA: 0s - loss: 29023.2583 -
mean_absolute_error: 29023.2539
Epoch 00056: val_loss improved from 32191.44785 to 32123.87607, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 107us/sample - loss: 28824.4979
- mean_absolute_error: 28824.4961 - val_loss: 32123.8761 -
val_mean_absolute_error: 32123.8730
Epoch 57/250
 832/1168 [===================>…] - ETA: 0s - loss: 28043.3101 -
mean_absolute_error: 28043.3125
Epoch 00057: val_loss improved from 32123.87607 to 31453.59525, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 94us/sample - loss: 28235.9706 -
mean_absolute_error: 28235.9727 - val_loss: 31453.5952 -
val_mean_absolute_error: 31453.5957
Epoch 58/250
 800/1168 [===================>…] - ETA: 0s - loss: 28493.4007 -
mean_absolute_error: 28493.4004
Epoch 00058: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 79us/sample - loss: 28052.4052 -
mean_absolute_error: 28052.4043 - val_loss: 31511.9160 -
val_mean_absolute_error: 31511.9180
Epoch 59/250
 736/1168 [================>…] - ETA: 0s - loss: 29309.2097 -
mean_absolute_error: 29309.2090
Epoch 00059: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 87us/sample - loss: 28635.8079 -
mean_absolute_error: 28635.8086 - val_loss: 32666.0611 -
val_mean_absolute_error: 32666.0625
Epoch 60/250
 928/1168 [====================>…] - ETA: 0s - loss: 29304.5348 -
mean_absolute_error: 29304.5352
Epoch 00060: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 68us/sample - loss: 28829.5176 -
mean_absolute_error: 28829.5176 - val_loss: 35145.4313 -

val_mean_absolute_error: 35145.4258
Epoch 61/250
 896/1168 [=====================>…] - ETA: 0s - loss: 27982.6736 -
mean_absolute_error: 27982.6719
Epoch 00061: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 69us/sample - loss: 28948.8578 -
mean_absolute_error: 28948.8555 - val_loss: 31664.3407 -
val_mean_absolute_error: 31664.3398
Epoch 62/250
 864/1168 [====================>…] - ETA: 0s - loss: 28123.9117 -
mean_absolute_error: 28123.9160
Epoch 00062: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 83us/sample - loss: 28522.0279 -
mean_absolute_error: 28522.0352 - val_loss: 31719.4104 -
val_mean_absolute_error: 31719.4102
Epoch 63/250
 832/1168 [===================>…] - ETA: 0s - loss: 28923.3026 -
mean_absolute_error: 28923.3027
Epoch 00063: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 76us/sample - loss: 28867.9112 -
mean_absolute_error: 28867.9102 - val_loss: 32136.6000 -
val_mean_absolute_error: 32136.5996
Epoch 64/250
 768/1168 [=================>…] - ETA: 0s - loss: 27920.0800 -
mean_absolute_error: 27920.0781
Epoch 00064: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 79us/sample - loss: 28452.1593 -
mean_absolute_error: 28452.1562 - val_loss: 31740.8403 -
val_mean_absolute_error: 31740.8418
Epoch 65/250
 768/1168 [=================>…] - ETA: 0s - loss: 29620.6308 -
mean_absolute_error: 29620.6328
Epoch 00065: val_loss did not improve from 31453.59525
1168/1168 [==============================] - 0s 80us/sample - loss: 27965.2107 -
mean_absolute_error: 27965.2148 - val_loss: 32025.3690 -
val_mean_absolute_error: 32025.3691
Epoch 66/250
 800/1168 [==================>…] - ETA: 0s - loss: 26611.1051 -
mean_absolute_error: 26611.1074
Epoch 00066: val_loss improved from 31453.59525 to 30396.13040, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 109us/sample - loss: 27656.5620
- mean_absolute_error: 27656.5625 - val_loss: 30396.1304 -
val_mean_absolute_error: 30396.1309
Epoch 67/250
 832/1168 [====================>…] - ETA: 0s - loss: 26974.0581 -
mean_absolute_error: 26974.0586
Epoch 00067: val_loss did not improve from 30396.13040

```
1168/1168 [==============================] - 0s 73us/sample - loss: 28380.8727 -
mean_absolute_error: 28380.8750 - val_loss: 32038.7288 -
val_mean_absolute_error: 32038.7324
Epoch 68/250
 896/1168 [=====================>…] - ETA: 0s - loss: 29313.4331 -
mean_absolute_error: 29313.4375
Epoch 00068: val_loss did not improve from 30396.13040
1168/1168 [==============================] - 0s 68us/sample - loss: 28583.4961 -
mean_absolute_error: 28583.4980 - val_loss: 31435.1298 -
val_mean_absolute_error: 31435.1309
Epoch 69/250
 864/1168 [====================>…] - ETA: 0s - loss: 27821.4127 -
mean_absolute_error: 27821.4141
Epoch 00069: val_loss did not improve from 30396.13040
1168/1168 [==============================] - 0s 71us/sample - loss: 28331.1892 -
mean_absolute_error: 28331.1895 - val_loss: 36308.2609 -
val_mean_absolute_error: 36308.2656
Epoch 70/250
 736/1168 [=================>…] - ETA: 0s - loss: 28550.6075 -
mean_absolute_error: 28550.6055
Epoch 00070: val_loss did not improve from 30396.13040
1168/1168 [==============================] - 0s 83us/sample - loss: 28963.0875 -
mean_absolute_error: 28963.0898 - val_loss: 30985.0016 -
val_mean_absolute_error: 30985.0000
Epoch 71/250
 736/1168 [=================>…] - ETA: 0s - loss: 27088.7100 -
mean_absolute_error: 27088.7090
Epoch 00071: val_loss did not improve from 30396.13040
1168/1168 [==============================] - 0s 86us/sample - loss: 27110.6453 -
mean_absolute_error: 27110.6465 - val_loss: 31495.4121 -
val_mean_absolute_error: 31495.4102
Epoch 72/250
 544/1168 [============>…] - ETA: 0s - loss: 28391.5043 -
mean_absolute_error: 28391.5059
Epoch 00072: val_loss improved from 30396.13040 to 29859.44954, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 125us/sample - loss: 27174.8448
- mean_absolute_error: 27174.8418 - val_loss: 29859.4495 -
val_mean_absolute_error: 29859.4492
Epoch 73/250
 832/1168 [====================>…] - ETA: 0s - loss: 27376.4243 -
mean_absolute_error: 27376.4199
Epoch 00073: val_loss did not improve from 29859.44954
1168/1168 [==============================] - 0s 73us/sample - loss: 26931.3653 -
mean_absolute_error: 26931.3652 - val_loss: 29874.1511 -
val_mean_absolute_error: 29874.1504
Epoch 74/250
 864/1168 [====================>…] - ETA: 0s - loss: 26053.7618 -
```

mean_absolute_error: 26053.7617
Epoch 00074: val_loss did not improve from 29859.44954
1168/1168 [==============================] - 0s 71us/sample - loss: 26694.0776 -
mean_absolute_error: 26694.0762 - val_loss: 30336.8198 -
val_mean_absolute_error: 30336.8184
Epoch 75/250
 832/1168 [====================>…] - ETA: 0s - loss: 27134.2820 -
mean_absolute_error: 27134.2832
Epoch 00075: val_loss did not improve from 29859.44954
1168/1168 [==============================] - 0s 71us/sample - loss: 27388.9806 -
mean_absolute_error: 27388.9824 - val_loss: 30115.7128 -
val_mean_absolute_error: 30115.7129
Epoch 76/250
 864/1168 [====================>…] - ETA: 0s - loss: 26785.3132 -
mean_absolute_error: 26785.3145
Epoch 00076: val_loss did not improve from 29859.44954
1168/1168 [==============================] - 0s 70us/sample - loss: 26558.9389 -
mean_absolute_error: 26558.9375 - val_loss: 30569.8814 -
val_mean_absolute_error: 30569.8809
Epoch 77/250
 864/1168 [====================>…] - ETA: 0s - loss: 27082.6343 -
mean_absolute_error: 27082.6289
Epoch 00077: val_loss did not improve from 29859.44954
1168/1168 [==============================] - 0s 69us/sample - loss: 26329.0027 -
mean_absolute_error: 26328.9980 - val_loss: 30457.8235 -
val_mean_absolute_error: 30457.8223
Epoch 78/250
 960/1168 [======================>…] - ETA: 0s - loss: 25680.7821 -
mean_absolute_error: 25680.7812
Epoch 00078: val_loss improved from 29859.44954 to 29268.49112, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 93us/sample - loss: 25820.3559 -
mean_absolute_error: 25820.3555 - val_loss: 29268.4911 -
val_mean_absolute_error: 29268.4922
Epoch 79/250
 832/1168 [====================>…] - ETA: 0s - loss: 27035.1417 -
mean_absolute_error: 27035.1387
Epoch 00079: val_loss improved from 29268.49112 to 29058.21987, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 111us/sample - loss: 26599.5158
- mean_absolute_error: 26599.5137 - val_loss: 29058.2199 -
val_mean_absolute_error: 29058.2188
Epoch 80/250
 736/1168 [=================>…] - ETA: 0s - loss: 26038.1072 -
mean_absolute_error: 26038.1094
Epoch 00080: val_loss did not improve from 29058.21987
1168/1168 [==============================] - 0s 86us/sample - loss: 26635.0174 -
mean_absolute_error: 26635.0215 - val_loss: 34346.3440 -

