In [0]:
```
import pandas as pd
import numpy as np
from sklearn import preprocessing
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
import seaborn as sns
```

In [188]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

# EDA

## Train data

In [0]:
```
test=pd.read_csv("/content/drive/My Drive/walmart/test.csv")
```

In [257]:
```
test.head()
```

Out[257]:

| | Store | Dept | Date | IsHoliday |
|---|---|---|---|---|
| **0** | 1 | 1 | 2012-11-02 | False |
| **1** | 1 | 1 | 2012-11-09 | False |
| **2** | 1 | 1 | 2012-11-16 | False |
| **3** | 1 | 1 | 2012-11-23 | True |
| **4** | 1 | 1 | 2012-11-30 | False |

In [0]:
```
train=pd.read_csv("/content/drive/My Drive/walmart/train.csv")
```

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

Out[192]:

| | Store | Dept | Date | Weekly_Sales | IsHoliday |
|---|---|---|---|---|---|
| **0** | 1 | 1 | 2010-02-05 | 24924.50 | False |
| **1** | 1 | 1 | 2010-02-12 | 46039.49 | True |
| **2** | 1 | 1 | 2010-02-19 | 41595.55 | False |
| **3** | 1 | 1 | 2010-02-26 | 19403.54 | False |
| **4** | 1 | 1 | 2010-03-05 | 21827.90 | False |

In [193]:
```
train.shape
```

Out[193]:
```
(421570, 5)
```

In [0]:
```
#date_values=train['Date']
```

In [0]:
```
#https://www.geeksforgeeks.org/python-working-with-date-and-time-using-pandas/
#train['Date'] = pd.to_datetime(train['Date'], errors='coerce')
```

In [0]:
```
#https://stackoverflow.com/questions/55776571/how-to-split-a-date-column-into-separate-day-month-year-column-in-pandas

#train['day'] = train['Date'].dt.day
#train['month'] = train['Date'].dt.month
#train['year'] = train['Date'].dt.year
```

In [0]:
```
#train=train.drop(['Date'], axis=1)
```

In [194]:
```
#Find out if there are any negative values
train["Weekly_Sales"][train["Weekly_Sales"]<0].all()
```

Out[194]: True

In [0]:
```
#make all the negative values to zero
train["Weekly_Sales"][train["Weekly_Sales"]<0]=0
```

**Observations:**

- There are negative values in Weekly_Sales

# Stores Data

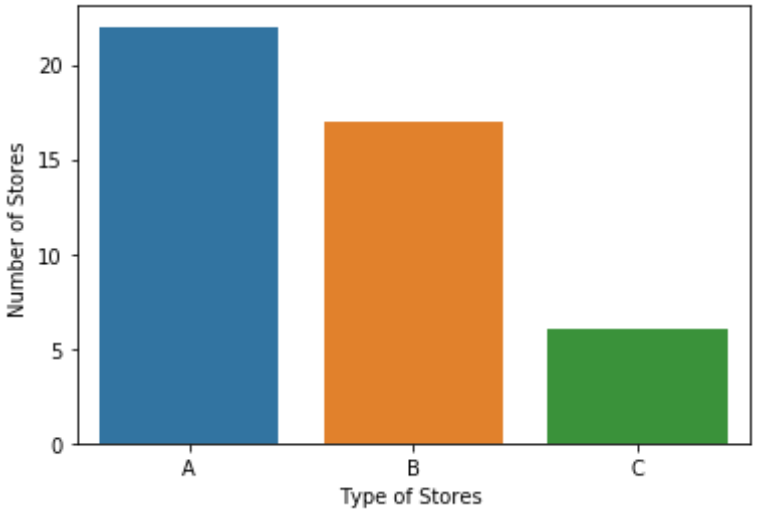
In [196]:
```
stores=pd.read_csv("/content/drive/My Drive/walmart/stores.csv")
stores.head()
```

Out[196]:

| | Store | Type | Size |
|---|---|---|---|
| **0** | 1 | A | 151315 |
| **1** | 2 | A | 202307 |
| **2** | 3 | B | 37392 |
| **3** | 4 | A | 205863 |
| **4** | 5 | B | 34875 |

In [197]:
```
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
x = np.array(stores['Type'].value_counts().index)
y = np.array(stores['Type'].value_counts().values)
plt.figure()
sns.barplot(x,y)
plt.xlabel('Type of Stores ')
plt.ylabel('Number of Stores ')
```

Out[197]: Text(0, 0.5, 'Number of Stores ')




**Observation :**

- there are less number of C type stores.

# Features data

In [198]:
```
features=pd.read_csv("/content/drive/My Drive/walmart/features.csv")
features.head()
```

Out[198]:

| | Store | Date | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 | MarkDown4 | Mar |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 2010-02-05 | 42.31 | 2.572 | NaN | NaN | NaN | NaN | |
| **1** | 1 | 2010-02-12 | 38.51 | 2.548 | NaN | NaN | NaN | NaN | |
| **2** | 1 | 2010-02-19 | 39.93 | 2.514 | NaN | NaN | NaN | NaN | |

| | Store | Date | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 | MarkDown4 | Mar |
|---|---|---|---|---|---|---|---|---|---|
| **3** | 1 | 2010-02-26 | 46.63 | 2.561 | NaN | NaN | NaN | NaN | |
| **4** | 1 | 2010-03-05 | 46.50 | 2.625 | NaN | NaN | NaN | NaN | |

In [199]:
```
features.describe()
```

Out[199]:

| | Store | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 | M |
|---|---|---|---|---|---|---|---|
| **count** | 8190.000000 | 8190.000000 | 8190.000000 | 4032.000000 | 2921.000000 | 3613.000000 | 34 |
| **mean** | 23.000000 | 59.356198 | 3.405992 | 7032.371786 | 3384.176594 | 1760.100180 | 32 |
| **std** | 12.987966 | 18.678607 | 0.431337 | 9262.747448 | 8793.583016 | 11276.462208 | 67 |
| **min** | 1.000000 | -7.290000 | 2.472000 | -2781.450000 | -265.760000 | -179.260000 | |
| **25%** | 12.000000 | 45.902500 | 3.041000 | 1577.532500 | 68.880000 | 6.600000 | 3 |
| **50%** | 23.000000 | 60.710000 | 3.513000 | 4743.580000 | 364.570000 | 36.260000 | 11 |
| **75%** | 34.000000 | 73.880000 | 3.743000 | 8923.310000 | 2153.350000 | 163.150000 | 33 |
| **max** | 45.000000 | 101.950000 | 4.468000 | 103184.980000 | 104519.540000 | 149483.310000 | 674 |

In [200]:
```
print("")
print(features["MarkDown1"][features["MarkDown1"]<0].all())
print("_____________________________________________")
print(features["MarkDown2"][features["MarkDown2"]<0].all())
print("_____________________________________________")
print(features["MarkDown3"][features["MarkDown3"]<0].all())
print("_____________________________________________")
print(features["MarkDown4"][features["MarkDown4"]<0].all())
print("_____________________________________________")
print(features["MarkDown5"][features["MarkDown5"]<0].all())
```

```
True
_____________________________________________
```

```
True
_____
True
_____
True
_____
True
```

In [0]:
```
features["MarkDown1"][features["MarkDown1"]<0]=0
features["MarkDown2"][features["MarkDown2"]<0]=0
features["MarkDown3"][features["MarkDown3"]<0]=0
features["MarkDown5"][features["MarkDown5"]<0]=0
```

In [202]:
```
df_full=pd.merge(train,stores,how='inner',on='Store')
df_full=pd.merge(df_full,features,how='inner',on=['Store','IsHoliday',
'Date'])
df_full.head()
```

Out[202]:

| | Store | Dept | Date | Weekly_Sales | IsHoliday | Type | Size | Temperature | Fuel_Price | MarkDow |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | 2010-02-05 | 24924.50 | False | A | 151315 | 42.31 | 2.572 | N |
| **1** | 1 | 2 | 2010-02-05 | 50605.27 | False | A | 151315 | 42.31 | 2.572 | N |
| **2** | 1 | 3 | 2010-02-05 | 13740.12 | False | A | 151315 | 42.31 | 2.572 | N |
| **3** | 1 | 4 | 2010-02-05 | 39954.04 | False | A | 151315 | 42.31 | 2.572 | N |
| **4** | 1 | 5 | 2010-02-05 | 32229.38 | False | A | 151315 | 42.31 | 2.572 | N |

In [258]:
```
test_full=pd.merge(test,stores,how='inner',on='Store')
test_full=pd.merge(test_full,features,how='inner',on=['Store','IsHolida
y','Date'])
test_full.head()
```

Out[258]:

| | Store | Dept | Date | IsHoliday | Type | Size | Temperature | Fuel_Price | MarkDown1 | MarkDown2 |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | 2012-11-02 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 |
| **1** | 1 | 2 | 2012-11-02 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 |
| **2** | 1 | 3 | 2012-11-02 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 |
| **3** | 1 | 4 | 2012-11-02 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 |
| **4** | 1 | 5 | 2012-11-02 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 |

In [0]:
```
df=test_full
df2 = df.assign(ColumnA = df.Store.astype(str) + '_' +df.Dept.astype(str) + '_' + df.Date.astype(str))
```

In [0]:
```
df2=df2.drop(['Store','Dept','Date','IsHoliday','Type','Size','Temperature','Fuel_Price','MarkDown1','MarkDown2','MarkDown3','MarkDown4','MarkDown5','CPI','Unemployment'], axis=1)
```

In [204]:
```
df_full.describe()
```

Out[204]:

| | Store | Dept | Weekly_Sales | Size | Temperature | Fuel_Price |
|---|---|---|---|---|---|---|
| **count** | 421570.000000 | 421570.000000 | 421570.000000 | 421570.000000 | 421570.000000 | 421570.000000 |
| **mean** | 22.200546 | 44.260317 | 15981.467250 | 136727.915739 | 60.090059 | 3.361027 |
| **std** | 12.785297 | 30.492054 | 22711.032446 | 60980.583328 | 18.447931 | 0.458515 |
| **min** | 1.000000 | 1.000000 | 0.000000 | 34875.000000 | -2.060000 | 2.472000 |
| **25%** | 11.000000 | 18.000000 | 2079.650000 | 93638.000000 | 46.680000 | 2.933000 |
| **50%** | 22.000000 | 37.000000 | 7612.030000 | 140167.000000 | 62.090000 | 3.452000 |

| | Store | Dept | Weekly_Sales | Size | Temperature | Fuel_Pric |
|---|---|---|---|---|---|---|
| **75%** | 33.000000 | 74.000000 | 20205.852500 | 202505.000000 | 74.280000 | 3.73800 |
| **max** | 45.000000 | 99.000000 | 693099.360000 | 219622.000000 | 100.140000 | 4.46800 |

In [205]:
```
test_full.describe()
```

Out[205]:

| | Store | Dept | Size | Temperature | Fuel_Price | MarkDown1 |
|---|---|---|---|---|---|---|
| **count** | 115064.000000 | 115064.000000 | 115064.000000 | 115064.000000 | 115064.000000 | 114915.000000 |
| **mean** | 22.238207 | 44.339524 | 136497.688921 | 53.941804 | 3.581546 | 7691.065592 |
| **std** | 12.809930 | 30.656410 | 61106.926438 | 18.724153 | 0.239442 | 10697.254646 |
| **min** | 1.000000 | 1.000000 | 34875.000000 | -7.290000 | 2.872000 | 0.000000 |
| **25%** | 11.000000 | 18.000000 | 93638.000000 | 39.820000 | 3.431000 | 1966.460000 |
| **50%** | 22.000000 | 37.000000 | 140167.000000 | 54.470000 | 3.606000 | 4842.290000 |
| **75%** | 33.000000 | 74.000000 | 202505.000000 | 67.350000 | 3.766000 | 9439.140000 |
| **max** | 45.000000 | 99.000000 | 219622.000000 | 101.950000 | 4.125000 | 103184.980000 |

In [0]:
```
#https://www.geeksforgeeks.org/python-working-with-date-and-time-using-pandas/
df_full['Date'] = pd.to_datetime(df_full['Date'], errors='coerce')
```

In [0]:
```
#https://stackoverflow.com/questions/55776571/how-to-split-a-date-column-into-separate-day-month-year-column-in-pandas

df_full['day'] = df_full['Date'].dt.day
df_full['month'] = df_full['Date'].dt.month
df_full['year'] = df_full['Date'].dt.year
```

In [0]:
```
df_full=df_full.drop(['Date'], axis=1)
```

In [0]:
```
#https://www.geeksforgeeks.org/python-working-with-date-and-time-using-pandas/
test_full['Date'] = pd.to_datetime(test_full['Date'], errors='coerce')
```

In [0]:
```
#https://stackoverflow.com/questions/55776571/how-to-split-a-date-column-into-separate-day-month-year-column-in-pandas

test_full['day'] = test_full['Date'].dt.day
test_full['month'] = test_full['Date'].dt.month
test_full['year'] = test_full['Date'].dt.year
```

In [0]:
```
test_full=test_full.drop(['Date'], axis=1)
```

In [212]:
```
df_full.head(2)
```

Out[212]:

| | Store | Dept | Weekly_Sales | IsHoliday | Type | Size | Temperature | Fuel_Price | MarkDown1 | Ma |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | 24924.50 | False | A | 151315 | 42.31 | 2.572 | NaN | |
| **1** | 1 | 2 | 50605.27 | False | A | 151315 | 42.31 | 2.572 | NaN | |

In [213]:
```
test_full.head(2)
```

Out[213]:

| | Store | Dept | IsHoliday | Type | Size | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | Mark |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | |
| **1** | 1 | 2 | False | A | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | |

In [0]:
```
```

In [0]:
```
df_type = pd.get_dummies(df_full['Type'])
```

In [215]:
```
df_new = pd.concat([df_full, df_type], axis=1)
```

```
df_new=df_new.drop(['Type'], axis=1)

df_new.head()
```

Out[215]:

| | Store | Dept | Weekly_Sales | IsHoliday | Size | Temperature | Fuel_Price | MarkDown1 | MarkDow |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | 24924.50 | False | 151315 | 42.31 | 2.572 | NaN | Na |
| **1** | 1 | 2 | 50605.27 | False | 151315 | 42.31 | 2.572 | NaN | Na |
| **2** | 1 | 3 | 13740.12 | False | 151315 | 42.31 | 2.572 | NaN | Na |
| **3** | 1 | 4 | 39954.04 | False | 151315 | 42.31 | 2.572 | NaN | Na |
| **4** | 1 | 5 | 32229.38 | False | 151315 | 42.31 | 2.572 | NaN | Na |

In [216]:

```
test_type = pd.get_dummies(test_full['Type'])

test_new = pd.concat([test_full, test_type], axis=1)
test_new=test_new.drop(['Type'], axis=1)

test_new.head()
```

Out[216]:

| | Store | Dept | IsHoliday | Size | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | False | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 |
| **1** | 1 | 2 | False | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 |
| **2** | 1 | 3 | False | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 |
| **3** | 1 | 4 | False | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 |
| **4** | 1 | 5 | False | 151315 | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 |

In [217]:

```
print(test_new.shape)
```

```
(115064, 19)
```

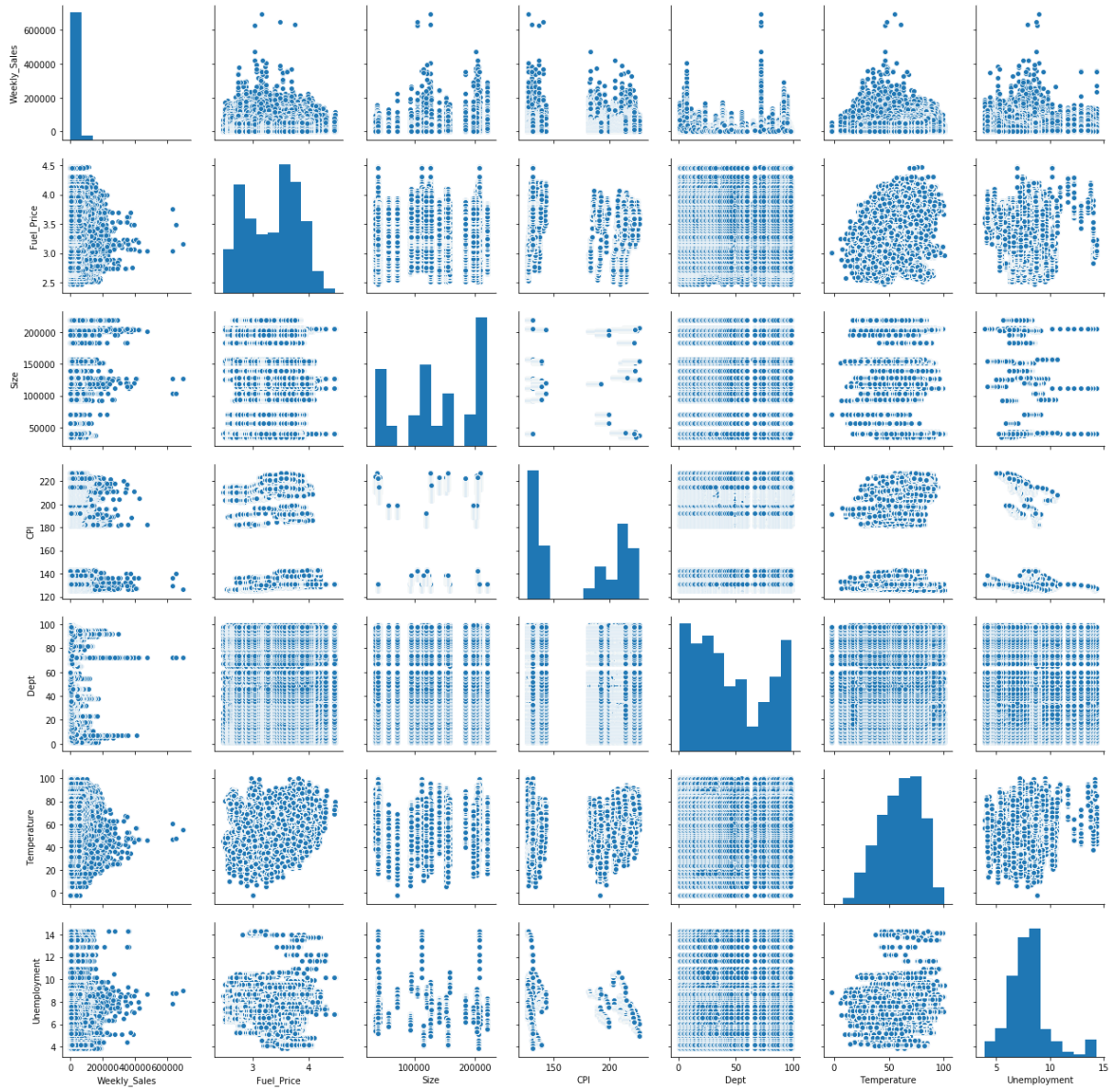
In [218]:
```
print(df_new.shape)
```

```
(421570, 20)
```

In [0]:
```
one_in_all=df_new
```

In [133]:
```
#https://seaborn.pydata.org/generated/seaborn.pairplot.html
sns.pairplot(one_in_all, vars=['Weekly_Sales', 'Fuel_Price', 'Size', 'C
PI', 'Dept', 'Temperature', 'Unemployment'])
```

Out[133]:
```
<seaborn.axisgrid.PairGrid at 0x7f34c41f9518>
```

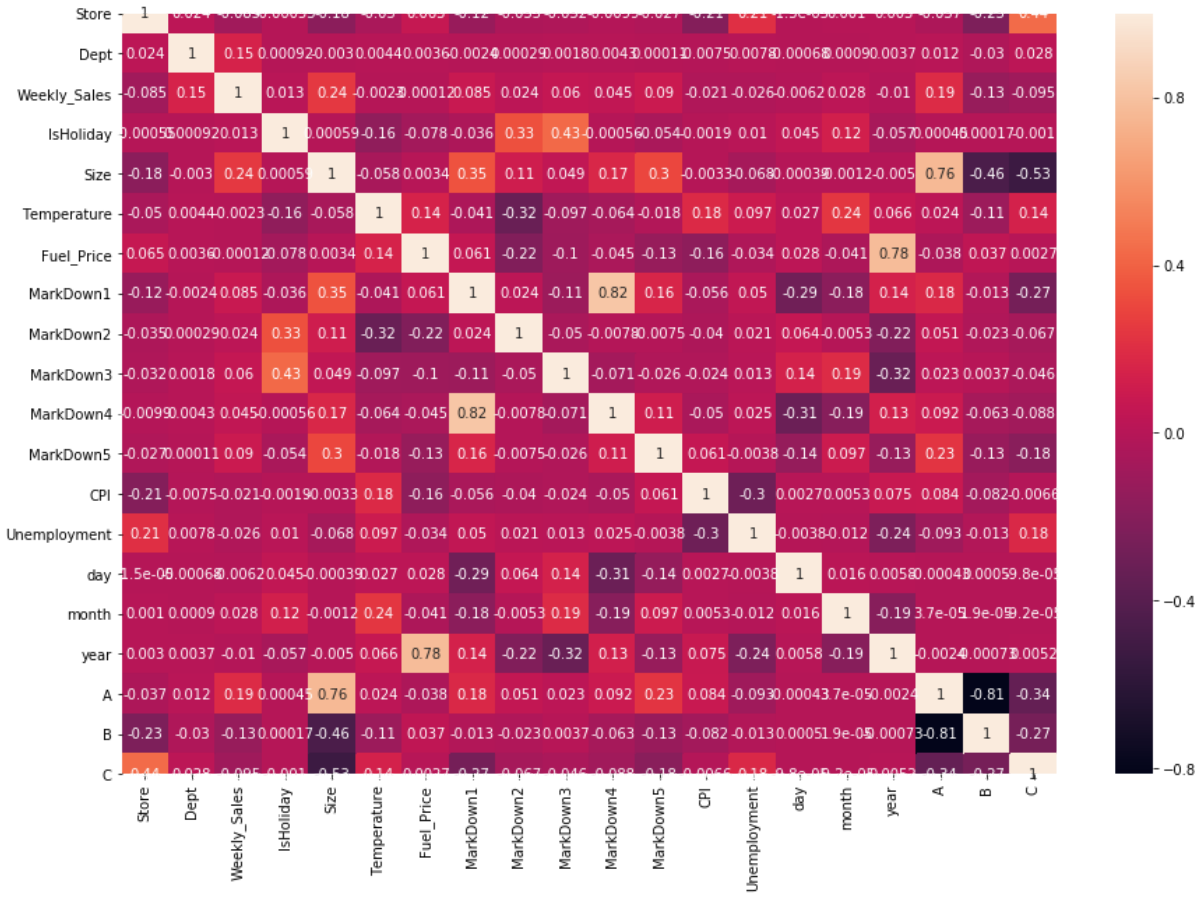



In [0]:
```
corr = one_in_all.corr()
```

In [135]:
```
plt.figure(figsize=(15, 10))
```

```
sns.heatmap(corr, annot=True)
plt.plot()
```