val_mean_absolute_error: 34346.3477
Epoch 81/250
 704/1168 [=================>…] - ETA: 0s - loss: 25001.7247 -
mean_absolute_error: 25001.7246
Epoch 00081: val_loss improved from 29058.21987 to 28590.50436, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 113us/sample - loss: 25798.7539
- mean_absolute_error: 25798.7520 - val_loss: 28590.5044 -
val_mean_absolute_error: 28590.5039
Epoch 82/250
 896/1168 [=====================>…] - ETA: 0s - loss: 26163.7504 -
mean_absolute_error: 26163.7500
Epoch 00082: val_loss did not improve from 28590.50436
1168/1168 [==============================] - 0s 68us/sample - loss: 26115.3195 -
mean_absolute_error: 26115.3203 - val_loss: 29249.6795 -
val_mean_absolute_error: 29249.6777
Epoch 83/250
 736/1168 [=================>…] - ETA: 0s - loss: 26001.3384 -
mean_absolute_error: 26001.3379
Epoch 00083: val_loss improved from 28590.50436 to 28066.30249, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 108us/sample - loss: 25898.2311
- mean_absolute_error: 25898.2285 - val_loss: 28066.3025 -
val_mean_absolute_error: 28066.3027
Epoch 84/250
 704/1168 [=================>…] - ETA: 0s - loss: 24342.9059 -
mean_absolute_error: 24342.9062
Epoch 00084: val_loss did not improve from 28066.30249
1168/1168 [==============================] - 0s 91us/sample - loss: 25472.3160 -
mean_absolute_error: 25472.3184 - val_loss: 28323.5153 -
val_mean_absolute_error: 28323.5156
Epoch 85/250
 608/1168 [==============>…] - ETA: 0s - loss: 24728.6521 -
mean_absolute_error: 24728.6504
Epoch 00085: val_loss did not improve from 28066.30249
1168/1168 [==============================] - 0s 96us/sample - loss: 25624.1049 -
mean_absolute_error: 25624.1035 - val_loss: 32125.9868 -
val_mean_absolute_error: 32125.9863
Epoch 86/250
 960/1168 [======================>…] - ETA: 0s - loss: 25808.6516 -
mean_absolute_error: 25808.6504
Epoch 00086: val_loss did not improve from 28066.30249
1168/1168 [==============================] - 0s 65us/sample - loss: 24948.2461 -
mean_absolute_error: 24948.2422 - val_loss: 28419.2021 -
val_mean_absolute_error: 28419.2012
Epoch 87/250
 800/1168 [===================>…] - ETA: 0s - loss: 24653.6883 -
mean_absolute_error: 24653.6855

Epoch 00087: val_loss improved from 28066.30249 to 27091.84594, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 108us/sample - loss: 25435.1467
- mean_absolute_error: 25435.1445 - val_loss: 27091.8459 -
val_mean_absolute_error: 27091.8477
Epoch 88/250
 736/1168 [=================>…] - ETA: 0s - loss: 24846.3863 -
mean_absolute_error: 24846.3828
Epoch 00088: val_loss did not improve from 27091.84594
1168/1168 [==============================] - 0s 83us/sample - loss: 24662.5448 -
mean_absolute_error: 24662.5430 - val_loss: 27265.7107 -
val_mean_absolute_error: 27265.7090
Epoch 89/250
 800/1168 [==================>…] - ETA: 0s - loss: 24262.1288 -
mean_absolute_error: 24262.1328
Epoch 00089: val_loss did not improve from 27091.84594
1168/1168 [==============================] - 0s 76us/sample - loss: 24001.2936 -
mean_absolute_error: 24001.2988 - val_loss: 28213.9228 -
val_mean_absolute_error: 28213.9238
Epoch 90/250
 832/1168 [====================>…] - ETA: 0s - loss: 24094.0053 -
mean_absolute_error: 24094.0039
Epoch 00090: val_loss did not improve from 27091.84594
1168/1168 [==============================] - 0s 72us/sample - loss: 25307.5134 -
mean_absolute_error: 25307.5137 - val_loss: 34392.2221 -
val_mean_absolute_error: 34392.2227
Epoch 91/250
 768/1168 [==================>…] - ETA: 0s - loss: 25568.5369 -
mean_absolute_error: 25568.5391
Epoch 00091: val_loss improved from 27091.84594 to 26806.25177, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 117us/sample - loss: 25089.6571
- mean_absolute_error: 25089.6562 - val_loss: 26806.2518 -
val_mean_absolute_error: 26806.2520
Epoch 92/250
 800/1168 [==================>…] - ETA: 0s - loss: 22283.9095 -
mean_absolute_error: 22283.9102
Epoch 00092: val_loss did not improve from 26806.25177
1168/1168 [==============================] - 0s 75us/sample - loss: 24069.7315 -
mean_absolute_error: 24069.7344 - val_loss: 27002.1516 -
val_mean_absolute_error: 27002.1523
Epoch 93/250
 896/1168 [=====================>…] - ETA: 0s - loss: 24119.8384 -
mean_absolute_error: 24119.8398
Epoch 00093: val_loss did not improve from 26806.25177
1168/1168 [==============================] - 0s 68us/sample - loss: 23737.2829 -
mean_absolute_error: 23737.2832 - val_loss: 30623.9830 -
val_mean_absolute_error: 30623.9824

```
Epoch 94/250
 896/1168 [=====================>…] - ETA: 0s - loss: 26852.7031 -
mean_absolute_error: 26852.7031
Epoch 00094: val_loss improved from 26806.25177 to 26597.68688, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 94us/sample - loss: 26279.5610 -
mean_absolute_error: 26279.5625 - val_loss: 26597.6869 -
val_mean_absolute_error: 26597.6855
Epoch 95/250
 960/1168 [=====================>…] - ETA: 0s - loss: 24836.8142 -
mean_absolute_error: 24836.8145
Epoch 00095: val_loss did not improve from 26597.68688
1168/1168 [==============================] - 0s 64us/sample - loss: 24899.3628 -
mean_absolute_error: 24899.3633 - val_loss: 34937.4534 -
val_mean_absolute_error: 34937.4531
Epoch 96/250
 832/1168 [===================>…] - ETA: 0s - loss: 24487.6669 -
mean_absolute_error: 24487.6660
Epoch 00096: val_loss improved from 26597.68688 to 26531.65154, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 104us/sample - loss: 24320.0374
- mean_absolute_error: 24320.0391 - val_loss: 26531.6515 -
val_mean_absolute_error: 26531.6523
Epoch 97/250
 800/1168 [===================>…] - ETA: 0s - loss: 23386.7884 -
mean_absolute_error: 23386.7891
Epoch 00097: val_loss did not improve from 26531.65154
1168/1168 [==============================] - 0s 73us/sample - loss: 22791.4824 -
mean_absolute_error: 22791.4863 - val_loss: 26937.6725 -
val_mean_absolute_error: 26937.6719
Epoch 98/250
 768/1168 [==================>…] - ETA: 0s - loss: 22113.7143 -
mean_absolute_error: 22113.7129
Epoch 00098: val_loss did not improve from 26531.65154
1168/1168 [==============================] - 0s 79us/sample - loss: 22280.2151 -
mean_absolute_error: 22280.2168 - val_loss: 28046.9335 -
val_mean_absolute_error: 28046.9355
Epoch 99/250
 800/1168 [===================>…] - ETA: 0s - loss: 21868.8155 -
mean_absolute_error: 21868.8184
Epoch 00099: val_loss did not improve from 26531.65154
1168/1168 [==============================] - 0s 88us/sample - loss: 23061.9843 -
mean_absolute_error: 23061.9863 - val_loss: 28384.1050 -
val_mean_absolute_error: 28384.1035
Epoch 100/250
1056/1168 [=========================>…] - ETA: 0s - loss: 22207.0454 -
mean_absolute_error: 22207.0410
Epoch 00100: val_loss did not improve from 26531.65154
```

```
1168/1168 [==============================] - 0s 121us/sample - loss: 22228.3991
- mean_absolute_error: 22228.3965 - val_loss: 27225.8003 -
val_mean_absolute_error: 27225.7988
Epoch 101/250
 608/1168 [==============>…] - ETA: 0s - loss: 22861.6777 -
mean_absolute_error: 22861.6797
Epoch 00101: val_loss did not improve from 26531.65154
1168/1168 [==============================] - 0s 94us/sample - loss: 22924.0844 -
mean_absolute_error: 22924.0840 - val_loss: 27096.1870 -
val_mean_absolute_error: 27096.1855
Epoch 102/250
 704/1168 [================>…] - ETA: 0s - loss: 22051.6833 -
mean_absolute_error: 22051.6855
Epoch 00102: val_loss improved from 26531.65154 to 25890.31312, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 118us/sample - loss: 21598.7257
- mean_absolute_error: 21598.7285 - val_loss: 25890.3131 -
val_mean_absolute_error: 25890.3145
Epoch 103/250
 672/1168 [===============>…] - ETA: 0s - loss: 21989.7873 -
mean_absolute_error: 21989.7891
Epoch 00103: val_loss did not improve from 25890.31312
1168/1168 [==============================] - 0s 92us/sample - loss: 22339.5205 -
mean_absolute_error: 22339.5215 - val_loss: 27879.9181 -
val_mean_absolute_error: 27879.9199
Epoch 104/250
 736/1168 [================>…] - ETA: 0s - loss: 21676.3265 -
mean_absolute_error: 21676.3262
Epoch 00104: val_loss improved from 25890.31312 to 24789.74007, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 110us/sample - loss: 22134.8504
- mean_absolute_error: 22134.8496 - val_loss: 24789.7401 -
val_mean_absolute_error: 24789.7402
Epoch 105/250
 832/1168 [===================>…] - ETA: 0s - loss: 20858.4908 -
mean_absolute_error: 20858.4922
Epoch 00105: val_loss did not improve from 24789.74007
1168/1168 [==============================] - 0s 76us/sample - loss: 21189.8816 -
mean_absolute_error: 21189.8828 - val_loss: 31342.0813 -
val_mean_absolute_error: 31342.0820
Epoch 106/250
 800/1168 [==================>…] - ETA: 0s - loss: 21765.5266 -
mean_absolute_error: 21765.5273
Epoch 00106: val_loss improved from 24789.74007 to 24719.48250, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 103us/sample - loss: 21706.0792
- mean_absolute_error: 21706.0781 - val_loss: 24719.4825 -
val_mean_absolute_error: 24719.4824
```

```
Epoch 107/250
  800/1168 [==================>…] - ETA: 0s - loss: 24459.3230 -
mean_absolute_error: 24459.3223
Epoch 00107: val_loss did not improve from 24719.48250
1168/1168 [==============================] - 0s 77us/sample - loss: 23975.7259 -
mean_absolute_error: 23975.7285 - val_loss: 25556.4242 -
val_mean_absolute_error: 25556.4238
Epoch 108/250
  832/1168 [==================>…] - ETA: 0s - loss: 21111.7360 -
mean_absolute_error: 21111.7324
Epoch 00108: val_loss improved from 24719.48250 to 23805.30536, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 99us/sample - loss: 22217.0714 -
mean_absolute_error: 22217.0684 - val_loss: 23805.3054 -
val_mean_absolute_error: 23805.3066
Epoch 109/250
  864/1168 [====================>…] - ETA: 0s - loss: 21224.2482 -
mean_absolute_error: 21224.2480
Epoch 00109: val_loss did not improve from 23805.30536
1168/1168 [==============================] - 0s 80us/sample - loss: 21178.0564 -
mean_absolute_error: 21178.0586 - val_loss: 24515.7794 -
val_mean_absolute_error: 24515.7793
Epoch 110/250
  896/1168 [=====================>…] - ETA: 0s - loss: 20727.1501 -
mean_absolute_error: 20727.1543
Epoch 00110: val_loss did not improve from 23805.30536
1168/1168 [==============================] - 0s 68us/sample - loss: 20542.8117 -
mean_absolute_error: 20542.8125 - val_loss: 25246.8221 -
val_mean_absolute_error: 25246.8203
Epoch 111/250
  896/1168 [=====================>…] - ETA: 0s - loss: 25014.5033 -
mean_absolute_error: 25014.5000
Epoch 00111: val_loss did not improve from 23805.30536
1168/1168 [==============================] - 0s 67us/sample - loss: 25502.8439 -
mean_absolute_error: 25502.8418 - val_loss: 34583.6106 -
val_mean_absolute_error: 34583.6133
Epoch 112/250
  896/1168 [=====================>…] - ETA: 0s - loss: 26070.8001 -
mean_absolute_error: 26070.7988
Epoch 00112: val_loss did not improve from 23805.30536
1168/1168 [==============================] - 0s 66us/sample - loss: 25927.0481 -
mean_absolute_error: 25927.0488 - val_loss: 28042.8798 -
val_mean_absolute_error: 28042.8809
Epoch 113/250
  864/1168 [====================>…] - ETA: 0s - loss: 22611.9627 -
mean_absolute_error: 22611.9648
Epoch 00113: val_loss did not improve from 23805.30536
1168/1168 [==============================] - 0s 74us/sample - loss: 22780.5791 -
```

mean_absolute_error: 22780.5820 - val_loss: 24306.1200 -
val_mean_absolute_error: 24306.1172
Epoch 114/250
 768/1168 [==================>…] - ETA: 0s - loss: 22761.8882 -
mean_absolute_error: 22761.8887
Epoch 00114: val_loss improved from 23805.30536 to 23100.27796, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 103us/sample - loss: 21782.5564
- mean_absolute_error: 21782.5547 - val_loss: 23100.2780 -
val_mean_absolute_error: 23100.2773
Epoch 115/250
 864/1168 [====================>…] - ETA: 0s - loss: 21764.7836 -
mean_absolute_error: 21764.7832
Epoch 00115: val_loss improved from 23100.27796 to 23067.81512, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 96us/sample - loss: 21908.0386 -
mean_absolute_error: 21908.0410 - val_loss: 23067.8151 -
val_mean_absolute_error: 23067.8164
Epoch 116/250
 896/1168 [=====================>…] - ETA: 0s - loss: 19465.7536 -
mean_absolute_error: 19465.7539
Epoch 00116: val_loss did not improve from 23067.81512
1168/1168 [==============================] - 0s 68us/sample - loss: 20628.8208 -
mean_absolute_error: 20628.8223 - val_loss: 24601.0605 -
val_mean_absolute_error: 24601.0605
Epoch 117/250
 928/1168 [=====================>…] - ETA: 0s - loss: 19253.1588 -
mean_absolute_error: 19253.1582
Epoch 00117: val_loss did not improve from 23067.81512
1168/1168 [==============================] - 0s 66us/sample - loss: 20264.2947 -
mean_absolute_error: 20264.2930 - val_loss: 24639.3166 -
val_mean_absolute_error: 24639.3184
Epoch 118/250
 960/1168 [======================>…] - ETA: 0s - loss: 19621.6362 -
mean_absolute_error: 19621.6348
Epoch 00118: val_loss did not improve from 23067.81512
1168/1168 [==============================] - 0s 64us/sample - loss: 20397.6945 -
mean_absolute_error: 20397.6953 - val_loss: 23339.5667 -
val_mean_absolute_error: 23339.5645
Epoch 119/250
 928/1168 [=====================>…] - ETA: 0s - loss: 19662.1175 -
mean_absolute_error: 19662.1172
Epoch 00119: val_loss did not improve from 23067.81512
1168/1168 [==============================] - 0s 66us/sample - loss: 20037.8612 -
mean_absolute_error: 20037.8613 - val_loss: 24140.8602 -
val_mean_absolute_error: 24140.8594
Epoch 120/250
 896/1168 [=====================>…] - ETA: 0s - loss: 21638.4372 -

mean_absolute_error: 21638.4355
Epoch 00120: val_loss improved from 23067.81512 to 22102.50016, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 89us/sample - loss: 20832.2610 -
mean_absolute_error: 20832.2617 - val_loss: 22102.5002 -
val_mean_absolute_error: 22102.4980
Epoch 121/250
 960/1168 [=======================>…] - ETA: 0s - loss: 20538.2689 -
mean_absolute_error: 20538.2715
Epoch 00121: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 65us/sample - loss: 20640.0578 -
mean_absolute_error: 20640.0586 - val_loss: 23395.8467 -
val_mean_absolute_error: 23395.8457
Epoch 122/250
 864/1168 [=====================>…] - ETA: 0s - loss: 21400.6450 -
mean_absolute_error: 21400.6426
Epoch 00122: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 69us/sample - loss: 21010.7460 -
mean_absolute_error: 21010.7480 - val_loss: 24280.0088 -
val_mean_absolute_error: 24280.0117
Epoch 123/250
 896/1168 [=====================>…] - ETA: 0s - loss: 19955.5188 -
mean_absolute_error: 19955.5176
Epoch 00123: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 71us/sample - loss: 20293.5638 -
mean_absolute_error: 20293.5625 - val_loss: 27554.9056 -
val_mean_absolute_error: 27554.9043
Epoch 124/250
 864/1168 [=====================>…] - ETA: 0s - loss: 21808.9970 -
mean_absolute_error: 21808.9961
Epoch 00124: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 73us/sample - loss: 21424.3355 -
mean_absolute_error: 21424.3340 - val_loss: 24271.3734 -
val_mean_absolute_error: 24271.3750
Epoch 125/250
 768/1168 [==================>…] - ETA: 0s - loss: 26837.0739 -
mean_absolute_error: 26837.0762
Epoch 00125: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 80us/sample - loss: 24166.1965 -
mean_absolute_error: 24166.1953 - val_loss: 32443.8119 -
val_mean_absolute_error: 32443.8125
Epoch 126/250
 896/1168 [=====================>…] - ETA: 0s - loss: 21507.3974 -
mean_absolute_error: 21507.3945
Epoch 00126: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 71us/sample - loss: 21599.5991 -
mean_absolute_error: 21599.5957 - val_loss: 23149.8836 -
val_mean_absolute_error: 23149.8828

```
Epoch 127/250
 832/1168 [====================>…] - ETA: 0s - loss: 19684.1171 -
mean_absolute_error: 19684.1191
Epoch 00127: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 79us/sample - loss: 20402.4727 -
mean_absolute_error: 20402.4746 - val_loss: 27723.7597 -
val_mean_absolute_error: 27723.7598
Epoch 128/250
 672/1168 [===============>…] - ETA: 0s - loss: 23910.2167 -
mean_absolute_error: 23910.2168
Epoch 00128: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 80us/sample - loss: 21677.1416 -
mean_absolute_error: 21677.1426 - val_loss: 23025.2301 -
val_mean_absolute_error: 23025.2305
Epoch 129/250
 864/1168 [=====================>…] - ETA: 0s - loss: 19723.8273 -
mean_absolute_error: 19723.8262
Epoch 00129: val_loss did not improve from 22102.50016
1168/1168 [==============================] - 0s 78us/sample - loss: 20158.5646 -
mean_absolute_error: 20158.5645 - val_loss: 24015.9341 -
val_mean_absolute_error: 24015.9355
Epoch 130/250
 608/1168 [==============>…] - ETA: 0s - loss: 21562.4300 -
mean_absolute_error: 21562.4316
Epoch 00130: val_loss improved from 22102.50016 to 21860.83136, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 132us/sample - loss: 20455.1895
- mean_absolute_error: 20455.1875 - val_loss: 21860.8314 -
val_mean_absolute_error: 21860.8320
Epoch 131/250
 768/1168 [==================>…] - ETA: 0s - loss: 18892.0885 -
mean_absolute_error: 18892.0879
Epoch 00131: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 87us/sample - loss: 19752.6659 -
mean_absolute_error: 19752.6641 - val_loss: 26712.7371 -
val_mean_absolute_error: 26712.7363
Epoch 132/250
 832/1168 [====================>…] - ETA: 0s - loss: 20529.6535 -
mean_absolute_error: 20529.6543
Epoch 00132: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 75us/sample - loss: 20803.7787 -
mean_absolute_error: 20803.7793 - val_loss: 23587.3076 -
val_mean_absolute_error: 23587.3086
Epoch 133/250
 800/1168 [==================>…] - ETA: 0s - loss: 19203.2722 -
mean_absolute_error: 19203.2734
Epoch 00133: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 75us/sample - loss: 19414.7014 -
```