Out[135]: []




**Observation:**

- There is a correlation between A and Size , Fuel_Price and year ,MarkDown1 and MarkDown4

In [0]:
```
#removing one of the highly correlated features
```

```
df_new=df_new.drop(["MarkDown4","year","Size"],axis=1)
```

In [0]:
```
#removing one of the highly correlated features
test_new=test_new.drop(["MarkDown4","year","Size"],axis=1)
```

In [0]:
```
df_new['IsHoliday']=df_new['IsHoliday'].replace(True,5).replace(False,1
)
df_new['IsHoliday'] = df_new['IsHoliday'].apply(np.int64)
```

In [223]:
```
df_new.head()
```

Out[223]:

| | Store | Dept | Weekly_Sales | IsHoliday | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | Mark |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | 24924.50 | 1 | 42.31 | 2.572 | NaN | NaN | |
| **1** | 1 | 2 | 50605.27 | 1 | 42.31 | 2.572 | NaN | NaN | |
| **2** | 1 | 3 | 13740.12 | 1 | 42.31 | 2.572 | NaN | NaN | |
| **3** | 1 | 4 | 39954.04 | 1 | 42.31 | 2.572 | NaN | NaN | |
| **4** | 1 | 5 | 32229.38 | 1 | 42.31 | 2.572 | NaN | NaN | |

In [0]:
```
df_new['MarkDown1']=df_new['MarkDown1'].fillna(df_new['MarkDown1'].mean
())
df_new['MarkDown2']=df_new['MarkDown2'].fillna(df_new['MarkDown2'].mean
())
df_new['MarkDown3']=df_new['MarkDown3'].fillna(df_new['MarkDown3'].mean
())
df_new['MarkDown5']=df_new['MarkDown5'].fillna(df_new['MarkDown5'].mean
())
```

In [0]:
```
test_new['MarkDown1']=test_new['MarkDown1'].fillna(test_new['MarkDown1'
].mean())
test_new['MarkDown2']=test_new['MarkDown2'].fillna(test_new['MarkDown2'
].mean())
test_new['MarkDown3']=test_new['MarkDown3'].fillna(test_new['MarkDown3'
].mean())
```

```
test_new['MarkDown5']=test_new['MarkDown5'].fillna(test_new['MarkDown5'
].mean())
```

In [226]:
```
df_new.head()
```

Out[226]:

| | Store | Dept | Weekly_Sales | IsHoliday | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | Mar |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | 24924.50 | 1 | 42.31 | 2.572 | 7246.420196 | 3334.99232 | 1439 |
| **1** | 1 | 2 | 50605.27 | 1 | 42.31 | 2.572 | 7246.420196 | 3334.99232 | 1439 |
| **2** | 1 | 3 | 13740.12 | 1 | 42.31 | 2.572 | 7246.420196 | 3334.99232 | 1439 |
| **3** | 1 | 4 | 39954.04 | 1 | 42.31 | 2.572 | 7246.420196 | 3334.99232 | 1439 |
| **4** | 1 | 5 | 32229.38 | 1 | 42.31 | 2.572 | 7246.420196 | 3334.99232 | 1439 |

In [227]:
```
test_new.head()
```

Out[227]:

| | Store | Dept | IsHoliday | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 | MarkD |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **1** | 1 | 2 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **2** | 1 | 3 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **3** | 1 | 4 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **4** | 1 | 5 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |

In [0]:
```
y=np.array(df_new['Weekly_Sales'])

x=np.array(df_new.drop(['Weekly_Sales'],axis=1))
```

In [0]:
```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random
_state=42)
```

# SGD Regressor

In [0]:
```
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import GridSearchCV
from sklearn.preprocessing import StandardScaler
sc_X = StandardScaler()
X_train = sc_X.fit_transform(X_train)
X_test = sc_X.transform(X_test)
```

In [0]:
```
from sklearn.linear_model import SGDRegressor
svm_model=SGDRegressor()
```

In [148]:
```
alphas =[10**-4, 10**-2, 10**0, 10**2, 10**4]

param_grid = {'alpha':alphas,'loss':['squared_loss','huber','epsilon_in
sensitive','squared_epsilon_insensitive'],'penalty':['l1','l2','elastic
net'],
'learning_rate':['constant','optimal','invscaling','adaptive'] }
grid = GridSearchCV(estimator = svm_model,param_grid=param_grid ,scorin
g = 'r2')
grid.fit(X_train, y_train)


print(grid.best_estimator_)
print(grid.score(X_test, y_test))
```

```
SGDRegressor(alpha=0.01, average=False, early_stopping=False, epsilon=
0.1,
             eta0=0.01, fit_intercept=True, l1_ratio=0.15,
             learning_rate='adaptive', loss='squared_epsilon_insensitiv
e',
             max_iter=1000, n_iter_no_change=5, penalty='l2', power_t=
0.25,
             random_state=None, shuffle=True, tol=0.001,
             validation_fraction=0.1, verbose=0, warm_start=False)
0.06955048302689926
```

In [149]:
```
svm_model=SGDRegressor(alpha=1, average=False, early_stopping=False, epsilon=0.1,
             eta0=0.01, fit_intercept=True, l1_ratio=0.15,
             learning_rate='adaptive', loss='squared_epsilon_insensitive',
             max_iter=1000, n_iter_no_change=5, penalty='l1', power_t=0.25,
             random_state=None, shuffle=True, tol=0.001,
             validation_fraction=0.1, verbose=0, warm_start=False)
svm_model.fit(X_train,y_train)
```

Out[149]:
```
SGDRegressor(alpha=1, average=False, early_stopping=False, epsilon=0.1,
             eta0=0.01, fit_intercept=True, l1_ratio=0.15,
             learning_rate='adaptive', loss='squared_epsilon_insensitive',
             max_iter=1000, n_iter_no_change=5, penalty='l1', power_t=0.25,
             random_state=None, shuffle=True, tol=0.001,
             validation_fraction=0.1, verbose=0, warm_start=False)
```

In [150]:
```
#https://www.bmc.com/blogs/mean-squared-error-r2-and-variance-in-regression-analysis/
from sklearn.metrics import mean_squared_error, r2_score
preds = svm_model.predict(X_test)
print("R2 score : %.2f" % r2_score(y_test,preds))
print("Mean squared error: %.2f" % mean_squared_error(y_test,preds))
```

```
R2 score : 0.07
Mean squared error: 489149515.61
```

# Linear Regression

In [0]:
```
from sklearn.linear_model import LinearRegression
lr=LinearRegression(n_jobs=-1)
```

In [152]:
```
param_grid = {'fit_intercept':[True,False],'normalize':[True,False]}
```

```
grid = GridSearchCV(estimator = lr,param_grid=param_grid ,scoring = 'r
2')
grid.fit(X_train, y_train)


print(grid.best_estimator_)
print(grid.score(X_test, y_test))
```

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=-1, normalize=
False)
0.06954857792890268
```

In [153]:
```
lr=LinearRegression(copy_X=True, fit_intercept=True, normalize=False,n_
jobs=-1)
lr.fit(X_train,y_train)
```

Out[153]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=-1, normalize=
False)
```

In [154]:
```
#https://www.bmc.com/blogs/mean-squared-error-r2-and-variance-in-regres
sion-analysis/
from sklearn.metrics import mean_squared_error, r2_score
preds = lr.predict(X_test)
print("R2 score : %.2f" % r2_score(y_test,preds))
print("Mean squared error: %.2f" % mean_squared_error(y_test,preds))
```

```
R2 score : 0.07
Mean squared error: 489155846.58
```

# Decision Tree Regressor

In [0]:
```
from sklearn.tree import DecisionTreeRegressor
dt=DecisionTreeRegressor()
```

In [156]:
```
param_grid = {'max_depth':[1,5,10,15,20,25,30],
 'max_features': ['auto', 'sqrt','log2'],
```

```
 'min_samples_leaf': [1, 2, 4],
 'min_samples_split': [2, 5, 10]}
grid = GridSearchCV(estimator = dt,param_grid=param_grid ,scoring = 'r
2')
grid.fit(X_train, y_train)


print(grid.best_estimator_)
print(grid.score(X_test, y_test))
```

```
DecisionTreeRegressor(criterion='mse', max_depth=25, max_features='aut
o',
                      max_leaf_nodes=None, min_impurity_decrease=0.0,
                      min_impurity_split=None, min_samples_leaf=4,
                      min_samples_split=10, min_weight_fraction_leaf=0.
0,
                      presort=False, random_state=None, splitter='bes
t')
0.9547790697393355
```

In [157]:
```
dt=DecisionTreeRegressor(criterion='mse', max_depth=30, max_features='a
uto',
                      max_leaf_nodes=None, min_impurity_decrease=0.0,
                      min_impurity_split=None, min_samples_leaf=4,
                      min_samples_split=10, min_weight_fraction_leaf=0.
0,
                      presort=False, random_state=None, splitter='best'
)
dt.fit(X_train,y_train)
```

Out[157]:
```
DecisionTreeRegressor(criterion='mse', max_depth=30, max_features='aut
o',
                      max_leaf_nodes=None, min_impurity_decrease=0.0,
                      min_impurity_split=None, min_samples_leaf=4,
                      min_samples_split=10, min_weight_fraction_leaf=0.
0,
                      presort=False, random_state=None, splitter='bes
t')
```

In [158]:
```
#https://www.bmc.com/blogs/mean-squared-error-r2-and-variance-in-regression-analysis/
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.metrics import median_absolute_error
preds = dt.predict(X_test)
print("R2 score : %.2f" % r2_score(y_test,preds))
print("Mean squared error: %.2f" % mean_squared_error(y_test,preds))
```

```
R2 score : 0.95
Mean squared error: 23950304.81
```

# Random Forest Regressor

In [0]:
```
from sklearn.ensemble import RandomForestRegressor
rf=RandomForestRegressor()
```

In [160]:
```
from sklearn.model_selection import RandomizedSearchCV
param_grid = {'max_depth':[1,5,10,15,20,25,30],'n_estimators':[20,50,100],
  'min_samples_leaf': [1, 2, 4],
 'min_samples_split': [2, 5, 10]}
grid = RandomizedSearchCV(rf,param_grid ,scoring = 'r2')
grid.fit(X_train, y_train)


print(grid.best_estimator_)
print(grid.score(X_test, y_test))
```

```
RandomForestRegressor(bootstrap=True, criterion='mse', max_depth=25,
                      max_features='auto', max_leaf_nodes=None,
                      min_impurity_decrease=0.0, min_impurity_split=None,
                      min_samples_leaf=2, min_samples_split=2,
                      min_weight_fraction_leaf=0.0, n_estimators=50,
                      n_jobs=None, oob_score=False, random_state=None,
                      verbose=0, warm_start=False)
0.9681272566875261
```

In [161]:
```
rf=RandomForestRegressor(bootstrap=True, criterion='mse', max_depth=25,
                         max_features='auto', max_leaf_nodes=None,
                         min_impurity_decrease=0.0, min_impurity_split=Non
e,
                         min_samples_leaf=1, min_samples_split=5,
                         min_weight_fraction_leaf=0.0, n_estimators=100,
                         n_jobs=None, oob_score=False, random_state=None,
                         verbose=0, warm_start=False)
rf.fit(X_train,y_train)
```

Out[161]:
```
RandomForestRegressor(bootstrap=True, criterion='mse', max_depth=25,
                      max_features='auto', max_leaf_nodes=None,
                      min_impurity_decrease=0.0, min_impurity_split=Non
e,
                      min_samples_leaf=1, min_samples_split=5,
                      min_weight_fraction_leaf=0.0, n_estimators=100,
                      n_jobs=None, oob_score=False, random_state=None,
                      verbose=0, warm_start=False)
```

In [162]:
```
#https://www.bmc.com/blogs/mean-squared-error-r2-and-variance-in-regres
sion-analysis/
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.metrics import median_absolute_error
preds = rf.predict(X_test)
print("R2 score : %.2f" % r2_score(y_test,preds))
print("Mean squared error: %.2f" % mean_squared_error(y_test,preds))
```

```
R2 score : 0.97
Mean squared error: 16912007.90
```

# Gradient Boosted Regressor

In [0]:
```
from xgboost import XGBRegressor
xgb=XGBRegressor(n_jobs=-1)
```

In [269]:
```
from sklearn.model_selection import RandomizedSearchCV
```

```
param_grid = {'max_depth':[10,15,20,25,30],
              'n_estimators':[20,50,100],
              'learning_rate':[0.001,0.01,0.1,1]}
grid = RandomizedSearchCV(xgb,param_grid ,scoring = 'r2')
grid.fit(X_train, y_train)


print(grid.best_estimator_)
print(grid.score(X_test, y_test))
```

```
[18:50:36] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[18:51:31] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[18:52:26] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[18:53:21] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[18:54:34] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[18:55:47] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[18:57:00] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:00:35] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:04:11] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:07:46] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:08:06] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:08:27] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:08:47] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:10:38] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:12:27] WARNING: /workspace/src/objective/regression_obj.cu:152: re

g:linear is now deprecated in favor of reg:squarederror.
```

```
g:linear is now deprecated in favor of reg:squarederror.
[19:14:12] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:14:57] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:15:42] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:16:28] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:17:22] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:18:15] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:19:08] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:19:29] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:19:49] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:20:10] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:20:40] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:21:09] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:21:39] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:22:32] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:23:25] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
[19:24:18] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
XGBRegressor(base_score=0.5, booster='gbtree', colsample_bylevel=1,
             colsample_bynode=1, colsample_bytree=1, gamma=0,
             importance_type='gain', learning_rate=0.1, max_delta_step=
0,
             max_depth=15, min_child_weight=1, missing=None, n_estimato
rs=50,

             n_jobs=-1, nthread=None, objective='reg:linear', random_st
```

```
                n_jobs=-1, nthread=None, objective='reg:linear', random_st
ate=0,
                reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
                silent=None, subsample=1, verbosity=1)
0.9736218806571844
```

In [270]:
```
xgb=XGBRegressor(base_score=0.5, booster='gbtree', colsample_bylevel=1,
                colsample_bynode=1, colsample_bytree=1, gamma=0,
                importance_type='gain', learning_rate=0.1, max_delta_step=
0,
                max_depth=25, min_child_weight=1, missing=None, n_estimato
rs=100,
                n_jobs=-1, nthread=None, objective='reg:linear', random_st
ate=0,
                reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
                silent=None, subsample=1, verbosity=1)
xgb.fit(X_train,y_train)
```

```
[19:25:37] WARNING: /workspace/src/objective/regression_obj.cu:152: re
g:linear is now deprecated in favor of reg:squarederror.
```

Out[270]:
```
XGBRegressor(base_score=0.5, booster='gbtree', colsample_bylevel=1,
                colsample_bynode=1, colsample_bytree=1, gamma=0,
                importance_type='gain', learning_rate=0.1, max_delta_step=
0,
                max_depth=25, min_child_weight=1, missing=None, n_estimato
rs=100,
                n_jobs=-1, nthread=None, objective='reg:linear', random_st
ate=0,
                reg_alpha=0, reg_lambda=1, scale_pos_weight=1, seed=None,
                silent=None, subsample=1, verbosity=1)
```

In [271]:
```
#https://www.bmc.com/blogs/mean-squared-error-r2-and-variance-in-regres
sion-analysis/
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.metrics import median_absolute_error
preds = xgb.predict(X_test)
print("R2 score : %.2f" % r2_score(y_test,preds))
print("Mean squared error: %.2f" % mean_squared_error(y_test,preds))
```

```
R2 score : 0.97
Mean squared error: 13630313.14
```

# Deep learning model

In [167]:
```
#https://machinelearningmastery.com/regression-tutorial-keras-deep-learning-library-python/
from keras.callbacks import ModelCheckpoint
from keras.models import Sequential
from keras.layers import Dense, Activation, Flatten
NN_model = Sequential()

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

# The Hidden Layers :
NN_model.add(Dense(512, 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'))
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_squared_error', optimizer='adam', metrics=['mean_squared_error'])
NN_model.summary()
```

```
Using TensorFlow backend.
```

The default version of TensorFlow in Colab will soon switch to TensorFlow 2.x.
We recommend you upgrade now or ensure your notebook will continue to use TensorFlow 1.x via the `%tensorflow_version 1.x` magic: more info.

```
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow_backend.py:66: The name tf.get_default_graph is deprec
```

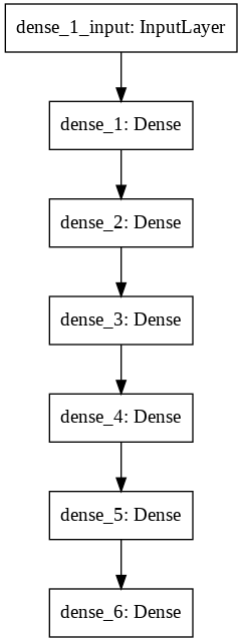
```
ated. Please use tf.compat.v1.get_default_graph instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:541: The name tf.placeholder is deprecated.
Please use tf.compat.v1.placeholder instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:4409: The name tf.random_normal is deprecat
ed. Please use tf.random.normal instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/op
timizers.py:793: The name tf.train.Optimizer is deprecated. Please use
tf.compat.v1.train.Optimizer instead.

Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense_1 (Dense)              (None, 128)               2176
_________________________________________________________________
dense_2 (Dense)              (None, 512)               66048
_________________________________________________________________
dense_3 (Dense)              (None, 256)               131328
_________________________________________________________________
dense_4 (Dense)              (None, 256)               65792
_________________________________________________________________
dense_5 (Dense)              (None, 256)               65792
_________________________________________________________________
dense_6 (Dense)              (None, 1)                 257
=================================================================
Total params: 331,393
Trainable params: 331,393
Non-trainable params: 0
_________________________________________________________________
```

In [168]:

```
# https://github.com/mmortazavi/EntityEmbedding-Working_Example/blob/ma
ster/EntityEmbedding.ipynb
#https://stackoverflow.com/questions/36886711/keras-runtimeerror-failed
-to-import-pydot-after-installing-graphviz-and-pyd
```

```
from keras.utils import plot_model
import keras
import pydotplus
from keras.utils.vis_utils import model_to_dot
#keras.utils.vis_utils.pydot = pydot
#import pydot_ng as pydot
plot_model(NN_model, to_file='model_2.png')
from IPython.display import Image
Image(retina=True, filename='model_2.png')
```

Out[168]:




In [0]:
```
checkpoint_name = 'Weights.hdf5'
checkpoint = ModelCheckpoint(checkpoint_name, monitor='val_mean_squared
_error', verbose = 1, save_best_only = True, mode ='auto')
callbacks_list = [checkpoint]
```