mean_absolute_error: 19414.7012 - val_loss: 24253.6875 -
val_mean_absolute_error: 24253.6875
Epoch 134/250
 800/1168 [====================>…] - ETA: 0s - loss: 18868.4106 -
mean_absolute_error: 18868.4102
Epoch 00134: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 76us/sample - loss: 19272.9097 -
mean_absolute_error: 19272.9102 - val_loss: 22083.5247 -
val_mean_absolute_error: 22083.5234
Epoch 135/250
 864/1168 [=====================>…] - ETA: 0s - loss: 18602.3617 -
mean_absolute_error: 18602.3613
Epoch 00135: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 70us/sample - loss: 18372.6265 -
mean_absolute_error: 18372.6250 - val_loss: 26234.2895 -
val_mean_absolute_error: 26234.2910
Epoch 136/250
 864/1168 [=====================>…] - ETA: 0s - loss: 19060.4972 -
mean_absolute_error: 19060.4980
Epoch 00136: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 75us/sample - loss: 19935.2643 -
mean_absolute_error: 19935.2656 - val_loss: 23476.5864 -
val_mean_absolute_error: 23476.5840
Epoch 137/250
 672/1168 [================>…] - ETA: 0s - loss: 17637.4934 -
mean_absolute_error: 17637.4961
Epoch 00137: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 88us/sample - loss: 18703.2321 -
mean_absolute_error: 18703.2363 - val_loss: 22350.7202 -
val_mean_absolute_error: 22350.7207
Epoch 138/250
 800/1168 [====================>…] - ETA: 0s - loss: 19737.5539 -
mean_absolute_error: 19737.5566
Epoch 00138: val_loss did not improve from 21860.83136
1168/1168 [==============================] - 0s 77us/sample - loss: 19680.2991 -
mean_absolute_error: 19680.2988 - val_loss: 25673.3472 -
val_mean_absolute_error: 25673.3457
Epoch 139/250
 992/1168 [=======================>…] - ETA: 0s - loss: 19180.5941 -
mean_absolute_error: 19180.5918
Epoch 00139: val_loss improved from 21860.83136 to 21758.16647, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 86us/sample - loss: 19372.2324 -
mean_absolute_error: 19372.2305 - val_loss: 21758.1665 -
val_mean_absolute_error: 21758.1680
Epoch 140/250
 928/1168 [======================>…] - ETA: 0s - loss: 21499.8296 -
mean_absolute_error: 21499.8301

```
Epoch 00140: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 67us/sample - loss: 20927.2273 -
mean_absolute_error: 20927.2285 - val_loss: 23883.9484 -
val_mean_absolute_error: 23883.9492
Epoch 141/250
 928/1168 [=====================>…] - ETA: 0s - loss: 19430.5141 -
mean_absolute_error: 19430.5156
Epoch 00141: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 67us/sample - loss: 19350.5946 -
mean_absolute_error: 19350.5938 - val_loss: 24154.9088 -
val_mean_absolute_error: 24154.9102
Epoch 142/250
 864/1168 [====================>…] - ETA: 0s - loss: 19986.5026 -
mean_absolute_error: 19986.5020
Epoch 00142: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 69us/sample - loss: 19844.2580 -
mean_absolute_error: 19844.2578 - val_loss: 22009.6251 -
val_mean_absolute_error: 22009.6250
Epoch 143/250
 896/1168 [=====================>…] - ETA: 0s - loss: 18241.7710 -
mean_absolute_error: 18241.7715
Epoch 00143: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 18489.2682 -
mean_absolute_error: 18489.2695 - val_loss: 24902.4632 -
val_mean_absolute_error: 24902.4629
Epoch 144/250
 992/1168 [=======================>…] - ETA: 0s - loss: 19415.1776 -
mean_absolute_error: 19415.1797
Epoch 00144: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 64us/sample - loss: 19588.4783 -
mean_absolute_error: 19588.4805 - val_loss: 22329.5984 -
val_mean_absolute_error: 22329.6016
Epoch 145/250
 960/1168 [======================>…] - ETA: 0s - loss: 21802.0870 -
mean_absolute_error: 21802.0898
Epoch 00145: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 64us/sample - loss: 20603.3659 -
mean_absolute_error: 20603.3672 - val_loss: 23801.6936 -
val_mean_absolute_error: 23801.6953
Epoch 146/250
 896/1168 [=====================>…] - ETA: 0s - loss: 20238.7942 -
mean_absolute_error: 20238.7930
Epoch 00146: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 19414.9026 -
mean_absolute_error: 19414.9023 - val_loss: 26328.6353 -
val_mean_absolute_error: 26328.6328
Epoch 147/250
 960/1168 [======================>…] - ETA: 0s - loss: 19069.4412 -
```

```
mean_absolute_error: 19069.4395
Epoch 00147: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 19532.7560 -
mean_absolute_error: 19532.7559 - val_loss: 28161.5980 -
val_mean_absolute_error: 28161.5996
Epoch 148/250
 928/1168 [=====================>…] - ETA: 0s - loss: 21736.3376 -
mean_absolute_error: 21736.3379
Epoch 00148: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 65us/sample - loss: 20868.9467 -
mean_absolute_error: 20868.9473 - val_loss: 22125.1976 -
val_mean_absolute_error: 22125.1973
Epoch 149/250
 896/1168 [=====================>…] - ETA: 0s - loss: 17728.0225 -
mean_absolute_error: 17728.0215
Epoch 00149: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 67us/sample - loss: 17919.7570 -
mean_absolute_error: 17919.7578 - val_loss: 22104.3024 -
val_mean_absolute_error: 22104.3027
Epoch 150/250
 992/1168 [======================>…] - ETA: 0s - loss: 17810.5011 -
mean_absolute_error: 17810.5000
Epoch 00150: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 63us/sample - loss: 17913.1875 -
mean_absolute_error: 17913.1855 - val_loss: 25473.8711 -
val_mean_absolute_error: 25473.8691
Epoch 151/250
 928/1168 [=====================>…] - ETA: 0s - loss: 18793.9955 -
mean_absolute_error: 18793.9961
Epoch 00151: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 18821.9297 -
mean_absolute_error: 18821.9297 - val_loss: 21887.2107 -
val_mean_absolute_error: 21887.2129
Epoch 152/250
 896/1168 [=====================>…] - ETA: 0s - loss: 19964.0580 -
mean_absolute_error: 19964.0605
Epoch 00152: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 19680.2335 -
mean_absolute_error: 19680.2324 - val_loss: 22069.4081 -
val_mean_absolute_error: 22069.4082
Epoch 153/250
 960/1168 [=====================>…] - ETA: 0s - loss: 20175.7067 -
mean_absolute_error: 20175.7070
Epoch 00153: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 64us/sample - loss: 19510.0390 -
mean_absolute_error: 19510.0371 - val_loss: 22237.5995 -
val_mean_absolute_error: 22237.6035
Epoch 154/250
```

```
  960/1168 [=======================>…] – ETA: 0s – loss: 17734.5775 –
mean_absolute_error: 17734.5762
Epoch 00154: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 65us/sample – loss: 17628.5110 –
mean_absolute_error: 17628.5098 – val_loss: 22325.0433 –
val_mean_absolute_error: 22325.0449
Epoch 155/250
  864/1168 [====================>…] – ETA: 0s – loss: 18325.7724 –
mean_absolute_error: 18325.7734
Epoch 00155: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 72us/sample – loss: 19212.1807 –
mean_absolute_error: 19212.1816 – val_loss: 28604.5817 –
val_mean_absolute_error: 28604.5820
Epoch 156/250
  832/1168 [====================>…] – ETA: 0s – loss: 23485.0114 –
mean_absolute_error: 23485.0098
Epoch 00156: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 74us/sample – loss: 22870.5892 –
mean_absolute_error: 22870.5898 – val_loss: 22181.6767 –
val_mean_absolute_error: 22181.6777
Epoch 157/250
  736/1168 [=================>…] – ETA: 0s – loss: 19764.0721 –
mean_absolute_error: 19764.0723
Epoch 00157: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 82us/sample – loss: 19146.3282 –
mean_absolute_error: 19146.3301 – val_loss: 22338.7362 –
val_mean_absolute_error: 22338.7363
Epoch 158/250
  832/1168 [====================>…] – ETA: 0s – loss: 18919.3051 –
mean_absolute_error: 18919.3047
Epoch 00158: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 75us/sample – loss: 18456.9731 –
mean_absolute_error: 18456.9688 – val_loss: 26859.6839 –
val_mean_absolute_error: 26859.6855
Epoch 159/250
  768/1168 [=================>…] – ETA: 0s – loss: 19223.9207 –
mean_absolute_error: 19223.9180
Epoch 00159: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 78us/sample – loss: 18893.6327 –
mean_absolute_error: 18893.6328 – val_loss: 22346.7836 –
val_mean_absolute_error: 22346.7852
Epoch 160/250
  960/1168 [=======================>…] – ETA: 0s – loss: 18017.6922 –
mean_absolute_error: 18017.6895
Epoch 00160: val_loss did not improve from 21758.16647
1168/1168 [==============================] – 0s 65us/sample – loss: 17781.8150 –
mean_absolute_error: 17781.8125 – val_loss: 25464.6784 –
val_mean_absolute_error: 25464.6777
```

```
Epoch 161/250
 992/1168 [=======================>…] - ETA: 0s - loss: 20230.0774 -
mean_absolute_error: 20230.0762
Epoch 00161: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 64us/sample - loss: 19704.3523 -
mean_absolute_error: 19704.3535 - val_loss: 22455.4426 -
val_mean_absolute_error: 22455.4414
Epoch 162/250
 960/1168 [=======================>…] - ETA: 0s - loss: 18716.3660 -
mean_absolute_error: 18716.3672
Epoch 00162: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 64us/sample - loss: 18934.2048 -
mean_absolute_error: 18934.2031 - val_loss: 23905.8033 -
val_mean_absolute_error: 23905.8008
Epoch 163/250
 960/1168 [=======================>…] - ETA: 0s - loss: 20563.4413 -
mean_absolute_error: 20563.4434
Epoch 00163: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 65us/sample - loss: 20100.9326 -
mean_absolute_error: 20100.9336 - val_loss: 22326.7544 -
val_mean_absolute_error: 22326.7539
Epoch 164/250
 800/1168 [===================>…] - ETA: 0s - loss: 17305.2431 -
mean_absolute_error: 17305.2441
Epoch 00164: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 75us/sample - loss: 18330.6802 -
mean_absolute_error: 18330.6816 - val_loss: 24552.4972 -
val_mean_absolute_error: 24552.4980
Epoch 165/250
 928/1168 [======================>…] - ETA: 0s - loss: 16960.8849 -
mean_absolute_error: 16960.8848
Epoch 00165: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 17307.0437 -
mean_absolute_error: 17307.0430 - val_loss: 26595.4969 -
val_mean_absolute_error: 26595.4980
Epoch 166/250
 928/1168 [======================>…] - ETA: 0s - loss: 18225.4496 -
mean_absolute_error: 18225.4492
Epoch 00166: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 65us/sample - loss: 18027.9329 -
mean_absolute_error: 18027.9316 - val_loss: 22126.6791 -
val_mean_absolute_error: 22126.6797
Epoch 167/250
 896/1168 [=====================>…] - ETA: 0s - loss: 20417.1193 -
mean_absolute_error: 20417.1191
Epoch 00167: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 68us/sample - loss: 20759.6957 -
mean_absolute_error: 20759.6953 - val_loss: 24854.6229 -
```

```
val_mean_absolute_error: 24854.6211
Epoch 168/250
 896/1168 [=====================>…] - ETA: 0s - loss: 22466.9675 -
mean_absolute_error: 22466.9688
Epoch 00168: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 67us/sample - loss: 21705.4404 -
mean_absolute_error: 21705.4395 - val_loss: 25636.1815 -
val_mean_absolute_error: 25636.1816
Epoch 169/250
 992/1168 [========================>…] - ETA: 0s - loss: 17589.7910 -
mean_absolute_error: 17589.7930
Epoch 00169: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 62us/sample - loss: 17608.4852 -
mean_absolute_error: 17608.4883 - val_loss: 22991.2714 -
val_mean_absolute_error: 22991.2715
Epoch 170/250
 928/1168 [======================>…] - ETA: 0s - loss: 19767.4975 -
mean_absolute_error: 19767.4941
Epoch 00170: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 66us/sample - loss: 19273.2904 -
mean_absolute_error: 19273.2852 - val_loss: 22084.1723 -
val_mean_absolute_error: 22084.1738
Epoch 171/250
 864/1168 [====================>…] - ETA: 0s - loss: 18276.6628 -
mean_absolute_error: 18276.6641
Epoch 00171: val_loss did not improve from 21758.16647
1168/1168 [==============================] - 0s 68us/sample - loss: 18633.2531 -
mean_absolute_error: 18633.2539 - val_loss: 36940.4101 -
val_mean_absolute_error: 36940.4102
Epoch 172/250
 960/1168 [=====================>…] - ETA: 0s - loss: 19677.7299 -
mean_absolute_error: 19677.7285
Epoch 00172: val_loss improved from 21758.16647 to 21590.63514, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 99us/sample - loss: 19676.6726 -
mean_absolute_error: 19676.6719 - val_loss: 21590.6351 -
val_mean_absolute_error: 21590.6348
Epoch 173/250
 800/1168 [==================>…] - ETA: 0s - loss: 18818.5428 -
mean_absolute_error: 18818.5469
Epoch 00173: val_loss did not improve from 21590.63514
1168/1168 [==============================] - 0s 75us/sample - loss: 17832.8334 -
mean_absolute_error: 17832.8359 - val_loss: 21609.0084 -
val_mean_absolute_error: 21609.0078
Epoch 174/250
 864/1168 [====================>…] - ETA: 0s - loss: 18506.9244 -
mean_absolute_error: 18506.9238
Epoch 00174: val_loss did not improve from 21590.63514
```

```
1168/1168 [==============================] - 0s 70us/sample - loss: 18061.1759 -
mean_absolute_error: 18061.1777 - val_loss: 22472.5650 -
val_mean_absolute_error: 22472.5645
Epoch 175/250
 896/1168 [=====================>…] - ETA: 0s - loss: 18392.4347 -
mean_absolute_error: 18392.4336
Epoch 00175: val_loss did not improve from 21590.63514
1168/1168 [==============================] - 0s 67us/sample - loss: 18586.1219 -
mean_absolute_error: 18586.1211 - val_loss: 22518.4406 -
val_mean_absolute_error: 22518.4414
Epoch 176/250
 928/1168 [=====================>…] - ETA: 0s - loss: 19033.3176 -
mean_absolute_error: 19033.3184
Epoch 00176: val_loss did not improve from 21590.63514
1168/1168 [==============================] - 0s 66us/sample - loss: 18284.2683 -
mean_absolute_error: 18284.2715 - val_loss: 22064.8051 -
val_mean_absolute_error: 22064.8066
Epoch 177/250
 928/1168 [=====================>…] - ETA: 0s - loss: 18012.4566 -
mean_absolute_error: 18012.4551
Epoch 00177: val_loss did not improve from 21590.63514
1168/1168 [==============================] - 0s 66us/sample - loss: 17998.1103 -
mean_absolute_error: 17998.1094 - val_loss: 24577.4174 -
val_mean_absolute_error: 24577.4180
Epoch 178/250
 896/1168 [=====================>…] - ETA: 0s - loss: 18948.8512 -
mean_absolute_error: 18948.8496
Epoch 00178: val_loss did not improve from 21590.63514
1168/1168 [==============================] - 0s 68us/sample - loss: 18911.1023 -
mean_absolute_error: 18911.1016 - val_loss: 21834.5219 -
val_mean_absolute_error: 21834.5215
Epoch 179/250
 864/1168 [=====================>…] - ETA: 0s - loss: 17848.7346 -
mean_absolute_error: 17848.7344
Epoch 00179: val_loss improved from 21590.63514 to 20928.08966, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 91us/sample - loss: 17676.7637 -
mean_absolute_error: 17676.7637 - val_loss: 20928.0897 -
val_mean_absolute_error: 20928.0898
Epoch 180/250
 960/1168 [=====================>…] - ETA: 0s - loss: 19935.2447 -
mean_absolute_error: 19935.2441
Epoch 00180: val_loss did not improve from 20928.08966
1168/1168 [==============================] - 0s 65us/sample - loss: 20107.3428 -
mean_absolute_error: 20107.3418 - val_loss: 26767.9408 -
val_mean_absolute_error: 26767.9414
Epoch 181/250
 896/1168 [=====================>…] - ETA: 0s - loss: 19209.0995 -
```

```
mean_absolute_error: 19209.0977
Epoch 00181: val_loss improved from 20928.08966 to 20833.20283, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 97us/sample - loss: 18659.7279 -
mean_absolute_error: 18659.7285 - val_loss: 20833.2028 -
val_mean_absolute_error: 20833.2012
Epoch 182/250
 896/1168 [=====================>…] - ETA: 0s - loss: 17633.0738 -
mean_absolute_error: 17633.0742
Epoch 00182: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 68us/sample - loss: 18044.8300 -
mean_absolute_error: 18044.8301 - val_loss: 21306.1127 -
val_mean_absolute_error: 21306.1113
Epoch 183/250
 960/1168 [======================>…] - ETA: 0s - loss: 18652.6206 -
mean_absolute_error: 18652.6211
Epoch 00183: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 65us/sample - loss: 18738.3531 -
mean_absolute_error: 18738.3535 - val_loss: 25804.6838 -
val_mean_absolute_error: 25804.6855
Epoch 184/250
 928/1168 [=====================>…] - ETA: 0s - loss: 18053.4209 -
mean_absolute_error: 18053.4219
Epoch 00184: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 66us/sample - loss: 17957.6029 -
mean_absolute_error: 17957.6035 - val_loss: 22025.9081 -
val_mean_absolute_error: 22025.9082
Epoch 185/250
 832/1168 [====================>…] - ETA: 0s - loss: 18679.7735 -
mean_absolute_error: 18679.7773
Epoch 00185: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 75us/sample - loss: 18368.8637 -
mean_absolute_error: 18368.8672 - val_loss: 25140.2103 -
val_mean_absolute_error: 25140.2090
Epoch 186/250
 768/1168 [==================>…] - ETA: 0s - loss: 17784.8912 -
mean_absolute_error: 17784.8926
Epoch 00186: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 78us/sample - loss: 17520.6715 -
mean_absolute_error: 17520.6738 - val_loss: 21292.1362 -
val_mean_absolute_error: 21292.1367
Epoch 187/250
 768/1168 [==================>…] - ETA: 0s - loss: 17373.0740 -
mean_absolute_error: 17373.0723
Epoch 00187: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 84us/sample - loss: 16926.1885 -
mean_absolute_error: 16926.1895 - val_loss: 21428.2431 -
val_mean_absolute_error: 21428.2441
```

```
Epoch 188/250
 768/1168 [=================>…] - ETA: 0s - loss: 16963.6454 -
mean_absolute_error: 16963.6465
Epoch 00188: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 78us/sample - loss: 18157.8218 -
mean_absolute_error: 18157.8223 - val_loss: 27683.9163 -
val_mean_absolute_error: 27683.9160
Epoch 189/250
 768/1168 [=================>…] - ETA: 0s - loss: 22397.9174 -
mean_absolute_error: 22397.9199
Epoch 00189: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 80us/sample - loss: 21290.3630 -
mean_absolute_error: 21290.3613 - val_loss: 21601.5065 -
val_mean_absolute_error: 21601.5078
Epoch 190/250
 736/1168 [=================>…] - ETA: 0s - loss: 18377.1130 -
mean_absolute_error: 18377.1133
Epoch 00190: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 80us/sample - loss: 18013.7027 -
mean_absolute_error: 18013.7012 - val_loss: 21000.5319 -
val_mean_absolute_error: 21000.5332
Epoch 191/250
 960/1168 [=====================>…] - ETA: 0s - loss: 17573.0980 -
mean_absolute_error: 17573.0977
Epoch 00191: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 64us/sample - loss: 17588.3325 -
mean_absolute_error: 17588.3340 - val_loss: 21319.2951 -
val_mean_absolute_error: 21319.2949
Epoch 192/250
 960/1168 [=====================>…] - ETA: 0s - loss: 17941.5917 -
mean_absolute_error: 17941.5918
Epoch 00192: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 66us/sample - loss: 17972.4091 -
mean_absolute_error: 17972.4102 - val_loss: 20856.4723 -
val_mean_absolute_error: 20856.4707
Epoch 193/250
 768/1168 [=================>…] - ETA: 0s - loss: 17610.2749 -
mean_absolute_error: 17610.2734
Epoch 00193: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 80us/sample - loss: 18207.2734 -
mean_absolute_error: 18207.2715 - val_loss: 21504.4618 -
val_mean_absolute_error: 21504.4629
Epoch 194/250
 736/1168 [=================>…] - ETA: 0s - loss: 19260.1946 -
mean_absolute_error: 19260.1934
Epoch 00194: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 83us/sample - loss: 19545.0568 -
mean_absolute_error: 19545.0586 - val_loss: 22009.4876 -
```

val_mean_absolute_error: 22009.4883
Epoch 195/250
 896/1168 [=====================>…] - ETA: 0s - loss: 18304.8447 -
mean_absolute_error: 18304.8457
Epoch 00195: val_loss did not improve from 20833.20283
1168/1168 [==============================] - 0s 67us/sample - loss: 18295.0142 -
mean_absolute_error: 18295.0156 - val_loss: 25165.4835 -
val_mean_absolute_error: 25165.4824
Epoch 196/250
 864/1168 [====================>…] - ETA: 0s - loss: 17871.2130 -
mean_absolute_error: 17871.2109
Epoch 00196: val_loss improved from 20833.20283 to 20794.07062, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 91us/sample - loss: 17378.7182 -
mean_absolute_error: 17378.7207 - val_loss: 20794.0706 -
val_mean_absolute_error: 20794.0703
Epoch 197/250
 864/1168 [====================>…] - ETA: 0s - loss: 16260.4125 -
mean_absolute_error: 16260.4150
Epoch 00197: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 70us/sample - loss: 16851.2473 -
mean_absolute_error: 16851.2461 - val_loss: 24246.4317 -
val_mean_absolute_error: 24246.4297
Epoch 198/250
 928/1168 [=====================>…] - ETA: 0s - loss: 17848.2238 -
mean_absolute_error: 17848.2246
Epoch 00198: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 71us/sample - loss: 17453.0264 -
mean_absolute_error: 17453.0273 - val_loss: 23276.1639 -
val_mean_absolute_error: 23276.1621
Epoch 199/250
 832/1168 [===================>…] - ETA: 0s - loss: 17551.1313 -
mean_absolute_error: 17551.1309
Epoch 00199: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 77us/sample - loss: 17878.3484 -
mean_absolute_error: 17878.3477 - val_loss: 25060.3456 -
val_mean_absolute_error: 25060.3438
Epoch 200/250
 768/1168 [=================>…] - ETA: 0s - loss: 17282.0052 -
mean_absolute_error: 17282.0039
Epoch 00200: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 78us/sample - loss: 17715.9142 -
mean_absolute_error: 17715.9141 - val_loss: 26574.1148 -
val_mean_absolute_error: 26574.1172
Epoch 201/250
 864/1168 [====================>…] - ETA: 0s - loss: 20803.1547 -
mean_absolute_error: 20803.1602
Epoch 00201: val_loss did not improve from 20794.07062

```
1168/1168 [==============================] - 0s 81us/sample - loss: 19927.4645 -
mean_absolute_error: 19927.4648 - val_loss: 24883.4936 -
val_mean_absolute_error: 24883.4941
Epoch 202/250
 800/1168 [===================>…] - ETA: 0s - loss: 20373.9633 -
mean_absolute_error: 20373.9629
Epoch 00202: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 80us/sample - loss: 19499.0615 -
mean_absolute_error: 19499.0625 - val_loss: 21566.1659 -
val_mean_absolute_error: 21566.1660
Epoch 203/250
 704/1168 [=================>…] - ETA: 0s - loss: 18257.0052 -
mean_absolute_error: 18257.0078
Epoch 00203: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 86us/sample - loss: 18294.1751 -
mean_absolute_error: 18294.1738 - val_loss: 21035.2694 -
val_mean_absolute_error: 21035.2695
Epoch 204/250
 992/1168 [=======================>…] - ETA: 0s - loss: 18658.2967 -
mean_absolute_error: 18658.2988
Epoch 00204: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 114us/sample - loss: 18354.9480
- mean_absolute_error: 18354.9492 - val_loss: 24251.3471 -
val_mean_absolute_error: 24251.3438
Epoch 205/250
 736/1168 [=================>…] - ETA: 0s - loss: 17334.3585 -
mean_absolute_error: 17334.3574
Epoch 00205: val_loss did not improve from 20794.07062
1168/1168 [==============================] - 0s 89us/sample - loss: 17076.7517 -
mean_absolute_error: 17076.7520 - val_loss: 21313.6296 -
val_mean_absolute_error: 21313.6289
Epoch 206/250
 800/1168 [===================>…] - ETA: 0s - loss: 17995.2163 -
mean_absolute_error: 17995.2168
Epoch 00206: val_loss improved from 20794.07062 to 20653.62714, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 111us/sample - loss: 18191.1793
- mean_absolute_error: 18191.1816 - val_loss: 20653.6271 -
val_mean_absolute_error: 20653.6289
Epoch 207/250
 800/1168 [===================>…] - ETA: 0s - loss: 17574.8432 -
mean_absolute_error: 17574.8418
Epoch 00207: val_loss did not improve from 20653.62714
1168/1168 [==============================] - 0s 77us/sample - loss: 17064.6056 -
mean_absolute_error: 17064.6035 - val_loss: 21829.7119 -
val_mean_absolute_error: 21829.7109
Epoch 208/250
 896/1168 [=====================>…] - ETA: 0s - loss: 21229.4084 -
```