In [170]:
```
NN_model.fit(X_train,y_train, epochs=500, batch_size=500, validation_sp
lit = 0.2, callbacks=callbacks_list)
```

```
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
```

```
ckend/tensorflow_backend.py:1033: The name tf.assign_add is deprecated.
Please use tf.compat.v1.assign_add instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:1020: The name tf.assign is deprecated. Ple
ase use tf.compat.v1.assign instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:3005: The name tf.Session is deprecated. Pl
ease use tf.compat.v1.Session instead.

Train on 269804 samples, validate on 67452 samples
Epoch 1/500
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:190: The name tf.get_default_session is dep
recated. Please use tf.compat.v1.get_default_session instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:197: The name tf.ConfigProto is deprecated.
Please use tf.compat.v1.ConfigProto instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:207: The name tf.global_variables is deprec
ated. Please use tf.compat.v1.global_variables instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:216: The name tf.is_variable_initialized is
deprecated. Please use tf.compat.v1.is_variable_initialized instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/ba
ckend/tensorflow_backend.py:223: The name tf.variables_initializer is d
eprecated. Please use tf.compat.v1.variables_initializer instead.

269804/269804 [==============================] - 9s 33us/step - loss: 4
45837209.5726 - mean_squared_error: 445837209.5726 - val_loss: 39107711
2.1105 - val_mean_squared_error: 391077112.1105

Epoch 00001: val_mean_squared_error improved from inf to 391077112.1105
4, saving model to Weights.hdf5
```

```
Epoch 2/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
83305425.1872 - mean_squared_error: 383305425.1872 - val_loss: 37414454
1.3727 - val_mean_squared_error: 374144541.3727

Epoch 00002: val_mean_squared_error improved from 391077112.11054 to 37
4144541.37271, saving model to Weights.hdf5
Epoch 3/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
66726922.0978 - mean_squared_error: 366726922.0978 - val_loss: 35295003
3.5485 - val_mean_squared_error: 352950033.5485

Epoch 00003: val_mean_squared_error improved from 374144541.37271 to 35
2950033.54848, saving model to Weights.hdf5
Epoch 4/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
43599736.3941 - mean_squared_error: 343599736.3941 - val_loss: 32877533
7.8725 - val_mean_squared_error: 328775337.8725

Epoch 00004: val_mean_squared_error improved from 352950033.54848 to 32
8775337.87250, saving model to Weights.hdf5
Epoch 5/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
16852148.5198 - mean_squared_error: 316852148.5198 - val_loss: 30191046
0.8385 - val_mean_squared_error: 301910460.8385

Epoch 00005: val_mean_squared_error improved from 328775337.87250 to 30
1910460.83852, saving model to Weights.hdf5
Epoch 6/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
99618011.3519 - mean_squared_error: 299618011.3519 - val_loss: 28577218
5.8678 - val_mean_squared_error: 285772185.8678

Epoch 00006: val_mean_squared_error improved from 301910460.83852 to 28
5772185.86776, saving model to Weights.hdf5
Epoch 7/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
90640251.2660 - mean_squared_error: 290640251.2660 - val_loss: 28813436
7.8918 - val_mean_squared_error: 288134367.8918
```

```
Epoch 00007: val_mean_squared_error did not improve from 285772185.8677
6
Epoch 8/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
79511598.2385 - mean_squared_error: 279511598.2385 - val_loss: 25963321
5.9649 - val_mean_squared_error: 259633215.9649

Epoch 00008: val_mean_squared_error improved from 285772185.86776 to 25
9633215.96489, saving model to Weights.hdf5
Epoch 9/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
40050307.5377 - mean_squared_error: 240050307.5377 - val_loss: 21438531
7.3134 - val_mean_squared_error: 214385317.3134

Epoch 00009: val_mean_squared_error improved from 259633215.96489 to 21
4385317.31341, saving model to Weights.hdf5
Epoch 10/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
06861389.2781 - mean_squared_error: 206861389.2781 - val_loss: 19727650
1.0292 - val_mean_squared_error: 197276501.0292

Epoch 00010: val_mean_squared_error improved from 214385317.31341 to 19
7276501.02924, saving model to Weights.hdf5
Epoch 11/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
97738884.0775 - mean_squared_error: 197738884.0775 - val_loss: 19418638
2.2195 - val_mean_squared_error: 194186382.2195

Epoch 00011: val_mean_squared_error improved from 197276501.02924 to 19
4186382.21953, saving model to Weights.hdf5
Epoch 12/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
93271853.1139 - mean_squared_error: 193271853.1139 - val_loss: 18246931
7.3528 - val_mean_squared_error: 182469317.3528

Epoch 00012: val_mean_squared_error improved from 194186382.21953 to 18
2469317.35278, saving model to Weights.hdf5
Epoch 13/500
```

```
269804/269804 [==============================] - 4s 16us/step - loss: 1
88033477.0233 - mean_squared_error: 188033477.0233 - val_loss: 18957092
7.1959 - val_mean_squared_error: 189570927.1959

Epoch 00013: val_mean_squared_error did not improve from 182469317.3527
8
Epoch 14/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
84009331.0915 - mean_squared_error: 184009331.0915 - val_loss: 17872068
4.1933 - val_mean_squared_error: 178720684.1933

Epoch 00014: val_mean_squared_error improved from 182469317.35278 to 17
8720684.19332, saving model to Weights.hdf5
Epoch 15/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
80695614.2484 - mean_squared_error: 180695614.2484 - val_loss: 18535005
3.4206 - val_mean_squared_error: 185350053.4206

Epoch 00015: val_mean_squared_error did not improve from 178720684.1933
2
Epoch 16/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
78934041.3622 - mean_squared_error: 178934041.3622 - val_loss: 18014078
3.6413 - val_mean_squared_error: 180140783.6413

Epoch 00016: val_mean_squared_error did not improve from 178720684.1933
2
Epoch 17/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
75526648.6264 - mean_squared_error: 175526648.6264 - val_loss: 19223945
8.7791 - val_mean_squared_error: 192239458.7791

Epoch 00017: val_mean_squared_error did not improve from 178720684.1933
2
Epoch 18/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
76170049.2565 - mean_squared_error: 176170049.2565 - val_loss: 17280665
8.9741 - val_mean_squared_error: 172806658.9741
```

```
Epoch 00018: val_mean_squared_error improved from 178720684.19332 to 17
2806658.97409, saving model to Weights.hdf5
Epoch 19/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
67941479.3559 - mean_squared_error: 167941479.3559 - val_loss: 16862901
5.2519 - val_mean_squared_error: 168629015.2519

Epoch 00019: val_mean_squared_error improved from 172806658.97409 to 16
8629015.25185, saving model to Weights.hdf5
Epoch 20/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
71695874.7647 - mean_squared_error: 171695874.7647 - val_loss: 16255137
9.8043 - val_mean_squared_error: 162551379.8043

Epoch 00020: val_mean_squared_error improved from 168629015.25185 to 16
2551379.80431, saving model to Weights.hdf5
Epoch 21/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
65296953.8991 - mean_squared_error: 165296953.8991 - val_loss: 16742029
6.2410 - val_mean_squared_error: 167420296.2410

Epoch 00021: val_mean_squared_error did not improve from 162551379.8043
1
Epoch 22/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
66025034.1733 - mean_squared_error: 166025034.1733 - val_loss: 16705002
4.3387 - val_mean_squared_error: 167050024.3387

Epoch 00022: val_mean_squared_error did not improve from 162551379.8043
1
Epoch 23/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
60691586.1452 - mean_squared_error: 160691586.1452 - val_loss: 16076370
6.7544 - val_mean_squared_error: 160763706.7544

Epoch 00023: val_mean_squared_error improved from 162551379.80431 to 16
0763706.75443, saving model to Weights.hdf5
Epoch 24/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
```

```
59051426.8433 - mean_squared_error: 159051426.8433 - val_loss: 15794708
7.3472 - val_mean_squared_error: 157947087.3472

Epoch 00024: val_mean_squared_error improved from 160763706.75443 to 15
7947087.34721, saving model to Weights.hdf5
Epoch 25/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
59511879.5191 - mean_squared_error: 159511879.5191 - val_loss: 16098159
3.7515 - val_mean_squared_error: 160981593.7515

Epoch 00025: val_mean_squared_error did not improve from 157947087.3472
1
Epoch 26/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
56158767.5293 - mean_squared_error: 156158767.5293 - val_loss: 15920666
5.3203 - val_mean_squared_error: 159206665.3203

Epoch 00026: val_mean_squared_error did not improve from 157947087.3472
1
Epoch 27/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
55591113.6530 - mean_squared_error: 155591113.6530 - val_loss: 14951862
1.4054 - val_mean_squared_error: 149518621.4054

Epoch 00027: val_mean_squared_error improved from 157947087.34721 to 14
9518621.40544, saving model to Weights.hdf5
Epoch 28/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
62035208.4943 - mean_squared_error: 162035208.4943 - val_loss: 18443384
5.7304 - val_mean_squared_error: 184433845.7304

Epoch 00028: val_mean_squared_error did not improve from 149518621.4054
4
Epoch 29/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
54105901.2606 - mean_squared_error: 154105901.2606 - val_loss: 15787142
3.1612 - val_mean_squared_error: 157871423.1612

Epoch 00029: val_mean_squared_error did not improve from 149518621.4054
```

```
4
Epoch 30/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
49367384.8014 - mean_squared_error: 149367384.8014 - val_loss: 14908312
1.7582 - val_mean_squared_error: 149083121.7582

Epoch 00030: val_mean_squared_error improved from 149518621.40544 to 14
9083121.75817, saving model to Weights.hdf5
Epoch 31/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
44604744.0181 - mean_squared_error: 144604744.0181 - val_loss: 14007114
8.5340 - val_mean_squared_error: 140071148.5340

Epoch 00031: val_mean_squared_error improved from 149083121.75817 to 14
0071148.53395, saving model to Weights.hdf5
Epoch 32/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
41757188.6701 - mean_squared_error: 141757188.6701 - val_loss: 14197674
1.4856 - val_mean_squared_error: 141976741.4856

Epoch 00032: val_mean_squared_error did not improve from 140071148.5339
5
Epoch 33/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
41201780.3550 - mean_squared_error: 141201780.3550 - val_loss: 13009388
4.4163 - val_mean_squared_error: 130093884.4163

Epoch 00033: val_mean_squared_error improved from 140071148.53395 to 13
0093884.41630, saving model to Weights.hdf5
Epoch 34/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
33930677.2156 - mean_squared_error: 133930677.2156 - val_loss: 14550672
9.5276 - val_mean_squared_error: 145506729.5276

Epoch 00034: val_mean_squared_error did not improve from 130093884.4163
0
Epoch 35/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
32153759.3196 - mean_squared_error: 132153759.3196 - val_loss: 12170753
```

```
7.4166 - val_mean_squared_error: 121707537.4166

Epoch 00035: val_mean_squared_error improved from 130093884.41630 to 12
1707537.41659, saving model to Weights.hdf5
Epoch 36/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
23368957.6434 - mean_squared_error: 123368957.6434 - val_loss: 11167185
6.5525 - val_mean_squared_error: 111671856.5525

Epoch 00036: val_mean_squared_error improved from 121707537.41659 to 11
1671856.55245, saving model to Weights.hdf5
Epoch 37/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
23475770.9087 - mean_squared_error: 123475770.9087 - val_loss: 13913448
7.7035 - val_mean_squared_error: 139134487.7035

Epoch 00037: val_mean_squared_error did not improve from 111671856.5524
5
Epoch 38/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
17648360.0958 - mean_squared_error: 117648360.0958 - val_loss: 11218141
3.5480 - val_mean_squared_error: 112181413.5480

Epoch 00038: val_mean_squared_error did not improve from 111671856.5524
5
Epoch 39/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
14545913.1170 - mean_squared_error: 114545913.1170 - val_loss: 12160344
4.9415 - val_mean_squared_error: 121603444.9415

Epoch 00039: val_mean_squared_error did not improve from 111671856.5524
5
Epoch 40/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
12805183.7674 - mean_squared_error: 112805183.7674 - val_loss: 11514733
2.1974 - val_mean_squared_error: 115147332.1974

Epoch 00040: val_mean_squared_error did not improve from 111671856.5524
5
```

```
Epoch 41/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
12888438.9297 - mean_squared_error: 112888438.9297 - val_loss: 10615408
3.9156 - val_mean_squared_error: 106154083.9156

Epoch 00041: val_mean_squared_error improved from 111671856.55245 to 10
6154083.91555, saving model to Weights.hdf5
Epoch 42/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
08642508.3600 - mean_squared_error: 108642508.3600 - val_loss: 11530688
6.3704 - val_mean_squared_error: 115306886.3704

Epoch 00042: val_mean_squared_error did not improve from 106154083.9155
5
Epoch 43/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
09822498.4892 - mean_squared_error: 109822498.4892 - val_loss: 10775430
6.7715 - val_mean_squared_error: 107754306.7715

Epoch 00043: val_mean_squared_error did not improve from 106154083.9155
5
Epoch 44/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
07172779.6884 - mean_squared_error: 107172779.6884 - val_loss: 9660728
5.6258 - val_mean_squared_error: 96607285.6258

Epoch 00044: val_mean_squared_error improved from 106154083.91555 to 96
607285.62581, saving model to Weights.hdf5
Epoch 45/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
9832993.5484 - mean_squared_error: 99832993.5484 - val_loss: 109802018.
8182 - val_mean_squared_error: 109802018.8182

Epoch 00045: val_mean_squared_error did not improve from 96607285.62581
Epoch 46/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
03153699.7798 - mean_squared_error: 103153699.7798 - val_loss: 9428101
3.9050 - val_mean_squared_error: 94281013.9050
```

```
Epoch 00046: val_mean_squared_error improved from 96607285.62581 to 942
81013.90500, saving model to Weights.hdf5
Epoch 47/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
6291766.2902 - mean_squared_error: 96291766.2902 - val_loss: 101332279.
2084 - val_mean_squared_error: 101332279.2084

Epoch 00047: val_mean_squared_error did not improve from 94281013.90500
Epoch 48/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
04172866.8005 - mean_squared_error: 104172866.8005 - val_loss: 9456117
1.0374 - val_mean_squared_error: 94561171.0374

Epoch 00048: val_mean_squared_error did not improve from 94281013.90500
Epoch 49/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
6187426.4407 - mean_squared_error: 96187426.4407 - val_loss: 97881352.5
375 - val_mean_squared_error: 97881352.5375

Epoch 00049: val_mean_squared_error did not improve from 94281013.90500
Epoch 50/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
9959971.1068 - mean_squared_error: 99959971.1068 - val_loss: 88838481.4
792 - val_mean_squared_error: 88838481.4792

Epoch 00050: val_mean_squared_error improved from 94281013.90500 to 888
38481.47921, saving model to Weights.hdf5
Epoch 51/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
5323135.4815 - mean_squared_error: 95323135.4815 - val_loss: 101083943.
3633 - val_mean_squared_error: 101083943.3633

Epoch 00051: val_mean_squared_error did not improve from 88838481.47921
Epoch 52/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
3137174.3708 - mean_squared_error: 93137174.3708 - val_loss: 89029496.4
526 - val_mean_squared_error: 89029496.4526

Epoch 00052: val_mean_squared_error did not improve from 88838481.47921
```

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Epoch 53/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
01726907.1284 - mean_squared_error: 101726907.1284 - val_loss: 9589477
5.2075 - val_mean_squared_error: 95894775.2075

Epoch 00053: val_mean_squared_error did not improve from 88838481.47921
Epoch 54/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
9637025.5441 - mean_squared_error: 99637025.5441 - val_loss: 132304167.
5654 - val_mean_squared_error: 132304167.5654

Epoch 00054: val_mean_squared_error did not improve from 88838481.47921
Epoch 55/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
01986525.5951 - mean_squared_error: 101986525.5951 - val_loss: 9062416
7.5652 - val_mean_squared_error: 90624167.5652

Epoch 00055: val_mean_squared_error did not improve from 88838481.47921
Epoch 56/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
2149093.2523 - mean_squared_error: 92149093.2523 - val_loss: 84287959.2
035 - val_mean_squared_error: 84287959.2035

Epoch 00056: val_mean_squared_error improved from 88838481.47921 to 842
87959.20346, saving model to Weights.hdf5
Epoch 57/500
269804/269804 [==============================] - 4s 17us/step - loss: 8
7800701.0554 - mean_squared_error: 87800701.0554 - val_loss: 85114977.1
609 - val_mean_squared_error: 85114977.1609

Epoch 00057: val_mean_squared_error did not improve from 84287959.20346
Epoch 58/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
3213101.1935 - mean_squared_error: 93213101.1935 - val_loss: 100656489.
0876 - val_mean_squared_error: 100656489.0876

Epoch 00058: val_mean_squared_error did not improve from 84287959.20346
Epoch 59/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
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9448755.3655 - mean_squared_error: 89448755.3655 - val_loss: 91565169.5
376 - val_mean_squared_error: 91565169.5376

Epoch 00059: val_mean_squared_error did not improve from 84287959.20346
Epoch 60/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
4029873.3232 - mean_squared_error: 94029873.3232 - val_loss: 103771930.
6287 - val_mean_squared_error: 103771930.6287

Epoch 00060: val_mean_squared_error did not improve from 84287959.20346
Epoch 61/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
8464732.5009 - mean_squared_error: 88464732.5009 - val_loss: 80169087.2
108 - val_mean_squared_error: 80169087.2108

Epoch 00061: val_mean_squared_error improved from 84287959.20346 to 801
69087.21082, saving model to Weights.hdf5
Epoch 62/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
3016515.0149 - mean_squared_error: 93016515.0149 - val_loss: 103930565.
9584 - val_mean_squared_error: 103930565.9584

Epoch 00062: val_mean_squared_error did not improve from 80169087.21082
Epoch 63/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
2303166.7278 - mean_squared_error: 92303166.7278 - val_loss: 91473197.1
405 - val_mean_squared_error: 91473197.1405

Epoch 00063: val_mean_squared_error did not improve from 80169087.21082
Epoch 64/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
0284160.6832 - mean_squared_error: 90284160.6832 - val_loss: 93497560.2
078 - val_mean_squared_error: 93497560.2078

Epoch 00064: val_mean_squared_error did not improve from 80169087.21082
Epoch 65/500
269804/269804 [==============================] - 4s 16us/step - loss: 9
1296664.9681 - mean_squared_error: 91296664.9681 - val_loss: 104227523.
9630 - val_mean_squared_error: 104227523.9630
```

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Epoch 00065: val_mean_squared_error did not improve from 80169087.21082
Epoch 66/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
6608081.9746 - mean_squared_error: 86608081.9746 - val_loss: 106783215.
7263 - val_mean_squared_error: 106783215.7263

Epoch 00066: val_mean_squared_error did not improve from 80169087.21082
Epoch 67/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
2235311.6057 - mean_squared_error: 82235311.6057 - val_loss: 84862768.5
935 - val_mean_squared_error: 84862768.5935

Epoch 00067: val_mean_squared_error did not improve from 80169087.21082
Epoch 68/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
5962731.4164 - mean_squared_error: 85962731.4164 - val_loss: 77866403.3
965 - val_mean_squared_error: 77866403.3965

Epoch 00068: val_mean_squared_error improved from 80169087.21082 to 778
66403.39655, saving model to Weights.hdf5
Epoch 69/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
1055927.2520 - mean_squared_error: 81055927.2520 - val_loss: 95200952.9
578 - val_mean_squared_error: 95200952.9578

Epoch 00069: val_mean_squared_error did not improve from 77866403.39655
Epoch 70/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
3251802.5464 - mean_squared_error: 83251802.5464 - val_loss: 89506329.2
088 - val_mean_squared_error: 89506329.2088

Epoch 00070: val_mean_squared_error did not improve from 77866403.39655
Epoch 71/500
269804/269804 [==============================] - 4s 16us/step - loss: 8
2738559.4853 - mean_squared_error: 82738559.4853 - val_loss: 95956583.9
889 - val_mean_squared_error: 95956583.9889

Epoch 00071: val_mean_squared_error did not improve from 77866403.39655
```

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Epoch 72/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
9358982.4348 - mean_squared_error: 79358982.4348 - val_loss: 125456954.
8235 - val_mean_squared_error: 125456954.8235

Epoch 00072: val_mean_squared_error did not improve from 77866403.39655
Epoch 73/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
8302899.7465 - mean_squared_error: 78302899.7465 - val_loss: 71799932.8
758 - val_mean_squared_error: 71799932.8758

Epoch 00073: val_mean_squared_error improved from 77866403.39655 to 717
99932.87576, saving model to Weights.hdf5
Epoch 74/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
7146660.3369 - mean_squared_error: 77146660.3369 - val_loss: 72637800.8
203 - val_mean_squared_error: 72637800.8203

Epoch 00074: val_mean_squared_error did not improve from 71799932.87576
Epoch 75/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
5022820.6045 - mean_squared_error: 75022820.6045 - val_loss: 95413550.2
805 - val_mean_squared_error: 95413550.2805

Epoch 00075: val_mean_squared_error did not improve from 71799932.87576
Epoch 76/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
5656278.8040 - mean_squared_error: 75656278.8040 - val_loss: 77183422.6
875 - val_mean_squared_error: 77183422.6875

Epoch 00076: val_mean_squared_error did not improve from 71799932.87576
Epoch 77/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
6562730.9140 - mean_squared_error: 76562730.9140 - val_loss: 104706192.
9244 - val_mean_squared_error: 104706192.9244

Epoch 00077: val_mean_squared_error did not improve from 71799932.87576
Epoch 78/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
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8178317.7688 - mean_squared_error: 78178317.7688 - val_loss: 83778873.8
450 - val_mean_squared_error: 83778873.8450

Epoch 00078: val_mean_squared_error did not improve from 71799932.87576
Epoch 79/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
4923774.7240 - mean_squared_error: 74923774.7240 - val_loss: 67945202.8
804 - val_mean_squared_error: 67945202.8804