mean_absolute_error: 21229.4102
Epoch 00208: val_loss did not improve from 20653.62714
1168/1168 [==============================] - 0s 69us/sample - loss: 21296.2500 -
mean_absolute_error: 21296.2520 - val_loss: 23710.7719 -
val_mean_absolute_error: 23710.7715
Epoch 209/250
 736/1168 [================>…] - ETA: 0s - loss: 19908.2188 -
mean_absolute_error: 19908.2188
Epoch 00209: val_loss did not improve from 20653.62714
1168/1168 [==============================] - 0s 79us/sample - loss: 20518.3113 -
mean_absolute_error: 20518.3105 - val_loss: 21651.9265 -
val_mean_absolute_error: 21651.9277
Epoch 210/250
 736/1168 [================>…] - ETA: 0s - loss: 18068.5675 -
mean_absolute_error: 18068.5664
Epoch 00210: val_loss did not improve from 20653.62714
1168/1168 [==============================] - 0s 95us/sample - loss: 18095.9077 -
mean_absolute_error: 18095.9043 - val_loss: 22538.3958 -
val_mean_absolute_error: 22538.3965
Epoch 211/250
 672/1168 [================>…] - ETA: 0s - loss: 16622.6991 -
mean_absolute_error: 16622.6973
Epoch 00211: val_loss improved from 20653.62714 to 20627.51980, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 118us/sample - loss: 16627.5119
- mean_absolute_error: 16627.5098 - val_loss: 20627.5198 -
val_mean_absolute_error: 20627.5215
Epoch 212/250
 896/1168 [=====================>…] - ETA: 0s - loss: 18760.7485 -
mean_absolute_error: 18760.7480
Epoch 00212: val_loss did not improve from 20627.51980
1168/1168 [==============================] - 0s 70us/sample - loss: 18391.6127 -
mean_absolute_error: 18391.6133 - val_loss: 22512.5501 -
val_mean_absolute_error: 22512.5488
Epoch 213/250
 800/1168 [==================>…] - ETA: 0s - loss: 17983.5687 -
mean_absolute_error: 17983.5684
Epoch 00213: val_loss did not improve from 20627.51980
1168/1168 [==============================] - 0s 79us/sample - loss: 18084.1163 -
mean_absolute_error: 18084.1172 - val_loss: 24373.3469 -
val_mean_absolute_error: 24373.3477
Epoch 214/250
 736/1168 [================>…] - ETA: 0s - loss: 17102.5794 -
mean_absolute_error: 17102.5781
Epoch 00214: val_loss did not improve from 20627.51980
1168/1168 [==============================] - 0s 81us/sample - loss: 17173.6922 -
mean_absolute_error: 17173.6934 - val_loss: 25150.4392 -
val_mean_absolute_error: 25150.4375

```
Epoch 215/250
 864/1168 [====================>…] - ETA: 0s - loss: 18849.0542 -
mean_absolute_error: 18849.0566
Epoch 00215: val_loss did not improve from 20627.51980
1168/1168 [==============================] - 0s 68us/sample - loss: 18945.8365 -
mean_absolute_error: 18945.8398 - val_loss: 22506.5017 -
val_mean_absolute_error: 22506.5000
Epoch 216/250
 768/1168 [=================>…] - ETA: 0s - loss: 17796.5601 -
mean_absolute_error: 17796.5645
Epoch 00216: val_loss did not improve from 20627.51980
1168/1168 [==============================] - 0s 73us/sample - loss: 18768.2357 -
mean_absolute_error: 18768.2402 - val_loss: 21284.9703 -
val_mean_absolute_error: 21284.9688
Epoch 217/250
 896/1168 [=====================>…] - ETA: 0s - loss: 17352.4377 -
mean_absolute_error: 17352.4395
Epoch 00217: val_loss did not improve from 20627.51980
1168/1168 [==============================] - 0s 66us/sample - loss: 17714.0157 -
mean_absolute_error: 17714.0176 - val_loss: 24828.7583 -
val_mean_absolute_error: 24828.7578
Epoch 218/250
 864/1168 [====================>…] - ETA: 0s - loss: 16900.8467 -
mean_absolute_error: 16900.8457
Epoch 00218: val_loss improved from 20627.51980 to 20393.85951, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 97us/sample - loss: 17007.6964 -
mean_absolute_error: 17007.6973 - val_loss: 20393.8595 -
val_mean_absolute_error: 20393.8594
Epoch 219/250
 768/1168 [=================>…] - ETA: 0s - loss: 16399.3883 -
mean_absolute_error: 16399.3867
Epoch 00219: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 78us/sample - loss: 16550.1006 -
mean_absolute_error: 16550.0996 - val_loss: 21474.0181 -
val_mean_absolute_error: 21474.0176
Epoch 220/250
 864/1168 [====================>…] - ETA: 0s - loss: 15347.1342 -
mean_absolute_error: 15347.1318
Epoch 00220: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 72us/sample - loss: 16116.3607 -
mean_absolute_error: 16116.3574 - val_loss: 21685.4331 -
val_mean_absolute_error: 21685.4336
Epoch 221/250
 896/1168 [====================>…] - ETA: 0s - loss: 16663.5675 -
mean_absolute_error: 16663.5684
Epoch 00221: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 70us/sample - loss: 16849.7309 -
```

mean_absolute_error: 16849.7324 - val_loss: 21032.2286 -
val_mean_absolute_error: 21032.2266
Epoch 222/250
 960/1168 [======================>…] - ETA: 0s - loss: 15829.6694 -
mean_absolute_error: 15829.6709
Epoch 00222: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 64us/sample - loss: 16238.1039 -
mean_absolute_error: 16238.1064 - val_loss: 21431.7338 -
val_mean_absolute_error: 21431.7344
Epoch 223/250
 864/1168 [====================>…] - ETA: 0s - loss: 16441.6190 -
mean_absolute_error: 16441.6152
Epoch 00223: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 71us/sample - loss: 17193.6366 -
mean_absolute_error: 17193.6348 - val_loss: 21652.1862 -
val_mean_absolute_error: 21652.1875
Epoch 224/250
 960/1168 [======================>…] - ETA: 0s - loss: 16387.6912 -
mean_absolute_error: 16387.6914
Epoch 00224: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 64us/sample - loss: 16575.1906 -
mean_absolute_error: 16575.1875 - val_loss: 20841.6282 -
val_mean_absolute_error: 20841.6270
Epoch 225/250
 928/1168 [=====================>…] - ETA: 0s - loss: 18452.3229 -
mean_absolute_error: 18452.3242
Epoch 00225: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 68us/sample - loss: 19567.5454 -
mean_absolute_error: 19567.5449 - val_loss: 24946.3156 -
val_mean_absolute_error: 24946.3184
Epoch 226/250
 896/1168 [====================>…] - ETA: 0s - loss: 19900.6536 -
mean_absolute_error: 19900.6523
Epoch 00226: val_loss did not improve from 20393.85951
1168/1168 [==============================] - 0s 69us/sample - loss: 19586.1047 -
mean_absolute_error: 19586.1035 - val_loss: 21997.5196 -
val_mean_absolute_error: 21997.5215
Epoch 227/250
 896/1168 [====================>…] - ETA: 0s - loss: 16783.6678 -
mean_absolute_error: 16783.6680
Epoch 00227: val_loss improved from 20393.85951 to 20226.47496, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 94us/sample - loss: 16548.2443 -
mean_absolute_error: 16548.2441 - val_loss: 20226.4750 -
val_mean_absolute_error: 20226.4746
Epoch 228/250
 832/1168 [===================>…] - ETA: 0s - loss: 18158.1718 -
mean_absolute_error: 18158.1719

```
Epoch 00228: val_loss did not improve from 20226.47496
1168/1168 [==============================] - 0s 74us/sample - loss: 18809.7821 -
mean_absolute_error: 18809.7852 - val_loss: 21308.4269 -
val_mean_absolute_error: 21308.4277
Epoch 229/250
 960/1168 [======================>…] - ETA: 0s - loss: 16338.9134 -
mean_absolute_error: 16338.9131
Epoch 00229: val_loss did not improve from 20226.47496
1168/1168 [==============================] - 0s 63us/sample - loss: 16433.1810 -
mean_absolute_error: 16433.1816 - val_loss: 21210.5707 -
val_mean_absolute_error: 21210.5723
Epoch 230/250
 896/1168 [=====================>…] - ETA: 0s - loss: 16654.5281 -
mean_absolute_error: 16654.5273
Epoch 00230: val_loss improved from 20226.47496 to 20019.53443, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 91us/sample - loss: 16283.4965 -
mean_absolute_error: 16283.4951 - val_loss: 20019.5344 -
val_mean_absolute_error: 20019.5332
Epoch 231/250
 864/1168 [====================>…] - ETA: 0s - loss: 16091.9587 -
mean_absolute_error: 16091.9609
Epoch 00231: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 72us/sample - loss: 16613.8443 -
mean_absolute_error: 16613.8438 - val_loss: 21488.5842 -
val_mean_absolute_error: 21488.5859
Epoch 232/250
 992/1168 [=======================>…] - ETA: 0s - loss: 17123.8758 -
mean_absolute_error: 17123.8750
Epoch 00232: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 63us/sample - loss: 17425.4407 -
mean_absolute_error: 17425.4395 - val_loss: 21357.5112 -
val_mean_absolute_error: 21357.5117
Epoch 233/250
 768/1168 [==================>…] - ETA: 0s - loss: 17954.3372 -
mean_absolute_error: 17954.3379
Epoch 00233: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 75us/sample - loss: 17274.2082 -
mean_absolute_error: 17274.2109 - val_loss: 25229.8951 -
val_mean_absolute_error: 25229.8965
Epoch 234/250
 896/1168 [=====================>…] - ETA: 0s - loss: 16644.9871 -
mean_absolute_error: 16644.9883
Epoch 00234: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 68us/sample - loss: 16956.0907 -
mean_absolute_error: 16956.0898 - val_loss: 22133.7025 -
val_mean_absolute_error: 22133.7012
Epoch 235/250
```

```
 864/1168 [=====================>…] – ETA: 0s – loss: 16675.2448 –
mean_absolute_error: 16675.2422
Epoch 00235: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 70us/sample – loss: 16839.9868 –
mean_absolute_error: 16839.9863 – val_loss: 20987.8189 –
val_mean_absolute_error: 20987.8184
Epoch 236/250
 896/1168 [=====================>…] – ETA: 0s – loss: 17280.1285 –
mean_absolute_error: 17280.1289
Epoch 00236: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 71us/sample – loss: 18741.7355 –
mean_absolute_error: 18741.7383 – val_loss: 26408.3555 –
val_mean_absolute_error: 26408.3555
Epoch 237/250
 832/1168 [====================>…] – ETA: 0s – loss: 18964.8123 –
mean_absolute_error: 18964.8145
Epoch 00237: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 77us/sample – loss: 20525.7905 –
mean_absolute_error: 20525.7949 – val_loss: 26358.1613 –
val_mean_absolute_error: 26358.1602
Epoch 238/250
 704/1168 [=================>…] – ETA: 0s – loss: 18962.9590 –
mean_absolute_error: 18962.9609
Epoch 00238: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 84us/sample – loss: 17611.6399 –
mean_absolute_error: 17611.6387 – val_loss: 20540.5583 –
val_mean_absolute_error: 20540.5586
Epoch 239/250
 704/1168 [=================>…] – ETA: 0s – loss: 16689.1342 –
mean_absolute_error: 16689.1348
Epoch 00239: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 83us/sample – loss: 17016.3897 –
mean_absolute_error: 17016.3906 – val_loss: 21758.7282 –
val_mean_absolute_error: 21758.7285
Epoch 240/250
 768/1168 [=================>…] – ETA: 0s – loss: 16511.8378 –
mean_absolute_error: 16511.8398
Epoch 00240: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 81us/sample – loss: 16638.0975 –
mean_absolute_error: 16638.0977 – val_loss: 20415.7549 –
val_mean_absolute_error: 20415.7578
Epoch 241/250
 768/1168 [=================>…] – ETA: 0s – loss: 17162.4279 –
mean_absolute_error: 17162.4277
Epoch 00241: val_loss did not improve from 20019.53443
1168/1168 [==============================] – 0s 84us/sample – loss: 16816.5390 –
mean_absolute_error: 16816.5371 – val_loss: 27020.1182 –
val_mean_absolute_error: 27020.1172
```

```
Epoch 242/250
 736/1168 [=================>…] - ETA: 0s - loss: 17137.6566 -
mean_absolute_error: 17137.6543
Epoch 00242: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 84us/sample - loss: 17159.5603 -
mean_absolute_error: 17159.5586 - val_loss: 21487.2253 -
val_mean_absolute_error: 21487.2246
Epoch 243/250
 800/1168 [==================>…] - ETA: 0s - loss: 17816.8284 -
mean_absolute_error: 17816.8281
Epoch 00243: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 75us/sample - loss: 17026.8541 -
mean_absolute_error: 17026.8535 - val_loss: 20747.8689 -
val_mean_absolute_error: 20747.8672
Epoch 244/250
 928/1168 [====================>…] - ETA: 0s - loss: 16229.2908 -
mean_absolute_error: 16229.2910
Epoch 00244: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 66us/sample - loss: 16043.3648 -
mean_absolute_error: 16043.3633 - val_loss: 20659.3072 -
val_mean_absolute_error: 20659.3086
Epoch 245/250
 960/1168 [=====================>…] - ETA: 0s - loss: 15823.5266 -
mean_absolute_error: 15823.5273
Epoch 00245: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 64us/sample - loss: 15673.1751 -
mean_absolute_error: 15673.1748 - val_loss: 24056.7379 -
val_mean_absolute_error: 24056.7383
Epoch 246/250
 864/1168 [====================>…] - ETA: 0s - loss: 16177.7230 -
mean_absolute_error: 16177.7236
Epoch 00246: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 70us/sample - loss: 16258.7899 -
mean_absolute_error: 16258.7891 - val_loss: 28537.2214 -
val_mean_absolute_error: 28537.2246
Epoch 247/250
 864/1168 [====================>…] - ETA: 0s - loss: 19701.8995 -
mean_absolute_error: 19701.8984
Epoch 00247: val_loss did not improve from 20019.53443
1168/1168 [==============================] - 0s 70us/sample - loss: 20254.8303 -
mean_absolute_error: 20254.8281 - val_loss: 22104.7307 -
val_mean_absolute_error: 22104.7305
Epoch 248/250
 832/1168 [===================>…] - ETA: 0s - loss: 17834.8760 -
mean_absolute_error: 17834.8770
Epoch 00248: val_loss improved from 20019.53443 to 19997.77354, saving model to
/Users/kaharbawa/Documents/MyCodes.h5
1168/1168 [==============================] - 0s 99us/sample - loss: 17716.9662 -
```

```
mean_absolute_error: 17716.9668 - val_loss: 19997.7735 -
val_mean_absolute_error: 19997.7734
Epoch 249/250
 800/1168 [==================>…] - ETA: 0s - loss: 17587.5125 -
mean_absolute_error: 17587.5117
Epoch 00249: val_loss did not improve from 19997.77354
1168/1168 [==============================] - 0s 75us/sample - loss: 17522.9715 -
mean_absolute_error: 17522.9727 - val_loss: 26388.6846 -
val_mean_absolute_error: 26388.6855
Epoch 250/250
 960/1168 [=====================>…] - ETA: 0s - loss: 16920.3488 -
mean_absolute_error: 16920.3496
Epoch 00250: val_loss did not improve from 19997.77354
1168/1168 [==============================] - 0s 64us/sample - loss: 16971.1467 -
mean_absolute_error: 16971.1465 - val_loss: 20523.8907 -
val_mean_absolute_error: 20523.8906
```