Epoch 00079: val_mean_squared_error improved from 71799932.87576 to 679
45202.88039, saving model to Weights.hdf5
Epoch 80/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
4739446.5394 - mean_squared_error: 74739446.5394 - val_loss: 82448311.8
456 - val_mean_squared_error: 82448311.8456

Epoch 00080: val_mean_squared_error did not improve from 67945202.88039
Epoch 81/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
0066087.4509 - mean_squared_error: 70066087.4509 - val_loss: 75742325.8
118 - val_mean_squared_error: 75742325.8118

Epoch 00081: val_mean_squared_error did not improve from 67945202.88039
Epoch 82/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
0093488.9573 - mean_squared_error: 70093488.9573 - val_loss: 70711487.7
461 - val_mean_squared_error: 70711487.7461

Epoch 00082: val_mean_squared_error did not improve from 67945202.88039
Epoch 83/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
0950935.1965 - mean_squared_error: 70950935.1965 - val_loss: 70395121.0
157 - val_mean_squared_error: 70395121.0157

Epoch 00083: val_mean_squared_error did not improve from 67945202.88039
Epoch 84/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
8554798.5451 - mean_squared_error: 68554798.5451 - val_loss: 78106210.6
344 - val_mean_squared_error: 78106210.6344
```

```
Epoch 00084: val_mean_squared_error did not improve from 67945202.88039
Epoch 85/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
2125098.9246 - mean_squared_error: 72125098.9246 - val_loss: 76747640.6
756 - val_mean_squared_error: 76747640.6756

Epoch 00085: val_mean_squared_error did not improve from 67945202.88039
Epoch 86/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
4638812.2126 - mean_squared_error: 64638812.2126 - val_loss: 72159929.6
749 - val_mean_squared_error: 72159929.6749

Epoch 00086: val_mean_squared_error did not improve from 67945202.88039
Epoch 87/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
0101736.1139 - mean_squared_error: 70101736.1139 - val_loss: 72006842.4
174 - val_mean_squared_error: 72006842.4174

Epoch 00087: val_mean_squared_error did not improve from 67945202.88039
Epoch 88/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
7995198.5563 - mean_squared_error: 67995198.5563 - val_loss: 63106948.5
092 - val_mean_squared_error: 63106948.5092

Epoch 00088: val_mean_squared_error improved from 67945202.88039 to 631
06948.50916, saving model to Weights.hdf5
Epoch 89/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
7238605.2725 - mean_squared_error: 67238605.2725 - val_loss: 88290116.5
880 - val_mean_squared_error: 88290116.5880

Epoch 00089: val_mean_squared_error did not improve from 63106948.50916
Epoch 90/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
8708003.9106 - mean_squared_error: 68708003.9106 - val_loss: 61443629.5
736 - val_mean_squared_error: 61443629.5736

Epoch 00090: val_mean_squared_error improved from 63106948.50916 to 614
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43629.57362, saving model to Weights.hdf5
Epoch 91/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
3575563.6105 - mean_squared_error: 63575563.6105 - val_loss: 74944359.9
320 - val_mean_squared_error: 74944359.9320

Epoch 00091: val_mean_squared_error did not improve from 61443629.57362
Epoch 92/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
6808879.5615 - mean_squared_error: 76808879.5615 - val_loss: 92560656.6
447 - val_mean_squared_error: 92560656.6447

Epoch 00092: val_mean_squared_error did not improve from 61443629.57362
Epoch 93/500
269804/269804 [==============================] - 4s 16us/step - loss: 7
0496566.1271 - mean_squared_error: 70496566.1271 - val_loss: 65139071.7
460 - val_mean_squared_error: 65139071.7460

Epoch 00093: val_mean_squared_error did not improve from 61443629.57362
Epoch 94/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
1596693.6805 - mean_squared_error: 61596693.6805 - val_loss: 62504080.8
565 - val_mean_squared_error: 62504080.8565

Epoch 00094: val_mean_squared_error did not improve from 61443629.57362
Epoch 95/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
9479821.9931 - mean_squared_error: 69479821.9931 - val_loss: 77421314.3
415 - val_mean_squared_error: 77421314.3415

Epoch 00095: val_mean_squared_error did not improve from 61443629.57362
Epoch 96/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
7674701.1924 - mean_squared_error: 67674701.1924 - val_loss: 74840502.5
158 - val_mean_squared_error: 74840502.5158

Epoch 00096: val_mean_squared_error did not improve from 61443629.57362
Epoch 97/500
269804/269804 [==============================] - 4s 15us/step - loss: 6
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8625695.4565 - mean_squared_error: 68625695.4565 - val_loss: 84824413.6
834 - val_mean_squared_error: 84824413.6834

Epoch 00097: val_mean_squared_error did not improve from 61443629.57362
Epoch 98/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
6583050.2157 - mean_squared_error: 66583050.2157 - val_loss: 63491461.0
212 - val_mean_squared_error: 63491461.0212

Epoch 00098: val_mean_squared_error did not improve from 61443629.57362
Epoch 99/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
7400618.4579 - mean_squared_error: 67400618.4579 - val_loss: 62571098.7
116 - val_mean_squared_error: 62571098.7116

Epoch 00099: val_mean_squared_error did not improve from 61443629.57362
Epoch 100/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
5633064.6905 - mean_squared_error: 65633064.6905 - val_loss: 68052971.4
458 - val_mean_squared_error: 68052971.4458

Epoch 00100: val_mean_squared_error did not improve from 61443629.57362
Epoch 101/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
4621437.7294 - mean_squared_error: 64621437.7294 - val_loss: 99850926.2
712 - val_mean_squared_error: 99850926.2712

Epoch 00101: val_mean_squared_error did not improve from 61443629.57362
Epoch 102/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
0571110.1250 - mean_squared_error: 60571110.1250 - val_loss: 55114826.3
009 - val_mean_squared_error: 55114826.3009

Epoch 00102: val_mean_squared_error improved from 61443629.57362 to 551
14826.30090, saving model to Weights.hdf5
Epoch 103/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
0498663.1184 - mean_squared_error: 60498663.1184 - val_loss: 77324914.1
930 - val_mean_squared_error: 77324914.1930
```

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Epoch 00103: val_mean_squared_error did not improve from 55114826.30090
Epoch 104/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
8437391.8047 - mean_squared_error: 58437391.8047 - val_loss: 62781210.6
046 - val_mean_squared_error: 62781210.6046

Epoch 00104: val_mean_squared_error did not improve from 55114826.30090
Epoch 105/500
269804/269804 [==============================] - 4s 16us/step - loss: 6
0658190.8596 - mean_squared_error: 60658190.8596 - val_loss: 67839266.0
735 - val_mean_squared_error: 67839266.0735

Epoch 00105: val_mean_squared_error did not improve from 55114826.30090
Epoch 106/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
4076064.3188 - mean_squared_error: 54076064.3188 - val_loss: 61492034.0
394 - val_mean_squared_error: 61492034.0394

Epoch 00106: val_mean_squared_error did not improve from 55114826.30090
Epoch 107/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
7331568.0873 - mean_squared_error: 57331568.0873 - val_loss: 50859806.0
370 - val_mean_squared_error: 50859806.0370

Epoch 00107: val_mean_squared_error improved from 55114826.30090 to 508
59806.03700, saving model to Weights.hdf5
Epoch 108/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
9999010.7403 - mean_squared_error: 49999010.7403 - val_loss: 70559604.8
378 - val_mean_squared_error: 70559604.8378

Epoch 00108: val_mean_squared_error did not improve from 50859806.03700
Epoch 109/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
7863519.1182 - mean_squared_error: 57863519.1182 - val_loss: 72537130.7
340 - val_mean_squared_error: 72537130.7340

Epoch 00109: val_mean_squared_error did not improve from 50859806.03700
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Epoch 110/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
6197537.6712 - mean_squared_error: 56197537.6712 - val_loss: 75902483.9
150 - val_mean_squared_error: 75902483.9150

Epoch 00110: val_mean_squared_error did not improve from 50859806.03700
Epoch 111/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
1216876.3271 - mean_squared_error: 51216876.3271 - val_loss: 53933523.5
370 - val_mean_squared_error: 53933523.5370

Epoch 00111: val_mean_squared_error did not improve from 50859806.03700
Epoch 112/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
8575221.4670 - mean_squared_error: 58575221.4670 - val_loss: 60745259.9
318 - val_mean_squared_error: 60745259.9318

Epoch 00112: val_mean_squared_error did not improve from 50859806.03700
Epoch 113/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
9791503.7481 - mean_squared_error: 49791503.7481 - val_loss: 67928507.1
745 - val_mean_squared_error: 67928507.1745

Epoch 00113: val_mean_squared_error did not improve from 50859806.03700
Epoch 114/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
6566605.6899 - mean_squared_error: 56566605.6899 - val_loss: 68563668.3
482 - val_mean_squared_error: 68563668.3482

Epoch 00114: val_mean_squared_error did not improve from 50859806.03700
Epoch 115/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
0859653.7073 - mean_squared_error: 50859653.7073 - val_loss: 50166183.4
181 - val_mean_squared_error: 50166183.4181

Epoch 00115: val_mean_squared_error improved from 50859806.03700 to 501
66183.41813, saving model to Weights.hdf5
Epoch 116/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
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9170967.9862 - mean_squared_error: 49170967.9862 - val_loss: 75026890.8
545 - val_mean_squared_error: 75026890.8545

Epoch 00116: val_mean_squared_error did not improve from 50166183.41813
Epoch 117/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
2448986.4411 - mean_squared_error: 52448986.4411 - val_loss: 54546577.4
691 - val_mean_squared_error: 54546577.4691

Epoch 00117: val_mean_squared_error did not improve from 50166183.41813
Epoch 118/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
1223990.3047 - mean_squared_error: 51223990.3047 - val_loss: 63105959.6
948 - val_mean_squared_error: 63105959.6948

Epoch 00118: val_mean_squared_error did not improve from 50166183.41813
Epoch 119/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6309130.2381 - mean_squared_error: 46309130.2381 - val_loss: 60591512.6
314 - val_mean_squared_error: 60591512.6314

Epoch 00119: val_mean_squared_error did not improve from 50166183.41813
Epoch 120/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
5077365.0029 - mean_squared_error: 55077365.0029 - val_loss: 67393215.3
789 - val_mean_squared_error: 67393215.3789

Epoch 00120: val_mean_squared_error did not improve from 50166183.41813
Epoch 121/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6712092.2944 - mean_squared_error: 46712092.2944 - val_loss: 65213144.3
589 - val_mean_squared_error: 65213144.3589

Epoch 00121: val_mean_squared_error did not improve from 50166183.41813
Epoch 122/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
2881902.6421 - mean_squared_error: 52881902.6421 - val_loss: 63404214.3
233 - val_mean_squared_error: 63404214.3233
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Epoch 00122: val_mean_squared_error did not improve from 50166183.41813
Epoch 123/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6365937.5500 - mean_squared_error: 46365937.5500 - val_loss: 62956001.0
811 - val_mean_squared_error: 62956001.0811

Epoch 00123: val_mean_squared_error did not improve from 50166183.41813
Epoch 124/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5869193.8048 - mean_squared_error: 45869193.8048 - val_loss: 80781929.7
945 - val_mean_squared_error: 80781929.7945

Epoch 00124: val_mean_squared_error did not improve from 50166183.41813
Epoch 125/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
8131693.0627 - mean_squared_error: 48131693.0627 - val_loss: 50881563.1
665 - val_mean_squared_error: 50881563.1665

Epoch 00125: val_mean_squared_error did not improve from 50166183.41813
Epoch 126/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
3344056.6357 - mean_squared_error: 53344056.6357 - val_loss: 60358933.4
796 - val_mean_squared_error: 60358933.4796

Epoch 00126: val_mean_squared_error did not improve from 50166183.41813
Epoch 127/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5356839.6473 - mean_squared_error: 45356839.6473 - val_loss: 56879912.1
293 - val_mean_squared_error: 56879912.1293

Epoch 00127: val_mean_squared_error did not improve from 50166183.41813
Epoch 128/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
0050426.7680 - mean_squared_error: 50050426.7680 - val_loss: 51907723.1
168 - val_mean_squared_error: 51907723.1168

Epoch 00128: val_mean_squared_error did not improve from 50166183.41813
Epoch 129/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
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3610138.5375 - mean_squared_error: 43610138.5375 - val_loss: 51187431.9
698 - val_mean_squared_error: 51187431.9698

Epoch 00129: val_mean_squared_error did not improve from 50166183.41813
Epoch 130/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
9739584.9920 - mean_squared_error: 49739584.9920 - val_loss: 62214301.5
019 - val_mean_squared_error: 62214301.5019

Epoch 00130: val_mean_squared_error did not improve from 50166183.41813
Epoch 131/500
269804/269804 [==============================] - 4s 17us/step - loss: 5
0951016.2132 - mean_squared_error: 50951016.2132 - val_loss: 63101207.2
571 - val_mean_squared_error: 63101207.2571

Epoch 00131: val_mean_squared_error did not improve from 50166183.41813
Epoch 132/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
0210813.5752 - mean_squared_error: 50210813.5752 - val_loss: 71398880.2
967 - val_mean_squared_error: 71398880.2967

Epoch 00132: val_mean_squared_error did not improve from 50166183.41813
Epoch 133/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
1176046.8653 - mean_squared_error: 51176046.8653 - val_loss: 52812786.5
006 - val_mean_squared_error: 52812786.5006

Epoch 00133: val_mean_squared_error did not improve from 50166183.41813
Epoch 134/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6934287.5169 - mean_squared_error: 46934287.5169 - val_loss: 49363831.3
746 - val_mean_squared_error: 49363831.3746

Epoch 00134: val_mean_squared_error improved from 50166183.41813 to 493
63831.37461, saving model to Weights.hdf5
Epoch 135/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0161196.8870 - mean_squared_error: 40161196.8870 - val_loss: 60557460.5
459 - val_mean_squared_error: 60557460.5459
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Epoch 00135: val_mean_squared_error did not improve from 49363831.37461
Epoch 136/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
7396203.9515 - mean_squared_error: 47396203.9515 - val_loss: 55616247.4
071 - val_mean_squared_error: 55616247.4071

Epoch 00136: val_mean_squared_error did not improve from 49363831.37461
Epoch 137/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
1057870.4292 - mean_squared_error: 51057870.4292 - val_loss: 52253736.6
255 - val_mean_squared_error: 52253736.6255

Epoch 00137: val_mean_squared_error did not improve from 49363831.37461
Epoch 138/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
3527733.8701 - mean_squared_error: 43527733.8701 - val_loss: 45963595.7
224 - val_mean_squared_error: 45963595.7224

Epoch 00138: val_mean_squared_error improved from 49363831.37461 to 459
63595.72235, saving model to Weights.hdf5
Epoch 139/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6043841.4071 - mean_squared_error: 46043841.4071 - val_loss: 94321946.5
443 - val_mean_squared_error: 94321946.5443

Epoch 00139: val_mean_squared_error did not improve from 45963595.72235
Epoch 140/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8755337.6888 - mean_squared_error: 38755337.6888 - val_loss: 43401107.7
213 - val_mean_squared_error: 43401107.7213

Epoch 00140: val_mean_squared_error improved from 45963595.72235 to 434
01107.72134, saving model to Weights.hdf5
Epoch 141/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
4870591.0165 - mean_squared_error: 44870591.0165 - val_loss: 48781671.6
766 - val_mean_squared_error: 48781671.6766
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Epoch 00141: val_mean_squared_error did not improve from 43401107.72134
Epoch 142/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
3501345.9954 - mean_squared_error: 43501345.9954 - val_loss: 48706975.1
458 - val_mean_squared_error: 48706975.1458

Epoch 00142: val_mean_squared_error did not improve from 43401107.72134
Epoch 143/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7669907.2686 - mean_squared_error: 37669907.2686 - val_loss: 54557854.7
601 - val_mean_squared_error: 54557854.7601

Epoch 00143: val_mean_squared_error did not improve from 43401107.72134
Epoch 144/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
7765930.8767 - mean_squared_error: 57765930.8767 - val_loss: 65364098.0
148 - val_mean_squared_error: 65364098.0148

Epoch 00144: val_mean_squared_error did not improve from 43401107.72134
Epoch 145/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
0866465.6598 - mean_squared_error: 50866465.6598 - val_loss: 57614119.5
233 - val_mean_squared_error: 57614119.5233

Epoch 00145: val_mean_squared_error did not improve from 43401107.72134
Epoch 146/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6967372.1318 - mean_squared_error: 46967372.1318 - val_loss: 90891143.3
324 - val_mean_squared_error: 90891143.3324

Epoch 00146: val_mean_squared_error did not improve from 43401107.72134
Epoch 147/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1898476.7505 - mean_squared_error: 41898476.7505 - val_loss: 45636504.0
291 - val_mean_squared_error: 45636504.0291

Epoch 00147: val_mean_squared_error did not improve from 43401107.72134
Epoch 148/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
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7179886.4031 - mean_squared_error: 47179886.4031 - val_loss: 50359481.6
706 - val_mean_squared_error: 50359481.6706

Epoch 00148: val_mean_squared_error did not improve from 43401107.72134
Epoch 149/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1284494.1462 - mean_squared_error: 41284494.1462 - val_loss: 48276055.8
153 - val_mean_squared_error: 48276055.8153

Epoch 00149: val_mean_squared_error did not improve from 43401107.72134
Epoch 150/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8636474.6111 - mean_squared_error: 38636474.6111 - val_loss: 53523244.9
052 - val_mean_squared_error: 53523244.9052

Epoch 00150: val_mean_squared_error did not improve from 43401107.72134
Epoch 151/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6021537.3945 - mean_squared_error: 46021537.3945 - val_loss: 40605794.9
006 - val_mean_squared_error: 40605794.9006

Epoch 00151: val_mean_squared_error improved from 43401107.72134 to 406
05794.90055, saving model to Weights.hdf5
Epoch 152/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0339665.9123 - mean_squared_error: 40339665.9123 - val_loss: 54006466.9
119 - val_mean_squared_error: 54006466.9119

Epoch 00152: val_mean_squared_error did not improve from 40605794.90055
Epoch 153/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6565451.9877 - mean_squared_error: 36565451.9877 - val_loss: 40185337.6
568 - val_mean_squared_error: 40185337.6568

Epoch 00153: val_mean_squared_error improved from 40605794.90055 to 401
85337.65676, saving model to Weights.hdf5
Epoch 154/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
7698695.1815 - mean_squared_error: 47698695.1815 - val_loss: 48179109.9
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076 - val_mean_squared_error: 48179109.9076

Epoch 00154: val_mean_squared_error did not improve from 40185337.65676
Epoch 155/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0921089.2822 - mean_squared_error: 40921089.2822 - val_loss: 58290917.2
409 - val_mean_squared_error: 58290917.2409

Epoch 00155: val_mean_squared_error did not improve from 40185337.65676
Epoch 156/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
8686752.1973 - mean_squared_error: 58686752.1973 - val_loss: 46909724.7
519 - val_mean_squared_error: 46909724.7519

Epoch 00156: val_mean_squared_error did not improve from 40185337.65676
Epoch 157/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0445199.6888 - mean_squared_error: 40445199.6888 - val_loss: 51537269.4
243 - val_mean_squared_error: 51537269.4243

Epoch 00157: val_mean_squared_error did not improve from 40185337.65676
Epoch 158/500
269804/269804 [==============================] - 4s 17us/step - loss: 3
7550942.9826 - mean_squared_error: 37550942.9826 - val_loss: 40287516.1
116 - val_mean_squared_error: 40287516.1116

Epoch 00158: val_mean_squared_error did not improve from 40185337.65676
Epoch 159/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5563236.8078 - mean_squared_error: 35563236.8078 - val_loss: 43642859.9
977 - val_mean_squared_error: 43642859.9977

Epoch 00159: val_mean_squared_error did not improve from 40185337.65676
Epoch 160/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1237611.4654 - mean_squared_error: 41237611.4654 - val_loss: 57766998.3
505 - val_mean_squared_error: 57766998.3505

Epoch 00160: val_mean_squared_error did not improve from 40185337.65676
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Epoch 161/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
4284472.0018 - mean_squared_error: 44284472.0018 - val_loss: 67357359.7
416 - val_mean_squared_error: 67357359.7416

Epoch 00161: val_mean_squared_error did not improve from 40185337.65676
Epoch 162/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6114390.5993 - mean_squared_error: 46114390.5993 - val_loss: 55012705.1
749 - val_mean_squared_error: 55012705.1749

Epoch 00162: val_mean_squared_error did not improve from 40185337.65676
Epoch 163/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8100736.6658 - mean_squared_error: 38100736.6658 - val_loss: 42617065.6
362 - val_mean_squared_error: 42617065.6362

Epoch 00163: val_mean_squared_error did not improve from 40185337.65676
Epoch 164/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6456766.8694 - mean_squared_error: 46456766.8694 - val_loss: 66663554.5
681 - val_mean_squared_error: 66663554.5681

Epoch 00164: val_mean_squared_error did not improve from 40185337.65676
Epoch 165/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5613700.9461 - mean_squared_error: 35613700.9461 - val_loss: 48845649.7
752 - val_mean_squared_error: 48845649.7752

Epoch 00165: val_mean_squared_error did not improve from 40185337.65676
Epoch 166/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1198741.1302 - mean_squared_error: 41198741.1302 - val_loss: 37723339.7
182 - val_mean_squared_error: 37723339.7182

Epoch 00166: val_mean_squared_error improved from 40185337.65676 to 377
23339.71820, saving model to Weights.hdf5
Epoch 167/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
```

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3310100.6439 - mean_squared_error: 33310100.6439 - val_loss: 60412395.0
636 - val_mean_squared_error: 60412395.0636

Epoch 00167: val_mean_squared_error did not improve from 37723339.71820
Epoch 168/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
9377925.9680 - mean_squared_error: 49377925.9680 - val_loss: 49702966.3
505 - val_mean_squared_error: 49702966.3505

Epoch 00168: val_mean_squared_error did not improve from 37723339.71820
Epoch 169/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
9729842.4886 - mean_squared_error: 39729842.4886 - val_loss: 45360487.3
234 - val_mean_squared_error: 45360487.3234

Epoch 00169: val_mean_squared_error did not improve from 37723339.71820
Epoch 170/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7298566.2899 - mean_squared_error: 37298566.2899 - val_loss: 52671975.8
548 - val_mean_squared_error: 52671975.8548

Epoch 00170: val_mean_squared_error did not improve from 37723339.71820
Epoch 171/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4393289.8877 - mean_squared_error: 34393289.8877 - val_loss: 53387963.1
523 - val_mean_squared_error: 53387963.1523

Epoch 00171: val_mean_squared_error did not improve from 37723339.71820
Epoch 172/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1313849.4208 - mean_squared_error: 41313849.4208 - val_loss: 47710051.6
624 - val_mean_squared_error: 47710051.6624

Epoch 00172: val_mean_squared_error did not improve from 37723339.71820
Epoch 173/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5170013.0047 - mean_squared_error: 45170013.0047 - val_loss: 48983352.2
642 - val_mean_squared_error: 48983352.2642
```

```
Epoch 00173: val_mean_squared_error did not improve from 37723339.71820
Epoch 174/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
3478540.4071 - mean_squared_error: 43478540.4071 - val_loss: 52856318.6
502 - val_mean_squared_error: 52856318.6502

Epoch 00174: val_mean_squared_error did not improve from 37723339.71820
Epoch 175/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8834542.0481 - mean_squared_error: 38834542.0481 - val_loss: 53612195.0
152 - val_mean_squared_error: 53612195.0152

Epoch 00175: val_mean_squared_error did not improve from 37723339.71820
Epoch 176/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
3578134.3967 - mean_squared_error: 43578134.3967 - val_loss: 58748506.8
522 - val_mean_squared_error: 58748506.8522

Epoch 00176: val_mean_squared_error did not improve from 37723339.71820
Epoch 177/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0427022.6487 - mean_squared_error: 40427022.6487 - val_loss: 44337928.7
907 - val_mean_squared_error: 44337928.7907

Epoch 00177: val_mean_squared_error did not improve from 37723339.71820
Epoch 178/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4877640.2173 - mean_squared_error: 34877640.2173 - val_loss: 60760321.8
249 - val_mean_squared_error: 60760321.8249

Epoch 00178: val_mean_squared_error did not improve from 37723339.71820
Epoch 179/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6675427.3667 - mean_squared_error: 46675427.3667 - val_loss: 47606962.3
431 - val_mean_squared_error: 47606962.3431

Epoch 00179: val_mean_squared_error did not improve from 37723339.71820
Epoch 180/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
```

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8464709.2629 - mean_squared_error: 48464709.2629 - val_loss: 40043830.2
167 - val_mean_squared_error: 40043830.2167

Epoch 00180: val_mean_squared_error did not improve from 37723339.71820
Epoch 181/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
2961258.6528 - mean_squared_error: 42961258.6528 - val_loss: 53355857.6
473 - val_mean_squared_error: 53355857.6473

Epoch 00181: val_mean_squared_error did not improve from 37723339.71820
Epoch 182/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1206543.3636 - mean_squared_error: 41206543.3636 - val_loss: 49512675.8
216 - val_mean_squared_error: 49512675.8216

Epoch 00182: val_mean_squared_error did not improve from 37723339.71820
Epoch 183/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1917734.4503 - mean_squared_error: 41917734.4503 - val_loss: 53799678.2
965 - val_mean_squared_error: 53799678.2965

Epoch 00183: val_mean_squared_error did not improve from 37723339.71820
Epoch 184/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
3164851.8074 - mean_squared_error: 43164851.8074 - val_loss: 59756114.0
600 - val_mean_squared_error: 59756114.0600

Epoch 00184: val_mean_squared_error did not improve from 37723339.71820
Epoch 185/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6954773.1338 - mean_squared_error: 46954773.1338 - val_loss: 60831516.6
204 - val_mean_squared_error: 60831516.6204

Epoch 00185: val_mean_squared_error did not improve from 37723339.71820
Epoch 186/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
4153501.8133 - mean_squared_error: 44153501.8133 - val_loss: 45944201.1
621 - val_mean_squared_error: 45944201.1621
```

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Epoch 00186: val_mean_squared_error did not improve from 37723339.71820
Epoch 187/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0690754.8630 - mean_squared_error: 40690754.8630 - val_loss: 48000578.4
598 - val_mean_squared_error: 48000578.4598

Epoch 00187: val_mean_squared_error did not improve from 37723339.71820
Epoch 188/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8529956.5145 - mean_squared_error: 38529956.5145 - val_loss: 46579801.4
239 - val_mean_squared_error: 46579801.4239

Epoch 00188: val_mean_squared_error did not improve from 37723339.71820
Epoch 189/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
4402583.2334 - mean_squared_error: 44402583.2334 - val_loss: 45182687.9
855 - val_mean_squared_error: 45182687.9855

Epoch 00189: val_mean_squared_error did not improve from 37723339.71820
Epoch 190/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
4153490.1859 - mean_squared_error: 44153490.1859 - val_loss: 51600114.8
351 - val_mean_squared_error: 51600114.8351

Epoch 00190: val_mean_squared_error did not improve from 37723339.71820
Epoch 191/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5136595.8219 - mean_squared_error: 45136595.8219 - val_loss: 44986737.9
387 - val_mean_squared_error: 44986737.9387

Epoch 00191: val_mean_squared_error did not improve from 37723339.71820
Epoch 192/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8637275.1488 - mean_squared_error: 38637275.1488 - val_loss: 45716581.8
147 - val_mean_squared_error: 45716581.8147

Epoch 00192: val_mean_squared_error did not improve from 37723339.71820
Epoch 193/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
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7064712.8118 - mean_squared_error: 47064712.8118 - val_loss: 55580183.9
208 - val_mean_squared_error: 55580183.9208

Epoch 00193: val_mean_squared_error did not improve from 37723339.71820
Epoch 194/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1877955.3431 - mean_squared_error: 41877955.3431 - val_loss: 48928649.1
441 - val_mean_squared_error: 48928649.1441

Epoch 00194: val_mean_squared_error did not improve from 37723339.71820
Epoch 195/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0801305.8459 - mean_squared_error: 40801305.8459 - val_loss: 38676541.5
828 - val_mean_squared_error: 38676541.5828

Epoch 00195: val_mean_squared_error did not improve from 37723339.71820
Epoch 196/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8138772.6044 - mean_squared_error: 38138772.6044 - val_loss: 53862486.6
547 - val_mean_squared_error: 53862486.6547

Epoch 00196: val_mean_squared_error did not improve from 37723339.71820
Epoch 197/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8806108.9821 - mean_squared_error: 38806108.9821 - val_loss: 43546036.9
192 - val_mean_squared_error: 43546036.9192

Epoch 00197: val_mean_squared_error did not improve from 37723339.71820
Epoch 198/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
9361234.1252 - mean_squared_error: 39361234.1252 - val_loss: 51878541.1
139 - val_mean_squared_error: 51878541.1139

Epoch 00198: val_mean_squared_error did not improve from 37723339.71820
Epoch 199/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6873566.1168 - mean_squared_error: 36873566.1168 - val_loss: 52197559.6
628 - val_mean_squared_error: 52197559.6628
```

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Epoch 00199: val_mean_squared_error did not improve from 37723339.71820
Epoch 200/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6753906.6553 - mean_squared_error: 36753906.6553 - val_loss: 57637777.6
415 - val_mean_squared_error: 57637777.6415

Epoch 00200: val_mean_squared_error did not improve from 37723339.71820
Epoch 201/500
269804/269804 [==============================] - 4s 16us/step - loss: 5
1668854.3733 - mean_squared_error: 51668854.3733 - val_loss: 64056008.0
598 - val_mean_squared_error: 64056008.0598

Epoch 00201: val_mean_squared_error did not improve from 37723339.71820
Epoch 202/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0945238.8928 - mean_squared_error: 40945238.8928 - val_loss: 68366197.6
986 - val_mean_squared_error: 68366197.6986

Epoch 00202: val_mean_squared_error did not improve from 37723339.71820
Epoch 203/500
269804/269804 [==============================] - 5s 17us/step - loss: 4
3644466.8174 - mean_squared_error: 43644466.8174 - val_loss: 44327091.4
159 - val_mean_squared_error: 44327091.4159

Epoch 00203: val_mean_squared_error did not improve from 37723339.71820
Epoch 204/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1468712.2467 - mean_squared_error: 41468712.2467 - val_loss: 38518895.5
637 - val_mean_squared_error: 38518895.5637

Epoch 00204: val_mean_squared_error did not improve from 37723339.71820
Epoch 205/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6114110.3336 - mean_squared_error: 36114110.3336 - val_loss: 52922678.9
032 - val_mean_squared_error: 52922678.9032

Epoch 00205: val_mean_squared_error did not improve from 37723339.71820
Epoch 206/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
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8364001.5218 - mean_squared_error: 38364001.5218 - val_loss: 42863652.5
356 - val_mean_squared_error: 42863652.5356

Epoch 00206: val_mean_squared_error did not improve from 37723339.71820
Epoch 207/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8474145.9191 - mean_squared_error: 38474145.9191 - val_loss: 57072063.6
686 - val_mean_squared_error: 57072063.6686

Epoch 00207: val_mean_squared_error did not improve from 37723339.71820
Epoch 208/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
3318124.2634 - mean_squared_error: 43318124.2634 - val_loss: 64565000.2
046 - val_mean_squared_error: 64565000.2046

Epoch 00208: val_mean_squared_error did not improve from 37723339.71820
Epoch 209/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5864837.0490 - mean_squared_error: 35864837.0490 - val_loss: 46798464.4
245 - val_mean_squared_error: 46798464.4245

Epoch 00209: val_mean_squared_error did not improve from 37723339.71820
Epoch 210/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8945363.8767 - mean_squared_error: 38945363.8767 - val_loss: 45592199.6
519 - val_mean_squared_error: 45592199.6519

Epoch 00210: val_mean_squared_error did not improve from 37723339.71820
Epoch 211/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3059477.5874 - mean_squared_error: 33059477.5874 - val_loss: 66569542.4
933 - val_mean_squared_error: 66569542.4933

Epoch 00211: val_mean_squared_error did not improve from 37723339.71820
Epoch 212/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6791082.4897 - mean_squared_error: 36791082.4897 - val_loss: 42767979.5
592 - val_mean_squared_error: 42767979.5592
```

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Epoch 00212: val_mean_squared_error did not improve from 37723339.71820
Epoch 213/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3627807.2240 - mean_squared_error: 33627807.2240 - val_loss: 44292574.3
920 - val_mean_squared_error: 44292574.3920

Epoch 00213: val_mean_squared_error did not improve from 37723339.71820
Epoch 214/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8510649.0728 - mean_squared_error: 38510649.0728 - val_loss: 54337888.6
392 - val_mean_squared_error: 54337888.6392

Epoch 00214: val_mean_squared_error did not improve from 37723339.71820
Epoch 215/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2881945.0715 - mean_squared_error: 32881945.0715 - val_loss: 49351364.8
153 - val_mean_squared_error: 49351364.8153

Epoch 00215: val_mean_squared_error did not improve from 37723339.71820
Epoch 216/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5476497.9073 - mean_squared_error: 35476497.9073 - val_loss: 54409436.9
632 - val_mean_squared_error: 54409436.9632

Epoch 00216: val_mean_squared_error did not improve from 37723339.71820
Epoch 217/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5006049.8154 - mean_squared_error: 45006049.8154 - val_loss: 38306858.2
083 - val_mean_squared_error: 38306858.2083

Epoch 00217: val_mean_squared_error did not improve from 37723339.71820
Epoch 218/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8457198.9166 - mean_squared_error: 38457198.9166 - val_loss: 43379292.2
543 - val_mean_squared_error: 43379292.2543

Epoch 00218: val_mean_squared_error did not improve from 37723339.71820
Epoch 219/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
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3485350.2535 - mean_squared_error: 33485350.2535 - val_loss: 59988819.2
208 - val_mean_squared_error: 59988819.2208

Epoch 00219: val_mean_squared_error did not improve from 37723339.71820
Epoch 220/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0017128.6469 - mean_squared_error: 40017128.6469 - val_loss: 56875709.2
787 - val_mean_squared_error: 56875709.2787

Epoch 00220: val_mean_squared_error did not improve from 37723339.71820
Epoch 221/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3400481.5035 - mean_squared_error: 33400481.5035 - val_loss: 70478105.0
634 - val_mean_squared_error: 70478105.0634

Epoch 00221: val_mean_squared_error did not improve from 37723339.71820
Epoch 222/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6246309.1247 - mean_squared_error: 36246309.1247 - val_loss: 39498284.1
162 - val_mean_squared_error: 39498284.1162

Epoch 00222: val_mean_squared_error did not improve from 37723339.71820
Epoch 223/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2580049.7237 - mean_squared_error: 32580049.7237 - val_loss: 37104363.1
694 - val_mean_squared_error: 37104363.1694

Epoch 00223: val_mean_squared_error improved from 37723339.71820 to 371
04363.16942, saving model to Weights.hdf5
Epoch 224/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6224268.0988 - mean_squared_error: 36224268.0988 - val_loss: 70008108.3
963 - val_mean_squared_error: 70008108.3963

Epoch 00224: val_mean_squared_error did not improve from 37104363.16942
Epoch 225/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3639752.8523 - mean_squared_error: 33639752.8523 - val_loss: 44156483.9
023 - val_mean_squared_error: 44156483.9023
```

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Epoch 00225: val_mean_squared_error did not improve from 37104363.16942
Epoch 226/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2475710.1434 - mean_squared_error: 32475710.1434 - val_loss: 41302270.9
193 - val_mean_squared_error: 41302270.9193

Epoch 00226: val_mean_squared_error did not improve from 37104363.16942
Epoch 227/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9754372.3685 - mean_squared_error: 29754372.3685 - val_loss: 54748426.0
323 - val_mean_squared_error: 54748426.0323

Epoch 00227: val_mean_squared_error did not improve from 37104363.16942
Epoch 228/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1923394.3012 - mean_squared_error: 31923394.3012 - val_loss: 31877005.2
217 - val_mean_squared_error: 31877005.2217

Epoch 00228: val_mean_squared_error improved from 37104363.16942 to 318
77005.22167, saving model to Weights.hdf5
Epoch 229/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1238145.7958 - mean_squared_error: 41238145.7958 - val_loss: 43705779.5
388 - val_mean_squared_error: 43705779.5388

Epoch 00229: val_mean_squared_error did not improve from 31877005.22167
Epoch 230/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1334074.8467 - mean_squared_error: 41334074.8467 - val_loss: 51746845.0
860 - val_mean_squared_error: 51746845.0860

Epoch 00230: val_mean_squared_error did not improve from 31877005.22167
Epoch 231/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
4878994.2770 - mean_squared_error: 44878994.2770 - val_loss: 40726721.7
056 - val_mean_squared_error: 40726721.7056

Epoch 00231: val_mean_squared_error did not improve from 31877005.22167
```

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Epoch 232/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1253813.3466 - mean_squared_error: 41253813.3466 - val_loss: 62199554.2
386 - val_mean_squared_error: 62199554.2386

Epoch 00232: val_mean_squared_error did not improve from 31877005.22167
Epoch 233/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
2700966.4743 - mean_squared_error: 42700966.4743 - val_loss: 43682508.0
843 - val_mean_squared_error: 43682508.0843

Epoch 00233: val_mean_squared_error did not improve from 31877005.22167
Epoch 234/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0880277.2382 - mean_squared_error: 30880277.2382 - val_loss: 45408007.0
568 - val_mean_squared_error: 45408007.0568

Epoch 00234: val_mean_squared_error did not improve from 31877005.22167
Epoch 235/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0278607.0199 - mean_squared_error: 40278607.0199 - val_loss: 54426140.8
649 - val_mean_squared_error: 54426140.8649

Epoch 00235: val_mean_squared_error did not improve from 31877005.22167
Epoch 236/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3385802.0834 - mean_squared_error: 33385802.0834 - val_loss: 64561187.8
873 - val_mean_squared_error: 64561187.8873

Epoch 00236: val_mean_squared_error did not improve from 31877005.22167
Epoch 237/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6086810.8756 - mean_squared_error: 36086810.8756 - val_loss: 49575831.9
062 - val_mean_squared_error: 49575831.9062

Epoch 00237: val_mean_squared_error did not improve from 31877005.22167
Epoch 238/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5097436.7840 - mean_squared_error: 35097436.7840 - val_loss: 32914230.8
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775 - val_mean_squared_error: 32914230.8775

Epoch 00238: val_mean_squared_error did not improve from 31877005.22167
Epoch 239/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7274607.1065 - mean_squared_error: 37274607.1065 - val_loss: 39744248.3
941 - val_mean_squared_error: 39744248.3941

Epoch 00239: val_mean_squared_error did not improve from 31877005.22167
Epoch 240/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5970920.1139 - mean_squared_error: 35970920.1139 - val_loss: 39210627.4
983 - val_mean_squared_error: 39210627.4983

Epoch 00240: val_mean_squared_error did not improve from 31877005.22167
Epoch 241/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2081781.4995 - mean_squared_error: 32081781.4995 - val_loss: 35745878.5
447 - val_mean_squared_error: 35745878.5447

Epoch 00241: val_mean_squared_error did not improve from 31877005.22167
Epoch 242/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1240522.8218 - mean_squared_error: 31240522.8218 - val_loss: 44059742.5
656 - val_mean_squared_error: 44059742.5656

Epoch 00242: val_mean_squared_error did not improve from 31877005.22167
Epoch 243/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1738337.2011 - mean_squared_error: 31738337.2011 - val_loss: 38019369.4
616 - val_mean_squared_error: 38019369.4616

Epoch 00243: val_mean_squared_error did not improve from 31877005.22167
Epoch 244/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6585321.4813 - mean_squared_error: 36585321.4813 - val_loss: 40626038.3
221 - val_mean_squared_error: 40626038.3221

Epoch 00244: val_mean_squared_error did not improve from 31877005.22167
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Epoch 245/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8504722.9608 - mean_squared_error: 38504722.9608 - val_loss: 41501350.3
955 - val_mean_squared_error: 41501350.3955

Epoch 00245: val_mean_squared_error did not improve from 31877005.22167
Epoch 246/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
1473428.5361 - mean_squared_error: 41473428.5361 - val_loss: 81145208.5
610 - val_mean_squared_error: 81145208.5610

Epoch 00246: val_mean_squared_error did not improve from 31877005.22167
Epoch 247/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8354116.0667 - mean_squared_error: 38354116.0667 - val_loss: 44689470.2
128 - val_mean_squared_error: 44689470.2128

Epoch 00247: val_mean_squared_error did not improve from 31877005.22167
Epoch 248/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1659100.7108 - mean_squared_error: 31659100.7108 - val_loss: 39284345.7
511 - val_mean_squared_error: 39284345.7511

Epoch 00248: val_mean_squared_error did not improve from 31877005.22167
Epoch 249/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5988245.9314 - mean_squared_error: 35988245.9314 - val_loss: 62712081.3
471 - val_mean_squared_error: 62712081.3471

Epoch 00249: val_mean_squared_error did not improve from 31877005.22167
Epoch 250/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7756023.4118 - mean_squared_error: 37756023.4118 - val_loss: 33929911.0
331 - val_mean_squared_error: 33929911.0331

Epoch 00250: val_mean_squared_error did not improve from 31877005.22167
Epoch 251/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6630117.9163 - mean_squared_error: 36630117.9163 - val_loss: 46106608.3
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321 - val_mean_squared_error: 46106608.3321

Epoch 00251: val_mean_squared_error did not improve from 31877005.22167
Epoch 252/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1361905.6318 - mean_squared_error: 31361905.6318 - val_loss: 36117330.8
509 - val_mean_squared_error: 36117330.8509

Epoch 00252: val_mean_squared_error did not improve from 31877005.22167
Epoch 253/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4410175.3758 - mean_squared_error: 34410175.3758 - val_loss: 50383399.5
970 - val_mean_squared_error: 50383399.5970

Epoch 00253: val_mean_squared_error did not improve from 31877005.22167
Epoch 254/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8050014.8346 - mean_squared_error: 38050014.8346 - val_loss: 36626262.5
415 - val_mean_squared_error: 36626262.5415

Epoch 00254: val_mean_squared_error did not improve from 31877005.22167
Epoch 255/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9083694.9396 - mean_squared_error: 29083694.9396 - val_loss: 49724635.9
471 - val_mean_squared_error: 49724635.9471