[53]:
```python
House_file = '/Users/kaharbawa/Documents/MyCodes.h5'
NN_model.load_weights(House_file)
```

[54]:
```python
NN_model.compile(loss='mean_absolute_error', optimizer='adam',
    metrics=['mean_absolute_error'])
```

[55]:
```python
predictions = NN_model.predict(test)
predictions
```

[55]:
```
array([[122182.695],
       [162764.84 ],
       [179755.69 ],
       …,
       [166039.2  ],
       [144203.3  ],
       [213050.84 ]], dtype=float32)
```
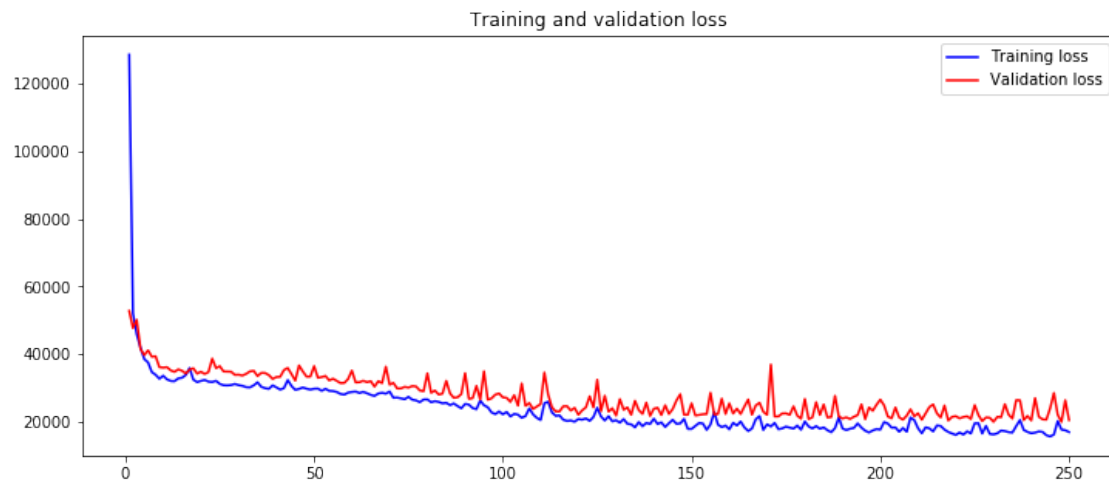
[58]:
```python
def plot_history(history):
    loss = history.history['loss']
    val_loss = history.history['val_loss']
    x = range(1, len(loss) + 1)

    plt.figure(figsize=(12, 5))
    plt.plot(x, loss, 'b', label='Training loss')
    plt.plot(x, val_loss, 'r', label='Validation loss')
    plt.title('Training and validation loss')
    plt.legend()
    plt.show()
```

```
plot_history(hist)
```


Training and validation loss

4 Comment

pretty good fit! Our neuron network seem to be well predicting the house price for this given data.