Epoch 00255: val_mean_squared_error did not improve from 31877005.22167
Epoch 256/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9574057.8655 - mean_squared_error: 29574057.8655 - val_loss: 79462179.7
743 - val_mean_squared_error: 79462179.7743

Epoch 00256: val_mean_squared_error did not improve from 31877005.22167
Epoch 257/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5616560.4336 - mean_squared_error: 45616560.4336 - val_loss: 57641800.0
805 - val_mean_squared_error: 57641800.0805

Epoch 00257: val_mean_squared_error did not improve from 31877005.22167
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Epoch 258/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6845040.2083 - mean_squared_error: 36845040.2083 - val_loss: 44453492.2
360 - val_mean_squared_error: 44453492.2360

Epoch 00258: val_mean_squared_error did not improve from 31877005.22167
Epoch 259/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7322853.4437 - mean_squared_error: 37322853.4437 - val_loss: 53521866.8
908 - val_mean_squared_error: 53521866.8908

Epoch 00259: val_mean_squared_error did not improve from 31877005.22167
Epoch 260/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1315528.0176 - mean_squared_error: 31315528.0176 - val_loss: 36636937.6
051 - val_mean_squared_error: 36636937.6051

Epoch 00260: val_mean_squared_error did not improve from 31877005.22167
Epoch 261/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8962290.9164 - mean_squared_error: 28962290.9164 - val_loss: 52733681.0
554 - val_mean_squared_error: 52733681.0554

Epoch 00261: val_mean_squared_error did not improve from 31877005.22167
Epoch 262/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7096706.4000 - mean_squared_error: 37096706.4000 - val_loss: 49794122.0
202 - val_mean_squared_error: 49794122.0202

Epoch 00262: val_mean_squared_error did not improve from 31877005.22167
Epoch 263/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0490981.9657 - mean_squared_error: 30490981.9657 - val_loss: 35638329.8
609 - val_mean_squared_error: 35638329.8609

Epoch 00263: val_mean_squared_error did not improve from 31877005.22167
Epoch 264/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8708383.7170 - mean_squared_error: 28708383.7170 - val_loss: 36832855.8
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726 - val_mean_squared_error: 36832855.8726

Epoch 00264: val_mean_squared_error did not improve from 31877005.22167
Epoch 265/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3092031.2770 - mean_squared_error: 33092031.2770 - val_loss: 34437274.5
595 - val_mean_squared_error: 34437274.5595

Epoch 00265: val_mean_squared_error did not improve from 31877005.22167
Epoch 266/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9151055.8595 - mean_squared_error: 29151055.8595 - val_loss: 41825980.3
655 - val_mean_squared_error: 41825980.3655

Epoch 00266: val_mean_squared_error did not improve from 31877005.22167
Epoch 267/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1313419.6358 - mean_squared_error: 31313419.6358 - val_loss: 59248637.2
781 - val_mean_squared_error: 59248637.2781

Epoch 00267: val_mean_squared_error did not improve from 31877005.22167
Epoch 268/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2284491.1487 - mean_squared_error: 32284491.1487 - val_loss: 44073641.4
727 - val_mean_squared_error: 44073641.4727

Epoch 00268: val_mean_squared_error did not improve from 31877005.22167
Epoch 269/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2416750.2083 - mean_squared_error: 32416750.2083 - val_loss: 54179819.3
641 - val_mean_squared_error: 54179819.3641

Epoch 00269: val_mean_squared_error did not improve from 31877005.22167
Epoch 270/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6964750.2629 - mean_squared_error: 26964750.2629 - val_loss: 39446277.5
385 - val_mean_squared_error: 39446277.5385

Epoch 00270: val_mean_squared_error did not improve from 31877005.22167
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Epoch 271/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1658773.2222 - mean_squared_error: 31658773.2222 - val_loss: 41803647.4
352 - val_mean_squared_error: 41803647.4352

Epoch 00271: val_mean_squared_error did not improve from 31877005.22167
Epoch 272/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1301055.2460 - mean_squared_error: 31301055.2460 - val_loss: 43456246.5
243 - val_mean_squared_error: 43456246.5243

Epoch 00272: val_mean_squared_error did not improve from 31877005.22167
Epoch 273/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5586696.1110 - mean_squared_error: 25586696.1110 - val_loss: 43671016.6
647 - val_mean_squared_error: 43671016.6647

Epoch 00273: val_mean_squared_error did not improve from 31877005.22167
Epoch 274/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4854118.0483 - mean_squared_error: 34854118.0483 - val_loss: 38471590.4
292 - val_mean_squared_error: 38471590.4292

Epoch 00274: val_mean_squared_error did not improve from 31877005.22167
Epoch 275/500
269804/269804 [==============================] - 4s 17us/step - loss: 3
0871015.8621 - mean_squared_error: 30871015.8621 - val_loss: 41091516.0
598 - val_mean_squared_error: 41091516.0598

Epoch 00275: val_mean_squared_error did not improve from 31877005.22167
Epoch 276/500
269804/269804 [==============================] - 4s 17us/step - loss: 2
8414466.9342 - mean_squared_error: 28414466.9342 - val_loss: 63255617.3
378 - val_mean_squared_error: 63255617.3378

Epoch 00276: val_mean_squared_error did not improve from 31877005.22167
Epoch 277/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0849514.9505 - mean_squared_error: 30849514.9505 - val_loss: 37368211.6
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798 - val_mean_squared_error: 37368211.6798

Epoch 00277: val_mean_squared_error did not improve from 31877005.22167
Epoch 278/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0538335.5232 - mean_squared_error: 30538335.5232 - val_loss: 38068092.1
943 - val_mean_squared_error: 38068092.1943

Epoch 00278: val_mean_squared_error did not improve from 31877005.22167
Epoch 279/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9955710.9359 - mean_squared_error: 29955710.9359 - val_loss: 38322306.4
418 - val_mean_squared_error: 38322306.4418

Epoch 00279: val_mean_squared_error did not improve from 31877005.22167
Epoch 280/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6858017.9233 - mean_squared_error: 26858017.9233 - val_loss: 35728316.5
854 - val_mean_squared_error: 35728316.5854

Epoch 00280: val_mean_squared_error did not improve from 31877005.22167
Epoch 281/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
0386797.5726 - mean_squared_error: 40386797.5726 - val_loss: 34548186.1
717 - val_mean_squared_error: 34548186.1717

Epoch 00281: val_mean_squared_error did not improve from 31877005.22167
Epoch 282/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3660876.9879 - mean_squared_error: 33660876.9879 - val_loss: 44305112.8
018 - val_mean_squared_error: 44305112.8018

Epoch 00282: val_mean_squared_error did not improve from 31877005.22167
Epoch 283/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2733960.3019 - mean_squared_error: 32733960.3019 - val_loss: 37710698.1
955 - val_mean_squared_error: 37710698.1955

Epoch 00283: val_mean_squared_error did not improve from 31877005.22167
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Epoch 284/500
269804/269804 [==============================] - 4s 15us/step - loss: 2
8367926.8048 - mean_squared_error: 28367926.8048 - val_loss: 73465620.6
134 - val_mean_squared_error: 73465620.6134

Epoch 00284: val_mean_squared_error did not improve from 31877005.22167
Epoch 285/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6192090.8050 - mean_squared_error: 26192090.8050 - val_loss: 40275514.1
287 - val_mean_squared_error: 40275514.1287

Epoch 00285: val_mean_squared_error did not improve from 31877005.22167
Epoch 286/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0323080.2715 - mean_squared_error: 30323080.2715 - val_loss: 46491539.0
342 - val_mean_squared_error: 46491539.0342

Epoch 00286: val_mean_squared_error did not improve from 31877005.22167
Epoch 287/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
7204240.5443 - mean_squared_error: 37204240.5443 - val_loss: 42224599.8
246 - val_mean_squared_error: 42224599.8246

Epoch 00287: val_mean_squared_error did not improve from 31877005.22167
Epoch 288/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7199378.3325 - mean_squared_error: 27199378.3325 - val_loss: 32335184.7
900 - val_mean_squared_error: 32335184.7900

Epoch 00288: val_mean_squared_error did not improve from 31877005.22167
Epoch 289/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6960150.3933 - mean_squared_error: 26960150.3933 - val_loss: 72155388.0
402 - val_mean_squared_error: 72155388.0402

Epoch 00289: val_mean_squared_error did not improve from 31877005.22167
Epoch 290/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5847705.8565 - mean_squared_error: 45847705.8565 - val_loss: 79727368.9
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640 - val_mean_squared_error: 79727368.9640

Epoch 00290: val_mean_squared_error did not improve from 31877005.22167
Epoch 291/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3452611.5561 - mean_squared_error: 33452611.5561 - val_loss: 42436147.7
035 - val_mean_squared_error: 42436147.7035

Epoch 00291: val_mean_squared_error did not improve from 31877005.22167
Epoch 292/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6956668.6758 - mean_squared_error: 26956668.6758 - val_loss: 35999235.2
171 - val_mean_squared_error: 35999235.2171

Epoch 00292: val_mean_squared_error did not improve from 31877005.22167
Epoch 293/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9613260.3329 - mean_squared_error: 29613260.3329 - val_loss: 43740022.0
436 - val_mean_squared_error: 43740022.0436

Epoch 00293: val_mean_squared_error did not improve from 31877005.22167
Epoch 294/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4502226.8547 - mean_squared_error: 34502226.8547 - val_loss: 34150802.2
814 - val_mean_squared_error: 34150802.2814

Epoch 00294: val_mean_squared_error did not improve from 31877005.22167
Epoch 295/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8726312.9836 - mean_squared_error: 28726312.9836 - val_loss: 39343630.5
773 - val_mean_squared_error: 39343630.5773

Epoch 00295: val_mean_squared_error did not improve from 31877005.22167
Epoch 296/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4255720.7990 - mean_squared_error: 34255720.7990 - val_loss: 57421594.3
316 - val_mean_squared_error: 57421594.3316

Epoch 00296: val_mean_squared_error did not improve from 31877005.22167
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Epoch 297/500
269804/269804 [==============================] - 4s 15us/step - loss: 3
9529787.4773 - mean_squared_error: 39529787.4773 - val_loss: 46717549.1
080 - val_mean_squared_error: 46717549.1080

Epoch 00297: val_mean_squared_error did not improve from 31877005.22167
Epoch 298/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1995427.3586 - mean_squared_error: 31995427.3586 - val_loss: 35465796.9
724 - val_mean_squared_error: 35465796.9724

Epoch 00298: val_mean_squared_error did not improve from 31877005.22167
Epoch 299/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8854914.4386 - mean_squared_error: 28854914.4386 - val_loss: 35563221.7
674 - val_mean_squared_error: 35563221.7674

Epoch 00299: val_mean_squared_error did not improve from 31877005.22167
Epoch 300/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7697603.0709 - mean_squared_error: 27697603.0709 - val_loss: 35535613.4
400 - val_mean_squared_error: 35535613.4400

Epoch 00300: val_mean_squared_error did not improve from 31877005.22167
Epoch 301/500
269804/269804 [==============================] - 4s 17us/step - loss: 2
5138203.4159 - mean_squared_error: 25138203.4159 - val_loss: 31706313.7
597 - val_mean_squared_error: 31706313.7597

Epoch 00301: val_mean_squared_error improved from 31877005.22167 to 317
06313.75971, saving model to Weights.hdf5
Epoch 302/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9451353.0674 - mean_squared_error: 29451353.0674 - val_loss: 43901267.5
147 - val_mean_squared_error: 43901267.5147

Epoch 00302: val_mean_squared_error did not improve from 31706313.75971
Epoch 303/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
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0220358.7563 - mean_squared_error: 30220358.7563 - val_loss: 167598878.
2001 - val_mean_squared_error: 167598878.2001

Epoch 00303: val_mean_squared_error did not improve from 31706313.75971
Epoch 304/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
6307935.5022 - mean_squared_error: 46307935.5022 - val_loss: 44986735.4
894 - val_mean_squared_error: 44986735.4894

Epoch 00304: val_mean_squared_error did not improve from 31706313.75971
Epoch 305/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1854628.9102 - mean_squared_error: 31854628.9102 - val_loss: 36978298.6
693 - val_mean_squared_error: 36978298.6693

Epoch 00305: val_mean_squared_error did not improve from 31706313.75971
Epoch 306/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7349950.7629 - mean_squared_error: 27349950.7629 - val_loss: 32838000.8
829 - val_mean_squared_error: 32838000.8829

Epoch 00306: val_mean_squared_error did not improve from 31706313.75971
Epoch 307/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
6724429.3441 - mean_squared_error: 36724429.3441 - val_loss: 44624969.0
642 - val_mean_squared_error: 44624969.0642

Epoch 00307: val_mean_squared_error did not improve from 31706313.75971
Epoch 308/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7258119.9896 - mean_squared_error: 27258119.9896 - val_loss: 55952492.1
945 - val_mean_squared_error: 55952492.1945

Epoch 00308: val_mean_squared_error did not improve from 31706313.75971
Epoch 309/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2656911.2008 - mean_squared_error: 32656911.2008 - val_loss: 51183738.4
829 - val_mean_squared_error: 51183738.4829
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Epoch 00309: val_mean_squared_error did not improve from 31706313.75971
Epoch 310/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9316074.1176 - mean_squared_error: 29316074.1176 - val_loss: 41916664.0
665 - val_mean_squared_error: 41916664.0665

Epoch 00310: val_mean_squared_error did not improve from 31706313.75971
Epoch 311/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8081939.9232 - mean_squared_error: 38081939.9232 - val_loss: 43976504.2
769 - val_mean_squared_error: 43976504.2769

Epoch 00311: val_mean_squared_error did not improve from 31706313.75971
Epoch 312/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8413236.2833 - mean_squared_error: 28413236.2833 - val_loss: 45159514.6
248 - val_mean_squared_error: 45159514.6248

Epoch 00312: val_mean_squared_error did not improve from 31706313.75971
Epoch 313/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9190865.5466 - mean_squared_error: 29190865.5466 - val_loss: 65792930.2
186 - val_mean_squared_error: 65792930.2186

Epoch 00313: val_mean_squared_error did not improve from 31706313.75971
Epoch 314/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3859777.1382 - mean_squared_error: 33859777.1382 - val_loss: 51802550.5
439 - val_mean_squared_error: 51802550.5439

Epoch 00314: val_mean_squared_error did not improve from 31706313.75971
Epoch 315/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2488522.6782 - mean_squared_error: 32488522.6782 - val_loss: 44172614.2
512 - val_mean_squared_error: 44172614.2512

Epoch 00315: val_mean_squared_error did not improve from 31706313.75971
Epoch 316/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
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4808867.8553 - mean_squared_error: 24808867.8553 - val_loss: 47746127.9
439 - val_mean_squared_error: 47746127.9439

Epoch 00316: val_mean_squared_error did not improve from 31706313.75971
Epoch 317/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3770556.3369 - mean_squared_error: 33770556.3369 - val_loss: 40331420.2
364 - val_mean_squared_error: 40331420.2364

Epoch 00317: val_mean_squared_error did not improve from 31706313.75971
Epoch 318/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4878274.5319 - mean_squared_error: 24878274.5319 - val_loss: 35771044.1
819 - val_mean_squared_error: 35771044.1819

Epoch 00318: val_mean_squared_error did not improve from 31706313.75971
Epoch 319/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6084604.8045 - mean_squared_error: 26084604.8045 - val_loss: 34118962.5
491 - val_mean_squared_error: 34118962.5491

Epoch 00319: val_mean_squared_error did not improve from 31706313.75971
Epoch 320/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6798246.0706 - mean_squared_error: 26798246.0706 - val_loss: 54928708.0
846 - val_mean_squared_error: 54928708.0846

Epoch 00320: val_mean_squared_error did not improve from 31706313.75971
Epoch 321/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5781128.9656 - mean_squared_error: 25781128.9656 - val_loss: 33032243.3
093 - val_mean_squared_error: 33032243.3093

Epoch 00321: val_mean_squared_error did not improve from 31706313.75971
Epoch 322/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1694021.6029 - mean_squared_error: 31694021.6029 - val_loss: 53539472.7
873 - val_mean_squared_error: 53539472.7873
```

```
Epoch 00322: val_mean_squared_error did not improve from 31706313.75971
Epoch 323/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5229584.9161 - mean_squared_error: 35229584.9161 - val_loss: 32503652.1
184 - val_mean_squared_error: 32503652.1184

Epoch 00323: val_mean_squared_error did not improve from 31706313.75971
Epoch 324/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5005701.1043 - mean_squared_error: 25005701.1043 - val_loss: 28029116.3
254 - val_mean_squared_error: 28029116.3254

Epoch 00324: val_mean_squared_error improved from 31706313.75971 to 280
29116.32539, saving model to Weights.hdf5
Epoch 325/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3047386.6260 - mean_squared_error: 23047386.6260 - val_loss: 34165987.3
720 - val_mean_squared_error: 34165987.3720

Epoch 00325: val_mean_squared_error did not improve from 28029116.32539
Epoch 326/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8573453.0074 - mean_squared_error: 28573453.0074 - val_loss: 28604519.4
314 - val_mean_squared_error: 28604519.4314

Epoch 00326: val_mean_squared_error did not improve from 28029116.32539
Epoch 327/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8084626.3058 - mean_squared_error: 28084626.3058 - val_loss: 33952411.8
683 - val_mean_squared_error: 33952411.8683

Epoch 00327: val_mean_squared_error did not improve from 28029116.32539
Epoch 328/500
269804/269804 [==============================] - 4s 15us/step - loss: 2
4433495.4034 - mean_squared_error: 24433495.4034 - val_loss: 30051566.3
667 - val_mean_squared_error: 30051566.3667

Epoch 00328: val_mean_squared_error did not improve from 28029116.32539
Epoch 329/500
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269804/269804 [==============================] - 4s 16us/step - loss: 2
4298346.5696 - mean_squared_error: 24298346.5696 - val_loss: 36044508.1
071 - val_mean_squared_error: 36044508.1071

Epoch 00329: val_mean_squared_error did not improve from 28029116.32539
Epoch 330/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3971590.2640 - mean_squared_error: 23971590.2640 - val_loss: 32170226.9
064 - val_mean_squared_error: 32170226.9064

Epoch 00330: val_mean_squared_error did not improve from 28029116.32539
Epoch 331/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4661679.1751 - mean_squared_error: 24661679.1751 - val_loss: 40837478.3
247 - val_mean_squared_error: 40837478.3247

Epoch 00331: val_mean_squared_error did not improve from 28029116.32539
Epoch 332/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8117904.2637 - mean_squared_error: 28117904.2637 - val_loss: 34012163.2
341 - val_mean_squared_error: 34012163.2341

Epoch 00332: val_mean_squared_error did not improve from 28029116.32539
Epoch 333/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1150670.7272 - mean_squared_error: 21150670.7272 - val_loss: 39995843.8
599 - val_mean_squared_error: 39995843.8599

Epoch 00333: val_mean_squared_error did not improve from 28029116.32539
Epoch 334/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3877212.6829 - mean_squared_error: 23877212.6829 - val_loss: 35710883.6
520 - val_mean_squared_error: 35710883.6520

Epoch 00334: val_mean_squared_error did not improve from 28029116.32539
Epoch 335/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
3064769.8518 - mean_squared_error: 33064769.8518 - val_loss: 40714143.5
803 - val_mean_squared_error: 40714143.5803
```

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Epoch 00335: val_mean_squared_error did not improve from 28029116.32539
Epoch 336/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5000435.9017 - mean_squared_error: 25000435.9017 - val_loss: 35328900.6
542 - val_mean_squared_error: 35328900.6542

Epoch 00336: val_mean_squared_error did not improve from 28029116.32539
Epoch 337/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4436085.6978 - mean_squared_error: 24436085.6978 - val_loss: 43057632.0
321 - val_mean_squared_error: 43057632.0321

Epoch 00337: val_mean_squared_error did not improve from 28029116.32539
Epoch 338/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9290649.5387 - mean_squared_error: 29290649.5387 - val_loss: 38284060.6
110 - val_mean_squared_error: 38284060.6110

Epoch 00338: val_mean_squared_error did not improve from 28029116.32539
Epoch 339/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4489269.3384 - mean_squared_error: 24489269.3384 - val_loss: 31205876.1
238 - val_mean_squared_error: 31205876.1238

Epoch 00339: val_mean_squared_error did not improve from 28029116.32539
Epoch 340/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
9329729.2304 - mean_squared_error: 39329729.2304 - val_loss: 37807145.4
801 - val_mean_squared_error: 37807145.4801

Epoch 00340: val_mean_squared_error did not improve from 28029116.32539
Epoch 341/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0651775.9484 - mean_squared_error: 30651775.9484 - val_loss: 33655493.7
231 - val_mean_squared_error: 33655493.7231

Epoch 00341: val_mean_squared_error did not improve from 28029116.32539
Epoch 342/500
```

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269804/269804 [==============================] - 4s 16us/step - loss: 2
4502278.1102 - mean_squared_error: 24502278.1102 - val_loss: 37970420.6
180 - val_mean_squared_error: 37970420.6180

Epoch 00342: val_mean_squared_error did not improve from 28029116.32539
Epoch 343/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8163459.1854 - mean_squared_error: 28163459.1854 - val_loss: 35996178.2
373 - val_mean_squared_error: 35996178.2373

Epoch 00343: val_mean_squared_error did not improve from 28029116.32539
Epoch 344/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2621918.5918 - mean_squared_error: 32621918.5918 - val_loss: 46601578.8
596 - val_mean_squared_error: 46601578.8596

Epoch 00344: val_mean_squared_error did not improve from 28029116.32539
Epoch 345/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9503633.4235 - mean_squared_error: 29503633.4235 - val_loss: 32515194.7
034 - val_mean_squared_error: 32515194.7034

Epoch 00345: val_mean_squared_error did not improve from 28029116.32539
Epoch 346/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6263697.9325 - mean_squared_error: 26263697.9325 - val_loss: 37106239.5
678 - val_mean_squared_error: 37106239.5678

Epoch 00346: val_mean_squared_error did not improve from 28029116.32539
Epoch 347/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4115666.6123 - mean_squared_error: 24115666.6123 - val_loss: 35285223.4
225 - val_mean_squared_error: 35285223.4225

Epoch 00347: val_mean_squared_error did not improve from 28029116.32539
Epoch 348/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1213564.8515 - mean_squared_error: 21213564.8515 - val_loss: 40979650.5
392 - val_mean_squared_error: 40979650.5392
```

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Epoch 00348: val_mean_squared_error did not improve from 28029116.32539
Epoch 349/500
269804/269804 [==============================] - 4s 17us/step - loss: 2
7509398.1037 - mean_squared_error: 27509398.1037 - val_loss: 28035269.2
481 - val_mean_squared_error: 28035269.2481

Epoch 00349: val_mean_squared_error did not improve from 28029116.32539
Epoch 350/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0270360.9935 - mean_squared_error: 30270360.9935 - val_loss: 29484070.9
382 - val_mean_squared_error: 29484070.9382

Epoch 00350: val_mean_squared_error did not improve from 28029116.32539
Epoch 351/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7790611.7970 - mean_squared_error: 27790611.7970 - val_loss: 37392477.4
417 - val_mean_squared_error: 37392477.4417

Epoch 00351: val_mean_squared_error did not improve from 28029116.32539
Epoch 352/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2840705.4198 - mean_squared_error: 22840705.4198 - val_loss: 31698935.4
006 - val_mean_squared_error: 31698935.4006

Epoch 00352: val_mean_squared_error did not improve from 28029116.32539
Epoch 353/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8994911.7002 - mean_squared_error: 38994911.7002 - val_loss: 57235487.4
745 - val_mean_squared_error: 57235487.4745

Epoch 00353: val_mean_squared_error did not improve from 28029116.32539
Epoch 354/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
5370799.7160 - mean_squared_error: 35370799.7160 - val_loss: 39001192.2
268 - val_mean_squared_error: 39001192.2268

Epoch 00354: val_mean_squared_error did not improve from 28029116.32539
Epoch 355/500
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269804/269804 [==============================] - 4s 16us/step - loss: 2
7811828.0392 - mean_squared_error: 27811828.0392 - val_loss: 34375514.5
966 - val_mean_squared_error: 34375514.5966

Epoch 00355: val_mean_squared_error did not improve from 28029116.32539
Epoch 356/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4729423.0576 - mean_squared_error: 24729423.0576 - val_loss: 47507787.9
932 - val_mean_squared_error: 47507787.9932

Epoch 00356: val_mean_squared_error did not improve from 28029116.32539
Epoch 357/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7820473.0161 - mean_squared_error: 27820473.0161 - val_loss: 32270469.5
060 - val_mean_squared_error: 32270469.5060

Epoch 00357: val_mean_squared_error did not improve from 28029116.32539
Epoch 358/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6532280.4939 - mean_squared_error: 26532280.4939 - val_loss: 29645908.3
235 - val_mean_squared_error: 29645908.3235

Epoch 00358: val_mean_squared_error did not improve from 28029116.32539
Epoch 359/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6297417.9939 - mean_squared_error: 26297417.9939 - val_loss: 34475428.3
678 - val_mean_squared_error: 34475428.3678

Epoch 00359: val_mean_squared_error did not improve from 28029116.32539
Epoch 360/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
4549378.5329 - mean_squared_error: 34549378.5329 - val_loss: 49888834.9
722 - val_mean_squared_error: 49888834.9722

Epoch 00360: val_mean_squared_error did not improve from 28029116.32539
Epoch 361/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9160471.3676 - mean_squared_error: 29160471.3676 - val_loss: 41610201.2
441 - val_mean_squared_error: 41610201.2441
```

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Epoch 00361: val_mean_squared_error did not improve from 28029116.32539
Epoch 362/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5807523.6352 - mean_squared_error: 25807523.6352 - val_loss: 38441768.3
533 - val_mean_squared_error: 38441768.3533

Epoch 00362: val_mean_squared_error did not improve from 28029116.32539
Epoch 363/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2128172.3610 - mean_squared_error: 22128172.3610 - val_loss: 45836475.8
510 - val_mean_squared_error: 45836475.8510

Epoch 00363: val_mean_squared_error did not improve from 28029116.32539
Epoch 364/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6487916.4579 - mean_squared_error: 26487916.4579 - val_loss: 55700144.5
584 - val_mean_squared_error: 55700144.5584

Epoch 00364: val_mean_squared_error did not improve from 28029116.32539
Epoch 365/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3562970.0398 - mean_squared_error: 23562970.0398 - val_loss: 29450384.4
817 - val_mean_squared_error: 29450384.4817

Epoch 00365: val_mean_squared_error did not improve from 28029116.32539
Epoch 366/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4868717.7780 - mean_squared_error: 24868717.7780 - val_loss: 28736017.5
149 - val_mean_squared_error: 28736017.5149

Epoch 00366: val_mean_squared_error did not improve from 28029116.32539
Epoch 367/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7093502.5666 - mean_squared_error: 27093502.5666 - val_loss: 33865705.3
626 - val_mean_squared_error: 33865705.3626

Epoch 00367: val_mean_squared_error did not improve from 28029116.32539
Epoch 368/500
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269804/269804 [==============================] - 4s 16us/step - loss: 2
1444894.9028 - mean_squared_error: 21444894.9028 - val_loss: 67811570.0
203 - val_mean_squared_error: 67811570.0203

Epoch 00368: val_mean_squared_error did not improve from 28029116.32539
Epoch 369/500
269804/269804 [==============================] - 4s 16us/step - loss: 4
5951066.1675 - mean_squared_error: 45951066.1675 - val_loss: 37568505.6
998 - val_mean_squared_error: 37568505.6998

Epoch 00369: val_mean_squared_error did not improve from 28029116.32539
Epoch 370/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5920019.7351 - mean_squared_error: 25920019.7351 - val_loss: 33448130.3
132 - val_mean_squared_error: 33448130.3132

Epoch 00370: val_mean_squared_error did not improve from 28029116.32539
Epoch 371/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6835737.7432 - mean_squared_error: 26835737.7432 - val_loss: 32508595.1
420 - val_mean_squared_error: 32508595.1420

Epoch 00371: val_mean_squared_error did not improve from 28029116.32539
Epoch 372/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6623562.2373 - mean_squared_error: 26623562.2373 - val_loss: 49224681.1
716 - val_mean_squared_error: 49224681.1716

Epoch 00372: val_mean_squared_error did not improve from 28029116.32539
Epoch 373/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5675096.5691 - mean_squared_error: 25675096.5691 - val_loss: 69189911.3
272 - val_mean_squared_error: 69189911.3272

Epoch 00373: val_mean_squared_error did not improve from 28029116.32539
Epoch 374/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
2532252.4998 - mean_squared_error: 32532252.4998 - val_loss: 58751944.0
180 - val_mean_squared_error: 58751944.0180
```

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Epoch 00374: val_mean_squared_error did not improve from 28029116.32539
Epoch 375/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9761625.0766 - mean_squared_error: 29761625.0766 - val_loss: 51107622.0
612 - val_mean_squared_error: 51107622.0612

Epoch 00375: val_mean_squared_error did not improve from 28029116.32539
Epoch 376/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4519716.3982 - mean_squared_error: 24519716.3982 - val_loss: 29730365.4
691 - val_mean_squared_error: 29730365.4691

Epoch 00376: val_mean_squared_error did not improve from 28029116.32539
Epoch 377/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0569071.4525 - mean_squared_error: 20569071.4525 - val_loss: 32063262.3
135 - val_mean_squared_error: 32063262.3135

Epoch 00377: val_mean_squared_error did not improve from 28029116.32539
Epoch 378/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
9015111.0291 - mean_squared_error: 19015111.0291 - val_loss: 30410430.1
246 - val_mean_squared_error: 30410430.1246

Epoch 00378: val_mean_squared_error did not improve from 28029116.32539
Epoch 379/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3485842.3031 - mean_squared_error: 23485842.3031 - val_loss: 31249218.0
747 - val_mean_squared_error: 31249218.0747

Epoch 00379: val_mean_squared_error did not improve from 28029116.32539
Epoch 380/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0684731.3301 - mean_squared_error: 20684731.3301 - val_loss: 27452915.9
605 - val_mean_squared_error: 27452915.9605

Epoch 00380: val_mean_squared_error improved from 28029116.32539 to 274
52915.96051, saving model to Weights.hdf5
```

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Epoch 381/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3397829.7688 - mean_squared_error: 23397829.7688 - val_loss: 32885331.8
657 - val_mean_squared_error: 32885331.8657

Epoch 00381: val_mean_squared_error did not improve from 27452915.96051
Epoch 382/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1295257.2710 - mean_squared_error: 31295257.2710 - val_loss: 45001001.6
552 - val_mean_squared_error: 45001001.6552

Epoch 00382: val_mean_squared_error did not improve from 27452915.96051
Epoch 383/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
8974520.5463 - mean_squared_error: 38974520.5463 - val_loss: 34108883.1
735 - val_mean_squared_error: 34108883.1735

Epoch 00383: val_mean_squared_error did not improve from 27452915.96051
Epoch 384/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4031583.3993 - mean_squared_error: 24031583.3993 - val_loss: 28963474.0
843 - val_mean_squared_error: 28963474.0843

Epoch 00384: val_mean_squared_error did not improve from 27452915.96051
Epoch 385/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6095185.6627 - mean_squared_error: 26095185.6627 - val_loss: 37351447.4
845 - val_mean_squared_error: 37351447.4845

Epoch 00385: val_mean_squared_error did not improve from 27452915.96051
Epoch 386/500
269804/269804 [==============================] - 4s 15us/step - loss: 2
3663215.5675 - mean_squared_error: 23663215.5675 - val_loss: 29988369.4
650 - val_mean_squared_error: 29988369.4650

Epoch 00386: val_mean_squared_error did not improve from 27452915.96051
Epoch 387/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2660644.1916 - mean_squared_error: 22660644.1916 - val_loss: 35230217.9
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779 - val_mean_squared_error: 35230217.9779

Epoch 00387: val_mean_squared_error did not improve from 27452915.96051
Epoch 388/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0518473.8675 - mean_squared_error: 30518473.8675 - val_loss: 27870627.6
861 - val_mean_squared_error: 27870627.6861

Epoch 00388: val_mean_squared_error did not improve from 27452915.96051
Epoch 389/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2594659.4983 - mean_squared_error: 22594659.4983 - val_loss: 31687309.0
515 - val_mean_squared_error: 31687309.0515

Epoch 00389: val_mean_squared_error did not improve from 27452915.96051
Epoch 390/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7728999.9467 - mean_squared_error: 27728999.9467 - val_loss: 32939293.6
833 - val_mean_squared_error: 32939293.6833

Epoch 00390: val_mean_squared_error did not improve from 27452915.96051
Epoch 391/500
269804/269804 [==============================] - 5s 17us/step - loss: 1
9952779.9302 - mean_squared_error: 19952779.9302 - val_loss: 34183797.5
230 - val_mean_squared_error: 34183797.5230

Epoch 00391: val_mean_squared_error did not improve from 27452915.96051
Epoch 392/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
1544132.0025 - mean_squared_error: 31544132.0025 - val_loss: 45885978.4
592 - val_mean_squared_error: 45885978.4592

Epoch 00392: val_mean_squared_error did not improve from 27452915.96051
Epoch 393/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8036047.2261 - mean_squared_error: 28036047.2261 - val_loss: 40668313.1
303 - val_mean_squared_error: 40668313.1303

Epoch 00393: val_mean_squared_error did not improve from 27452915.96051
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Epoch 394/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9330893.5570 - mean_squared_error: 29330893.5570 - val_loss: 34026126.5
939 - val_mean_squared_error: 34026126.5939

Epoch 00394: val_mean_squared_error did not improve from 27452915.96051
Epoch 395/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1370859.1695 - mean_squared_error: 21370859.1695 - val_loss: 27385473.4
331 - val_mean_squared_error: 27385473.4331

Epoch 00395: val_mean_squared_error improved from 27452915.96051 to 273
85473.43314, saving model to Weights.hdf5
Epoch 396/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1777482.1455 - mean_squared_error: 21777482.1455 - val_loss: 38509489.7
348 - val_mean_squared_error: 38509489.7348

Epoch 00396: val_mean_squared_error did not improve from 27385473.43314
Epoch 397/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4643626.2784 - mean_squared_error: 24643626.2784 - val_loss: 27080592.1
265 - val_mean_squared_error: 27080592.1265

Epoch 00397: val_mean_squared_error improved from 27385473.43314 to 270
80592.12655, saving model to Weights.hdf5
Epoch 398/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0007383.8618 - mean_squared_error: 20007383.8618 - val_loss: 30204162.1
318 - val_mean_squared_error: 30204162.1318

Epoch 00398: val_mean_squared_error did not improve from 27080592.12655
Epoch 399/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2174074.8522 - mean_squared_error: 22174074.8522 - val_loss: 27769780.6
206 - val_mean_squared_error: 27769780.6206

Epoch 00399: val_mean_squared_error did not improve from 27080592.12655
Epoch 400/500
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269804/269804 [==============================] - 4s 16us/step - loss: 2
0847158.0828 - mean_squared_error: 20847158.0828 - val_loss: 38028644.2
212 - val_mean_squared_error: 38028644.2212

Epoch 00400: val_mean_squared_error did not improve from 27080592.12655
Epoch 401/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4872193.7004 - mean_squared_error: 24872193.7004 - val_loss: 25865796.7
343 - val_mean_squared_error: 25865796.7343

Epoch 00401: val_mean_squared_error improved from 27080592.12655 to 258
65796.73427, saving model to Weights.hdf5
Epoch 402/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
9083263.9400 - mean_squared_error: 19083263.9400 - val_loss: 33953567.3
368 - val_mean_squared_error: 33953567.3368

Epoch 00402: val_mean_squared_error did not improve from 25865796.73427
Epoch 403/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0527305.8949 - mean_squared_error: 30527305.8949 - val_loss: 32929526.0
223 - val_mean_squared_error: 32929526.0223

Epoch 00403: val_mean_squared_error did not improve from 25865796.73427
Epoch 404/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4179326.1133 - mean_squared_error: 24179326.1133 - val_loss: 36491241.1
634 - val_mean_squared_error: 36491241.1634

Epoch 00404: val_mean_squared_error did not improve from 25865796.73427
Epoch 405/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8516964.5289 - mean_squared_error: 18516964.5289 - val_loss: 30744060.6
783 - val_mean_squared_error: 30744060.6783

Epoch 00405: val_mean_squared_error did not improve from 25865796.73427
Epoch 406/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6757380.1074 - mean_squared_error: 26757380.1074 - val_loss: 34810863.5
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096 - val_mean_squared_error: 34810863.5096

Epoch 00406: val_mean_squared_error did not improve from 25865796.73427
Epoch 407/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4450563.2496 - mean_squared_error: 24450563.2496 - val_loss: 29182136.5
759 - val_mean_squared_error: 29182136.5759

Epoch 00407: val_mean_squared_error did not improve from 25865796.73427
Epoch 408/500
269804/269804 [==============================] - 4s 15us/step - loss: 2
0554006.9843 - mean_squared_error: 20554006.9843 - val_loss: 41007692.8
842 - val_mean_squared_error: 41007692.8842

Epoch 00408: val_mean_squared_error did not improve from 25865796.73427
Epoch 409/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2959274.7639 - mean_squared_error: 22959274.7639 - val_loss: 26548362.8
185 - val_mean_squared_error: 26548362.8185

Epoch 00409: val_mean_squared_error did not improve from 25865796.73427
Epoch 410/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1486952.2059 - mean_squared_error: 21486952.2059 - val_loss: 28853896.5
902 - val_mean_squared_error: 28853896.5902

Epoch 00410: val_mean_squared_error did not improve from 25865796.73427
Epoch 411/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3102442.4334 - mean_squared_error: 23102442.4334 - val_loss: 25035371.5
056 - val_mean_squared_error: 25035371.5056

Epoch 00411: val_mean_squared_error improved from 25865796.73427 to 250
35371.50563, saving model to Weights.hdf5
Epoch 412/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2858609.8445 - mean_squared_error: 22858609.8445 - val_loss: 32458922.3
542 - val_mean_squared_error: 32458922.3542
```

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Epoch 00412: val_mean_squared_error did not improve from 25035371.50563
Epoch 413/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1115154.9748 - mean_squared_error: 21115154.9748 - val_loss: 28895901.4
781 - val_mean_squared_error: 28895901.4781

Epoch 00413: val_mean_squared_error did not improve from 25035371.50563
Epoch 414/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1594976.0530 - mean_squared_error: 21594976.0530 - val_loss: 65604542.6
413 - val_mean_squared_error: 65604542.6413

Epoch 00414: val_mean_squared_error did not improve from 25035371.50563
Epoch 415/500
269804/269804 [==============================] - 4s 15us/step - loss: 2
2302861.2257 - mean_squared_error: 22302861.2257 - val_loss: 29981590.8
071 - val_mean_squared_error: 29981590.8071

Epoch 00415: val_mean_squared_error did not improve from 25035371.50563
Epoch 416/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1202492.9628 - mean_squared_error: 21202492.9628 - val_loss: 38447421.3
202 - val_mean_squared_error: 38447421.3202

Epoch 00416: val_mean_squared_error did not improve from 25035371.50563
Epoch 417/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0904662.6234 - mean_squared_error: 20904662.6234 - val_loss: 43891136.0
528 - val_mean_squared_error: 43891136.0528

Epoch 00417: val_mean_squared_error did not improve from 25035371.50563
Epoch 418/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5865640.4708 - mean_squared_error: 25865640.4708 - val_loss: 46603235.3
763 - val_mean_squared_error: 46603235.3763

Epoch 00418: val_mean_squared_error did not improve from 25035371.50563
Epoch 419/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
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7809147.2034 - mean_squared_error: 17809147.2034 - val_loss: 25784570.0
196 - val_mean_squared_error: 25784570.0196

Epoch 00419: val_mean_squared_error did not improve from 25035371.50563
Epoch 420/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4063039.4834 - mean_squared_error: 24063039.4834 - val_loss: 27963213.8
541 - val_mean_squared_error: 27963213.8541

Epoch 00420: val_mean_squared_error did not improve from 25035371.50563
Epoch 421/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8893239.6745 - mean_squared_error: 18893239.6745 - val_loss: 42186309.7
853 - val_mean_squared_error: 42186309.7853

Epoch 00421: val_mean_squared_error did not improve from 25035371.50563
Epoch 422/500
269804/269804 [==============================] - 4s 17us/step - loss: 2
2519825.1973 - mean_squared_error: 22519825.1973 - val_loss: 29152442.1
545 - val_mean_squared_error: 29152442.1545

Epoch 00422: val_mean_squared_error did not improve from 25035371.50563
Epoch 423/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
9394119.8260 - mean_squared_error: 29394119.8260 - val_loss: 29718695.5
243 - val_mean_squared_error: 29718695.5243

Epoch 00423: val_mean_squared_error did not improve from 25035371.50563
Epoch 424/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7765443.6851 - mean_squared_error: 17765443.6851 - val_loss: 29187688.4
194 - val_mean_squared_error: 29187688.4194

Epoch 00424: val_mean_squared_error did not improve from 25035371.50563
Epoch 425/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2917178.9492 - mean_squared_error: 22917178.9492 - val_loss: 62083713.2
852 - val_mean_squared_error: 62083713.2852
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Epoch 00425: val_mean_squared_error did not improve from 25035371.50563
Epoch 426/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6217944.4221 - mean_squared_error: 26217944.4221 - val_loss: 25984071.2
947 - val_mean_squared_error: 25984071.2947

Epoch 00426: val_mean_squared_error did not improve from 25035371.50563
Epoch 427/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7898324.4855 - mean_squared_error: 17898324.4855 - val_loss: 38270577.9
462 - val_mean_squared_error: 38270577.9462

Epoch 00427: val_mean_squared_error did not improve from 25035371.50563
Epoch 428/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4663442.6949 - mean_squared_error: 24663442.6949 - val_loss: 27704273.0
849 - val_mean_squared_error: 27704273.0849

Epoch 00428: val_mean_squared_error did not improve from 25035371.50563
Epoch 429/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0371426.8238 - mean_squared_error: 20371426.8238 - val_loss: 30728133.4
635 - val_mean_squared_error: 30728133.4635

Epoch 00429: val_mean_squared_error did not improve from 25035371.50563
Epoch 430/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5327059.7987 - mean_squared_error: 25327059.7987 - val_loss: 26426475.4
743 - val_mean_squared_error: 26426475.4743

Epoch 00430: val_mean_squared_error did not improve from 25035371.50563
Epoch 431/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2737190.1924 - mean_squared_error: 22737190.1924 - val_loss: 40818728.4
276 - val_mean_squared_error: 40818728.4276

Epoch 00431: val_mean_squared_error did not improve from 25035371.50563
Epoch 432/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
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9257764.4967 - mean_squared_error: 19257764.4967 - val_loss: 33654161.7
645 - val_mean_squared_error: 33654161.7645

Epoch 00432: val_mean_squared_error did not improve from 25035371.50563
Epoch 433/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4626134.5877 - mean_squared_error: 24626134.5877 - val_loss: 29538145.2
946 - val_mean_squared_error: 29538145.2946

Epoch 00433: val_mean_squared_error did not improve from 25035371.50563
Epoch 434/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
9556362.2816 - mean_squared_error: 19556362.2816 - val_loss: 29531908.4
187 - val_mean_squared_error: 29531908.4187

Epoch 00434: val_mean_squared_error did not improve from 25035371.50563
Epoch 435/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2161580.2764 - mean_squared_error: 22161580.2764 - val_loss: 43401080.7
832 - val_mean_squared_error: 43401080.7832

Epoch 00435: val_mean_squared_error did not improve from 25035371.50563
Epoch 436/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0626040.8831 - mean_squared_error: 20626040.8831 - val_loss: 33878412.4
716 - val_mean_squared_error: 33878412.4716

Epoch 00436: val_mean_squared_error did not improve from 25035371.50563
Epoch 437/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4321963.5853 - mean_squared_error: 24321963.5853 - val_loss: 35666879.0
306 - val_mean_squared_error: 35666879.0306

Epoch 00437: val_mean_squared_error did not improve from 25035371.50563
Epoch 438/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3558029.3692 - mean_squared_error: 23558029.3692 - val_loss: 56468346.9
593 - val_mean_squared_error: 56468346.9593
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Epoch 00438: val_mean_squared_error did not improve from 25035371.50563
Epoch 439/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5148789.2912 - mean_squared_error: 25148789.2912 - val_loss: 36623211.5
637 - val_mean_squared_error: 36623211.5637

Epoch 00439: val_mean_squared_error did not improve from 25035371.50563
Epoch 440/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2289274.4228 - mean_squared_error: 22289274.4228 - val_loss: 33286460.1
272 - val_mean_squared_error: 33286460.1272

Epoch 00440: val_mean_squared_error did not improve from 25035371.50563
Epoch 441/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
9640138.6674 - mean_squared_error: 19640138.6674 - val_loss: 33427373.4
668 - val_mean_squared_error: 33427373.4668

Epoch 00441: val_mean_squared_error did not improve from 25035371.50563
Epoch 442/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1871703.8588 - mean_squared_error: 21871703.8588 - val_loss: 27052385.5
059 - val_mean_squared_error: 27052385.5059

Epoch 00442: val_mean_squared_error did not improve from 25035371.50563
Epoch 443/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7088397.5585 - mean_squared_error: 17088397.5585 - val_loss: 32225722.0
541 - val_mean_squared_error: 32225722.0541

Epoch 00443: val_mean_squared_error did not improve from 25035371.50563
Epoch 444/500
269804/269804 [==============================] - 5s 17us/step - loss: 2
1843192.6808 - mean_squared_error: 21843192.6808 - val_loss: 29588060.0
165 - val_mean_squared_error: 29588060.0165

Epoch 00444: val_mean_squared_error did not improve from 25035371.50563
Epoch 445/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
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0402367.4001 - mean_squared_error: 20402367.4001 - val_loss: 38617089.9
427 - val_mean_squared_error: 38617089.9427

Epoch 00445: val_mean_squared_error did not improve from 25035371.50563
Epoch 446/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
9302854.3539 - mean_squared_error: 19302854.3539 - val_loss: 70508898.4
372 - val_mean_squared_error: 70508898.4372

Epoch 00446: val_mean_squared_error did not improve from 25035371.50563
Epoch 447/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7142483.0893 - mean_squared_error: 27142483.0893 - val_loss: 28993669.9
117 - val_mean_squared_error: 28993669.9117

Epoch 00447: val_mean_squared_error did not improve from 25035371.50563
Epoch 448/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5078504.9579 - mean_squared_error: 25078504.9579 - val_loss: 30723552.9
705 - val_mean_squared_error: 30723552.9705

Epoch 00448: val_mean_squared_error did not improve from 25035371.50563
Epoch 449/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7533449.8966 - mean_squared_error: 17533449.8966 - val_loss: 28876984.0
907 - val_mean_squared_error: 28876984.0907

Epoch 00449: val_mean_squared_error did not improve from 25035371.50563
Epoch 450/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5045887.5762 - mean_squared_error: 25045887.5762 - val_loss: 42346322.6
730 - val_mean_squared_error: 42346322.6730

Epoch 00450: val_mean_squared_error did not improve from 25035371.50563
Epoch 451/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1649675.7806 - mean_squared_error: 21649675.7806 - val_loss: 30266057.4
742 - val_mean_squared_error: 30266057.4742
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Epoch 00451: val_mean_squared_error did not improve from 25035371.50563
Epoch 452/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8307817.3680 - mean_squared_error: 18307817.3680 - val_loss: 29640470.6
461 - val_mean_squared_error: 29640470.6461

Epoch 00452: val_mean_squared_error did not improve from 25035371.50563
Epoch 453/500
269804/269804 [==============================] - 4s 15us/step - loss: 1
7443088.6299 - mean_squared_error: 17443088.6299 - val_loss: 34338615.5
158 - val_mean_squared_error: 34338615.5158

Epoch 00453: val_mean_squared_error did not improve from 25035371.50563
Epoch 454/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4822370.2959 - mean_squared_error: 24822370.2959 - val_loss: 26754595.8
181 - val_mean_squared_error: 26754595.8181

Epoch 00454: val_mean_squared_error did not improve from 25035371.50563
Epoch 455/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8514725.2156 - mean_squared_error: 18514725.2156 - val_loss: 32073305.9
610 - val_mean_squared_error: 32073305.9610

Epoch 00455: val_mean_squared_error did not improve from 25035371.50563
Epoch 456/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1362223.5857 - mean_squared_error: 21362223.5857 - val_loss: 23021606.5
342 - val_mean_squared_error: 23021606.5342

Epoch 00456: val_mean_squared_error improved from 25035371.50563 to 230
21606.53422, saving model to Weights.hdf5
Epoch 457/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1311619.7152 - mean_squared_error: 21311619.7152 - val_loss: 35900826.0
965 - val_mean_squared_error: 35900826.0965

Epoch 00457: val_mean_squared_error did not improve from 23021606.53422
Epoch 458/500
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269804/269804 [==============================] - 4s 16us/step - loss: 2
0254201.8087 - mean_squared_error: 20254201.8087 - val_loss: 32282349.1
179 - val_mean_squared_error: 32282349.1179

Epoch 00458: val_mean_squared_error did not improve from 23021606.53422
Epoch 459/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
7487710.1904 - mean_squared_error: 27487710.1904 - val_loss: 27026336.4
304 - val_mean_squared_error: 27026336.4304

Epoch 00459: val_mean_squared_error did not improve from 23021606.53422
Epoch 460/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
6540834.6725 - mean_squared_error: 16540834.6725 - val_loss: 27491536.3
988 - val_mean_squared_error: 27491536.3988

Epoch 00460: val_mean_squared_error did not improve from 23021606.53422
Epoch 461/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
5343961.3212 - mean_squared_error: 25343961.3212 - val_loss: 35612470.4
083 - val_mean_squared_error: 35612470.4083

Epoch 00461: val_mean_squared_error did not improve from 23021606.53422
Epoch 462/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3642002.6859 - mean_squared_error: 23642002.6859 - val_loss: 27194946.8
053 - val_mean_squared_error: 27194946.8053

Epoch 00462: val_mean_squared_error did not improve from 23021606.53422
Epoch 463/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2333439.3101 - mean_squared_error: 22333439.3101 - val_loss: 29220047.5
286 - val_mean_squared_error: 29220047.5286

Epoch 00463: val_mean_squared_error did not improve from 23021606.53422
Epoch 464/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8456457.1014 - mean_squared_error: 18456457.1014 - val_loss: 37902116.8
876 - val_mean_squared_error: 37902116.8876
```

```
Epoch 00464: val_mean_squared_error did not improve from 23021606.53422
Epoch 465/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8450727.4219 - mean_squared_error: 18450727.4219 - val_loss: 29231371.3
613 - val_mean_squared_error: 29231371.3613

Epoch 00465: val_mean_squared_error did not improve from 23021606.53422
Epoch 466/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0761396.5583 - mean_squared_error: 20761396.5583 - val_loss: 41776841.0
412 - val_mean_squared_error: 41776841.0412

Epoch 00466: val_mean_squared_error did not improve from 23021606.53422
Epoch 467/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2076477.3988 - mean_squared_error: 22076477.3988 - val_loss: 31726264.4
949 - val_mean_squared_error: 31726264.4949

Epoch 00467: val_mean_squared_error did not improve from 23021606.53422
Epoch 468/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7486758.2260 - mean_squared_error: 17486758.2260 - val_loss: 28707750.9
842 - val_mean_squared_error: 28707750.9842

Epoch 00468: val_mean_squared_error did not improve from 23021606.53422
Epoch 469/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7844741.2024 - mean_squared_error: 17844741.2024 - val_loss: 46984173.6
017 - val_mean_squared_error: 46984173.6017

Epoch 00469: val_mean_squared_error did not improve from 23021606.53422
Epoch 470/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1863509.3129 - mean_squared_error: 21863509.3129 - val_loss: 30460410.2
696 - val_mean_squared_error: 30460410.2696

Epoch 00470: val_mean_squared_error did not improve from 23021606.53422
Epoch 471/500
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269804/269804 [==============================] - 4s 16us/step - loss: 2
5178669.2086 - mean_squared_error: 25178669.2086 - val_loss: 32739359.7
833 - val_mean_squared_error: 32739359.7833

Epoch 00471: val_mean_squared_error did not improve from 23021606.53422
Epoch 472/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7751647.9784 - mean_squared_error: 17751647.9784 - val_loss: 26410882.0
013 - val_mean_squared_error: 26410882.0013

Epoch 00472: val_mean_squared_error did not improve from 23021606.53422
Epoch 473/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0822931.8915 - mean_squared_error: 20822931.8915 - val_loss: 32873343.1
707 - val_mean_squared_error: 32873343.1707

Epoch 00473: val_mean_squared_error did not improve from 23021606.53422
Epoch 474/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6686910.8446 - mean_squared_error: 26686910.8446 - val_loss: 30007545.7
201 - val_mean_squared_error: 30007545.7201

Epoch 00474: val_mean_squared_error did not improve from 23021606.53422
Epoch 475/500
269804/269804 [==============================] - 4s 15us/step - loss: 1
7991039.4082 - mean_squared_error: 17991039.4082 - val_loss: 29946288.0
732 - val_mean_squared_error: 29946288.0732

Epoch 00475: val_mean_squared_error did not improve from 23021606.53422
Epoch 476/500
269804/269804 [==============================] - 4s 15us/step - loss: 1
6935872.0880 - mean_squared_error: 16935872.0880 - val_loss: 54663109.6
919 - val_mean_squared_error: 54663109.6919

Epoch 00476: val_mean_squared_error did not improve from 23021606.53422
Epoch 477/500
269804/269804 [==============================] - 4s 16us/step - loss: 3
0383469.6950 - mean_squared_error: 30383469.6950 - val_loss: 23405468.5
151 - val_mean_squared_error: 23405468.5151
```

```
Epoch 00477: val_mean_squared_error did not improve from 23021606.53422
Epoch 478/500
269804/269804 [==============================] - 4s 15us/step - loss: 1
5991172.6945 - mean_squared_error: 15991172.6945 - val_loss: 27609416.1
366 - val_mean_squared_error: 27609416.1366

Epoch 00478: val_mean_squared_error did not improve from 23021606.53422
Epoch 479/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8192623.9674 - mean_squared_error: 18192623.9674 - val_loss: 35360609.8
438 - val_mean_squared_error: 35360609.8438

Epoch 00479: val_mean_squared_error did not improve from 23021606.53422
Epoch 480/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
8037138.5487 - mean_squared_error: 28037138.5487 - val_loss: 45541115.0
969 - val_mean_squared_error: 45541115.0969

Epoch 00480: val_mean_squared_error did not improve from 23021606.53422
Epoch 481/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8772276.5129 - mean_squared_error: 18772276.5129 - val_loss: 37238793.4
391 - val_mean_squared_error: 37238793.4391

Epoch 00481: val_mean_squared_error did not improve from 23021606.53422
Epoch 482/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
6299046.8167 - mean_squared_error: 26299046.8167 - val_loss: 32933188.2
594 - val_mean_squared_error: 32933188.2594

Epoch 00482: val_mean_squared_error did not improve from 23021606.53422
Epoch 483/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
8117990.3452 - mean_squared_error: 18117990.3452 - val_loss: 29065486.9
943 - val_mean_squared_error: 29065486.9943

Epoch 00483: val_mean_squared_error did not improve from 23021606.53422
Epoch 484/500
```

```
269804/269804 [==============================] - 4s 15us/step - loss: 1
8314551.0707 - mean_squared_error: 18314551.0707 - val_loss: 28051836.2
950 - val_mean_squared_error: 28051836.2950

Epoch 00484: val_mean_squared_error did not improve from 23021606.53422
Epoch 485/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
6536906.0586 - mean_squared_error: 16536906.0586 - val_loss: 27292315.4
250 - val_mean_squared_error: 27292315.4250

Epoch 00485: val_mean_squared_error did not improve from 23021606.53422
Epoch 486/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
0767805.2982 - mean_squared_error: 20767805.2982 - val_loss: 32997057.3
015 - val_mean_squared_error: 32997057.3015

Epoch 00486: val_mean_squared_error did not improve from 23021606.53422
Epoch 487/500
269804/269804 [==============================] - 4s 15us/step - loss: 1
7428491.5319 - mean_squared_error: 17428491.5319 - val_loss: 35192253.3
890 - val_mean_squared_error: 35192253.3890

Epoch 00487: val_mean_squared_error did not improve from 23021606.53422
Epoch 488/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7998803.9502 - mean_squared_error: 17998803.9502 - val_loss: 26068419.0
841 - val_mean_squared_error: 26068419.0841

Epoch 00488: val_mean_squared_error did not improve from 23021606.53422
Epoch 489/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
9555845.8408 - mean_squared_error: 19555845.8408 - val_loss: 37538754.8
274 - val_mean_squared_error: 37538754.8274

Epoch 00489: val_mean_squared_error did not improve from 23021606.53422
Epoch 490/500
269804/269804 [==============================] - 7s 25us/step - loss: 3
9614969.6822 - mean_squared_error: 39614969.6822 - val_loss: 51895288.8
895 - val_mean_squared_error: 51895288.8895
```

```
Epoch 00490: val_mean_squared_error did not improve from 23021606.53422
Epoch 491/500
269804/269804 [==============================] - 7s 25us/step - loss: 3
1590580.9944 - mean_squared_error: 31590580.9944 - val_loss: 30428142.6
978 - val_mean_squared_error: 30428142.6978

Epoch 00491: val_mean_squared_error did not improve from 23021606.53422
Epoch 492/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
3749881.8455 - mean_squared_error: 23749881.8455 - val_loss: 34753711.8
968 - val_mean_squared_error: 34753711.8968

Epoch 00492: val_mean_squared_error did not improve from 23021606.53422
Epoch 493/500
269804/269804 [==============================] - 4s 17us/step - loss: 2
0593626.6700 - mean_squared_error: 20593626.6700 - val_loss: 45062041.7
742 - val_mean_squared_error: 45062041.7742

Epoch 00493: val_mean_squared_error did not improve from 23021606.53422
Epoch 494/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
4924605.4195 - mean_squared_error: 24924605.4195 - val_loss: 47709463.3
993 - val_mean_squared_error: 47709463.3993

Epoch 00494: val_mean_squared_error did not improve from 23021606.53422
Epoch 495/500
269804/269804 [==============================] - 4s 15us/step - loss: 2
1038485.3570 - mean_squared_error: 21038485.3570 - val_loss: 34435256.5
048 - val_mean_squared_error: 34435256.5048

Epoch 00495: val_mean_squared_error did not improve from 23021606.53422
Epoch 496/500
269804/269804 [==============================] - 4s 16us/step - loss: 1
7820407.8711 - mean_squared_error: 17820407.8711 - val_loss: 27384259.6
621 - val_mean_squared_error: 27384259.6621

Epoch 00496: val_mean_squared_error did not improve from 23021606.53422
Epoch 497/500
```

```
269804/269804 [==============================] - 4s 16us/step - loss: 1
9708353.3560 - mean_squared_error: 19708353.3560 - val_loss: 50597691.0
278 - val_mean_squared_error: 50597691.0278

Epoch 00497: val_mean_squared_error did not improve from 23021606.53422
Epoch 498/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
2274978.0248 - mean_squared_error: 22274978.0248 - val_loss: 27271296.1
003 - val_mean_squared_error: 27271296.1003

Epoch 00498: val_mean_squared_error did not improve from 23021606.53422
Epoch 499/500
269804/269804 [==============================] - 4s 16us/step - loss: 2
1960857.1384 - mean_squared_error: 21960857.1384 - val_loss: 27479910.1
276 - val_mean_squared_error: 27479910.1276

Epoch 00499: val_mean_squared_error did not improve from 23021606.53422
Epoch 500/500
269804/269804 [==============================] - 4s 15us/step - loss: 1
8163251.0932 - mean_squared_error: 18163251.0932 - val_loss: 27517359.8
839 - val_mean_squared_error: 27517359.8839

Epoch 00500: val_mean_squared_error did not improve from 23021606.53422
```

Out[170]:
```
<keras.callbacks.History at 0x7f34b92092b0>
```

In [0]:
```
```

In [0]:
```
```

In [174]:
```
from prettytable import PrettyTable
a = PrettyTable()
print("Linear SVM")
a.field_names = ["Vectorizer", "R2 score", "Mean squared error"]
a.add_row(["SGD Regressor",0.07,489147229.03])
a.add_row(["Linear Regression", 0.07,489155769.05])
a.add_row(["Decision Tree Regressor", 0.95,23946726.690])
a.add_row(["Random Forest Regressor", 0.97, 16745697.24])
```

```
a.add_row(["Gradient Boosted Regressor", 0.97,13627727.66])
a.add_row(["Deep learning model",'.',23021606.53])
print(a)
```

```
Linear SVM
+----------------------------+----------+--------------------+
|         Vectorizer         | R2 score | Mean squared error |
+----------------------------+----------+--------------------+
|       SGD Regressor        |   0.07   |    489147229.03    |
|     Linear Regression      |   0.07   |    489155769.05    |
|  Decision Tree Regressor   |   0.95   |    23946726.69     |
|  Random Forest Regressor   |   0.97   |    16745697.24     |
| Gradient Boosted Regressor |   0.97   |    13627727.66     |
|    Deep learning model     |    .     |    23021606.53     |
+----------------------------+----------+--------------------+
```

**Observation:**

- Gradient Boosted Regressor is the best compaired to others

# Submission

In [0]:
```
nans = lambda df: df[df.isnull().any(axis=1)]
```

In [250]:
```
nans(test_new)
```

Out[250]:

| Store | Dept | IsHoliday | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 | MarkDo |
|---|---|---|---|---|---|---|---|---|

In [0]:
```

```

In [0]:
```
test_new['CPI']=test_new['CPI'].fillna(test_new['CPI'].mean())
test_new['Unemployment']=test_new['Unemployment'].fillna(test_new['Unem
ployment'].mean())
```

In [0]:
```
xgb.fit(X_train,y_train)
```

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

Out[253]:

| | Store | Dept | IsHoliday | Temperature | Fuel_Price | MarkDown1 | MarkDown2 | MarkDown3 | MarkD |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 1 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **1** | 1 | 2 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **2** | 1 | 3 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **3** | 1 | 4 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |
| **4** | 1 | 5 | False | 55.32 | 3.386 | 6766.44 | 5147.7 | 50.82 | 27 |

In [0]:
```
test_a=np.array(test_new)
```

In [0]:
```
sc_X = StandardScaler()
test_a = sc_X.fit_transform(test_a)
```

In [0]:
```
pred =xgb.predict(test_a)
```

In [267]:
```
pred.shape
```

Out[267]:
```
(115064,)
```

In [265]:
```
df2.shape
```

Out[265]:
```
(115064, 1)
```

In [0]:
```
submission = pd.DataFrame({
        "Id": df2["ColumnA"],
        "Weekly_Sales": pred
    })
submission.to_csv('submission.csv', index=False)
```

In [0]:

In [0]:
```
pred2 =rf.predict(test_a)
```

In [0]:
```
submission2 = pd.DataFrame({
        "Id": df2["ColumnA"],
        "Weekly_Sales": pred2
    })
submission2.to_csv('submission2.csv', index=False)
```

In [0]: