Doge Currency Predictor- Sutow Brett

July 13, 2021

[68]:
```
#This notebook will try to predict cryptocurrency price changes#
#The goal is to be able to accurately use machine learning to predict the next␣
 ↪60 days of changes#
#We will utilize machine learning to see the results of this process#
#Setup#
import math
import pandas as pd
import pandas_datareader as web
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from keras.models import Sequential
from keras.layers import Dense, LSTM
import matplotlib.pyplot as plt
from statistics import *
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
%matplotlib inline
```

[69]:
```
#Pulls Data#
#Prints head and tail#
Doge = pd.read_csv('/Users/Brett/Desktop/DOGE.csv')
print(Doge.head())
print(Doge.tail())
```

```
     Date    Open    High     Low   Close
0  1/1/21  0.0047  0.0058  0.0046  0.0057
1  1/2/21  0.0058  0.0143  0.0056  0.0106
2  1/3/21  0.0105  0.0139  0.0091  0.0098
3  1/4/21  0.0098  0.0115  0.0072  0.0098
4  1/5/21  0.0098  0.0103  0.0088  0.0100
       Date    Open    High     Low   Close
185  7/5/21  0.2491  0.2504  0.2269  0.2334
186  7/6/21  0.2334  0.2420  0.2296  0.2312
187  7/7/21  0.2312  0.2384  0.2292  0.2314
188  7/8/21  0.2314  0.2314  0.2067  0.2090
189  7/9/21  0.2089  0.2293  0.1960  0.2204
```

[70]:
```
Doge
```

[70]:

	Date	Open	High	Low	Close
0	1/1/21	0.0047	0.0058	0.0046	0.0057
1	1/2/21	0.0058	0.0143	0.0056	0.0106
2	1/3/21	0.0105	0.0139	0.0091	0.0098
3	1/4/21	0.0098	0.0115	0.0072	0.0098
4	1/5/21	0.0098	0.0103	0.0088	0.0100
..	…	…	…	…	…
185	7/5/21	0.2491	0.2504	0.2269	0.2334
186	7/6/21	0.2334	0.2420	0.2296	0.2312
187	7/7/21	0.2312	0.2384	0.2292	0.2314
188	7/8/21	0.2314	0.2314	0.2067	0.2090
189	7/9/21	0.2089	0.2293	0.1960	0.2204

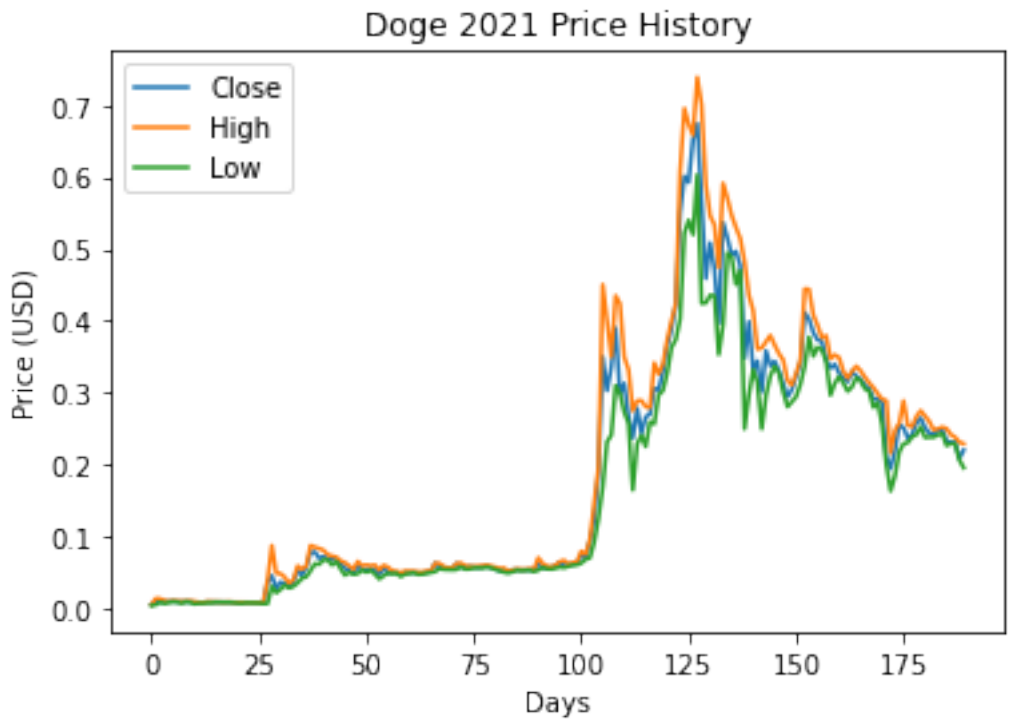
[190 rows x 5 columns]

[71]:
```
#Describes for graphing#

Doge.describe()
```

[71]:

	Open	High	Low	Close
count	190.000000	190.000000	190.000000	190.000000
mean	0.178127	0.195878	0.161235	0.179141
std	0.165966	0.183601	0.147524	0.165585
min	0.004700	0.005800	0.004600	0.005700
25%	0.051075	0.054725	0.048950	0.051375
50%	0.068000	0.075250	0.061350	0.069850
75%	0.311775	0.331925	0.292900	0.311625
max	0.672900	0.738700	0.603000	0.674300

[72]:
```
#Price Changes#
plt.figure()
plt.plot(Doge["Close"])
plt.plot(Doge["High"])
plt.plot(Doge["Low"])
plt.title('Doge 2021 Price History')
plt.ylabel('Price (USD)')
plt.xlabel('Days')
plt.legend(['Close','High', 'Low'], loc='upper left')

plt.show()
```



[73]:
```
#Checks real-time vs predictions using LSTM model#
#Creating a new dataset filtering by closing price#
closedata=Doge.filter(['Close'])
newdata= closedata.values

#Training LSTM#
trainingdata=math.ceil(len(newdata) * .8)
trainingdata
```

[73]: 152

[74]:
```
#Scales data to make it easier with using LSTM Model#
scaler = MinMaxScaler(feature_range=(0,1))
datascaled= scaler.fit_transform(newdata)
datascaled
```

[74]:
```
array([[0.        ],
       [0.00732875],
       [0.00613222],
       [0.00613222],
       [0.00643135],
       [0.00717918],
       [0.00613222],
```

```
[0.00613222],
[0.00673048],
[0.00628178],
[0.00463655],
[0.00358959],
[0.00448699],
[0.00553395],
[0.00553395],
[0.00538439],
[0.00508525],
[0.00523482],
[0.00508525],
[0.00493569],
[0.00358959],
[0.00418786],
[0.00433742],
[0.00448699],
[0.00403829],
[0.00388872],
[0.00269219],
[0.04651511],
[0.05997607],
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[0.04681424],
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[0.03828896],
[0.0474125 ],
[0.07074484],
[0.0616213 ],
[0.07777445],
[0.1081364 ],
[0.1094825 ],
[0.09632067],
[0.10020939],
[0.09572241],
[0.0961711 ],
[0.09063715],
[0.08525277],
[0.07583009],
[0.07149267],
[0.06551002],
[0.07941968],
[0.07373617],
[0.07253964],
[0.07538139],
[0.0717918 ],
[0.06266826],
```

```
[0.07642836],
[0.06610829],
[0.06715525],
[0.06655698],
[0.06371523],
[0.06715525],
[0.06670655],
[0.06700568],
[0.06625785],
[0.06565959],
[0.06775351],
[0.06909961],
[0.0860006 ],
[0.07822315],
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[0.07508226],
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[0.07807359],
[0.07717619],
[0.07867185],
[0.07941968],
[0.07747532],
[0.07373617],
[0.0713431 ],
[0.06865091],
[0.06820221],
[0.07209094],
[0.07283877],
[0.0717918 ],
[0.07239007],
[0.07239007],
[0.07194137],
[0.08435537],
[0.07777445],
[0.07463356],
[0.07747532],
[0.08106491],
[0.08779539],
[0.07927012],
[0.08405624],
[0.0837571 ],
[0.086898  ],
[0.10260245],
```

```
[0.09721807],
[0.1325157 ],
[0.17289859],
[0.27565061],
[0.51510619],
[0.44481005],
[0.49356865],
[0.57508226],
[0.4392761 ],
[0.45991624],
[0.39231229],
[0.34624589],
[0.40846545],
[0.35611726],
[0.39021837],
[0.39620102],
[0.4498953 ],
[0.44645528],
[0.48399641],
[0.5376907 ],
[0.57253964],
[0.62443913],
[0.81349088],
[0.8905175 ],
[0.8776548 ],
[0.96739456],
[1.        ],
[0.84101107],
[0.67783428],
[0.75186958],
[0.69772659],
[0.58495363],
[0.79419683],
[0.76218965],
[0.72554592],
[0.73451989],
[0.70475621],
[0.51256357],
[0.58809453],
[0.48863296],
[0.50643135],
[0.44241699],
[0.52752019],
[0.49641041],
[0.50598265],
[0.4862399 ],
[0.45827101],
```

```
       [0.43209692],
       [0.44690398],
       [0.4738259 ],
       [0.50224349],
       [0.60693987],
       [0.59362848],
       [0.56565959],
       [0.5501047 ],
       [0.5478612 ],
       [0.50897398],
       [0.49162429],
       [0.49970087],
       [0.48160335],
       [0.47068501],
       [0.46350583],
       [0.48489381],
       [0.47487287],
       [0.46889022],
       [0.45542926],
       [0.44884834],
       [0.4268621 ],
       [0.42671253],
       [0.42102902],
       [0.30705953],
       [0.28312893],
       [0.32037092],
       [0.37391564],
       [0.36763386],
       [0.34564762],
       [0.35402333],
       [0.37795393],
       [0.38767574],
       [0.36763386],
       [0.35686509],
       [0.35312593],
       [0.36224948],
       [0.36404427],
       [0.34056237],
       [0.33727191],
       [0.33757104],
       [0.3040682 ],
       [0.32111876]])
```

[75]:
```
#Create training set#
train_data=datascaled[0:trainingdata, :]

#Splits data into x and y train#
```

```
x_train=[]
y_train=[]
for i in range(60, len(train_data)):
    x_train.append(train_data[i-60:i, 0])
    y_train.append(train_data[i, 0])
    if i <= 60:
        print(x_train)
        print(y_train)
        print()
```

```
[array([0.        , 0.00732875, 0.00613222, 0.00613222, 0.00643135,
       0.00717918, 0.00613222, 0.00613222, 0.00673048, 0.00628178,
       0.00463655, 0.00358959, 0.00448699, 0.00553395, 0.00553395,
       0.00538439, 0.00508525, 0.00523482, 0.00508525, 0.00493569,
       0.00358959, 0.00418786, 0.00433742, 0.00448699, 0.00403829,
       0.00388872, 0.00269219, 0.04651511, 0.05997607, 0.03380197,
       0.04681424, 0.04352378, 0.03828896, 0.0474125 , 0.07074484,
       0.0616213 , 0.07777445, 0.1081364 , 0.1094825 , 0.09632067,
       0.10020939, 0.09572241, 0.0961711 , 0.09063715, 0.08525277,
       0.07583009, 0.07149267, 0.06551002, 0.07941968, 0.07373617,
       0.07253964, 0.07538139, 0.0717918 , 0.06266826, 0.07642836,
       0.06610829, 0.06715525, 0.06655698, 0.06371523, 0.06715525])]
[0.06670655100209394]
```

[76]:
```
#Convert to arrays#
x_train, y_train = np.array(x_train), np.array(y_train)
```

[77]:
```
#Reshapes data#
x_train=np.reshape(x_train,(x_train.shape[0],x_train.shape[1],1))
x_train
```

[77]:
```
array([[[0.        ],
        [0.00732875],
        [0.00613222],
        …,
        [0.06655698],
        [0.06371523],
        [0.06715525]],

       [[0.00732875],
        [0.00613222],
        [0.00613222],
        …,
        [0.06371523],
        [0.06715525],
        [0.06670655]],
```

```
       [[0.00613222],
        [0.00613222],
        [0.00643135],
        …,
        [0.06715525],
        [0.06670655],
        [0.06700568]],

       …,

       [[0.07194137],
        [0.08435537],
        [0.07777445],
        …,
        [0.4862399 ],
        [0.45827101],
        [0.43209692]],

       [[0.08435537],
        [0.07777445],
        [0.07463356],
        …,
        [0.45827101],
        [0.43209692],
        [0.44690398]],

       [[0.07777445],
        [0.07463356],
        [0.07747532],
        …,
        [0.43209692],
        [0.44690398],
        [0.4738259 ]]])
```

[78]:
```
#LSTM model being built to test what it should be#
lstmmodel= Sequential()
lstmmodel.add(LSTM(50, return_sequences=True, input_shape=(60,1)))
lstmmodel.add(LSTM(50, return_sequences=False))
lstmmodel.add(Dense(25))
lstmmodel.add(Dense(1))
```

[79]:
```
#Model Continues MSE#
lstmmodel.compile(optimizer='adam', loss= 'mean_squared_error')
```

[80]:
```
#LSTM Model Trained#
lstmmodel.fit(x_train, y_train, batch_size=1, epochs=3)
```

```
Epoch 1/3
92/92 [==============================] - 7s 36ms/step - loss: 0.0558
Epoch 2/3
92/92 [==============================] - 4s 40ms/step - loss: 0.0234
Epoch 3/3
92/92 [==============================] - 3s 31ms/step - loss: 0.0176
```

[80]:
```
<tensorflow.python.keras.callbacks.History at 0x7ffa5900ae50>
```

[81]:
```
#Testing Dataset#
testdata=datascaled[trainingdata -60:, :]

x_test= []
y_test= newdata[trainingdata:,:]
for i in range(60, len(testdata)):
    x_test.append(testdata[i-60:i,0])
```

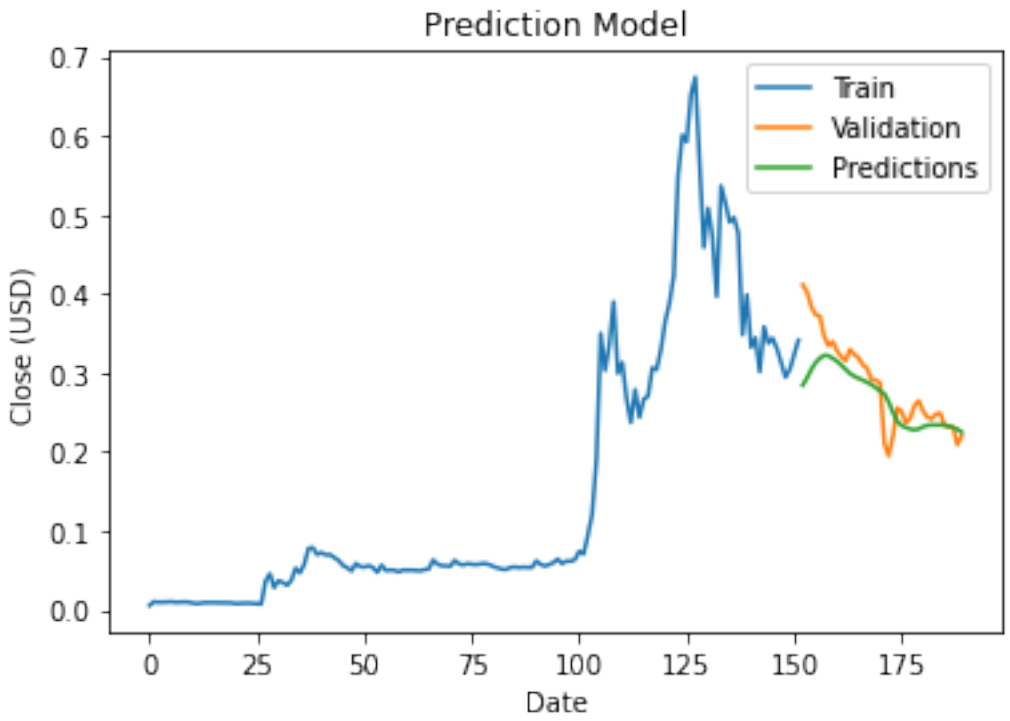
[82]:
```
#Convert to numpy#
x_test=np.array(x_test)
#Reshapes#
x_test=np.reshape(x_test, (38, 60,1))
```

[83]:
```
#Prediction for Xtest#
pred= lstmmodel.predict(x_test)
pred= scaler.inverse_transform(pred)
```

[84]:
```
#Plotting Data to show actual verus predictions from the LSTM model#
train= closedata[:trainingdata]
val= closedata[trainingdata:]
val['Predictions']= pred
plt.figure()
plt.title('Prediction Model')
plt.xlabel('Date')
plt.ylabel('Close (USD)')
plt.plot(train['Close'])
plt.plot(val[['Close','Predictions']])
plt.legend(['Train', 'Validation','Predictions'])
plt.show()
```

```
<ipython-input-84-49734c30c769>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  val['Predictions']= pred
```



[85]:
```
#Shows what the predictions based off previous days#
val
```

[85]:

	Close	Predictions
152	0.4115	0.284445
153	0.4026	0.293560
154	0.3839	0.304351
155	0.3735	0.313027
156	0.3720	0.318746
157	0.3460	0.322210
158	0.3344	0.321739
159	0.3398	0.318428
160	0.3277	0.314626
161	0.3204	0.309870
162	0.3156	0.304587
163	0.3299	0.299258
164	0.3232	0.295864
165	0.3192	0.293157
166	0.3102	0.290797
167	0.3058	0.288104
168	0.2911	0.285221
169	0.2910	0.281278
170	0.2872	0.277343

```
171  0.2110     0.273538
172  0.1950     0.263343
173  0.2199     0.250033
174  0.2557     0.238993
175  0.2515     0.233507
176  0.2368     0.230961
177  0.2424     0.228916
178  0.2584     0.227956
179  0.2649     0.229116
180  0.2515     0.231770
181  0.2443     0.233651
182  0.2418     0.234332
183  0.2479     0.234132
184  0.2491     0.234071
185  0.2334     0.234169
186  0.2312     0.232901
187  0.2314     0.230943
188  0.2090     0.228880
189  0.2204     0.224963
```

[86]:
```
#Setup for prediction column#
futuredays= 60
Doge['Prediction'] = Doge[['Close']].shift(-futuredays)
```

[87]:
```
#Checks to make sure prediction column was added#
Doge
```

[87]:

	Date	Open	High	Low	Close	Prediction
0	1/1/21	0.0047	0.0058	0.0046	0.0057	0.0503
1	1/2/21	0.0058	0.0143	0.0056	0.0106	0.0505
2	1/3/21	0.0105	0.0139	0.0091	0.0098	0.0500
3	1/4/21	0.0098	0.0115	0.0072	0.0098	0.0496
4	1/5/21	0.0098	0.0103	0.0088	0.0100	0.0510
..	…	…	…	…	…	…
185	7/5/21	0.2491	0.2504	0.2269	0.2334	NaN
186	7/6/21	0.2334	0.2420	0.2296	0.2312	NaN
187	7/7/21	0.2312	0.2384	0.2292	0.2314	NaN
188	7/8/21	0.2314	0.2314	0.2067	0.2090	NaN
189	7/9/21	0.2089	0.2293	0.1960	0.2204	NaN

[190 rows x 6 columns]

[88]:
```
#Creates independent data for predicting#
X= np.array(Doge[['Close']])
X= X[:-futuredays]
```

[89]:
```
#Creates dependent variable for predicting#
y= Doge['Prediction'].values
y=y[:-futuredays]
```

[90]:
```
#Splits for training purposes#
x_train, x_test, y_train, y_test = train_test_split(X, y, test_size = .05)
```

[91]:
```
#Creates modelling for training#
from sklearn.linear_model import LinearRegression
LR = LinearRegression()
LR.fit(x_train, y_train)
```

[91]:
```
LinearRegression()
```

[92]:
```
#Test confidence to see if it is good#
LR_Conf= LR.score(x_test, y_test)
LR_Conf
```

[92]:
```
-0.04757810669689433
```

[93]:
```
#Creating projections for the last 60 days#
x_projection = np.array(Doge[['Close']]) [-futuredays:]
x_projection
```

[93]:
```
array([[0.5084],
       [0.4722],
       [0.3968],
       [0.5367],
       [0.5153],
       [0.4908],
       [0.4968],
       [0.4769],
       [0.3484],
       [0.3989],
       [0.3324],
       [0.3443],
       [0.3015],
       [0.3584],
       [0.3376],
       [0.344 ],
       [0.3308],
       [0.3121],
       [0.2946],
       [0.3045],
       [0.3225],
       [0.3415],
       [0.4115],
```

```
       [0.4026],
       [0.3839],
       [0.3735],
       [0.372 ],
       [0.346 ],
       [0.3344],
       [0.3398],
       [0.3277],
       [0.3204],
       [0.3156],
       [0.3299],
       [0.3232],
       [0.3192],
       [0.3102],
       [0.3058],
       [0.2911],
       [0.291 ],
       [0.2872],
       [0.211 ],
       [0.195 ],
       [0.2199],
       [0.2557],
       [0.2515],
       [0.2368],
       [0.2424],
       [0.2584],
       [0.2649],
       [0.2515],
       [0.2443],
       [0.2418],
       [0.2479],
       [0.2491],
       [0.2334],
       [0.2312],
       [0.2314],
       [0.209 ],
       [0.2204]])
```

[94]:
```
#Prints prediction for the next 60 days#
#Based off our machine learning model we can see what is expect for the next 60␣
 ↪days from 7/9
LR_pred= LR.predict(x_projection)
LR_pred
```

[94]:
```
array([0.28703398, 0.28352709, 0.27622267, 0.28977556, 0.28770243,
       0.28532897, 0.28591023, 0.2839824 , 0.27153389, 0.27642611,
       0.26998388, 0.2711367 , 0.26699042, 0.27250265, 0.27048763,
```

```
       0.27110764, 0.26982888, 0.26801731, 0.26632198, 0.26728105,
       0.26902481, 0.27086545, 0.27764674, 0.27678455, 0.27497297,
       0.27396547, 0.27382015, 0.27130139, 0.27017763, 0.27070076,
       0.26952857, 0.26882137, 0.26835637, 0.26974169, 0.26909263,
       0.26870512, 0.26783324, 0.26740699, 0.26598292, 0.26597323,
       0.2656051 , 0.25822318, 0.25667317, 0.25908538, 0.26255352,
       0.26214665, 0.26072257, 0.26126508, 0.26281509, 0.26344478,
       0.26214665, 0.26144914, 0.26120695, 0.26179789, 0.26191414,
       0.2603932 , 0.26018007, 0.26019945, 0.25802943, 0.25913381])
```

[96]:
```
#Saves predictions as CSV, I find it easier to work with#
from numpy import asarray
from numpy import savetxt
savetxt('DogePred.csv', LR_pred, delimiter=',')
```

[97]:
```
DogePred= pd.read_csv('/Users/Brett/Desktop/DogePred.csv')
DogePred
```

[97]:

	Date	Close
0	1/1/21	0.0057
1	1/2/21	0.0106
2	1/3/21	0.0098
3	1/4/21	0.0098
4	1/5/21	0.0100
..	…	…
245	9/3/21	0.2604
246	9/4/21	0.2602
247	9/5/21	0.2602
248	9/6/21	0.2580
249	9/7/21	0.2591

[250 rows x 2 columns]

[98]:
```
#This plots the prediction vs the actual close. Showing what we are predicting␣
 ↪is going to happen#
plt.figure()
plt.plot(DogePred['Close'])
plt.plot(Doge["Close"])
plt.title('Doge 2021 Price vs Prediction')
plt.ylabel('Price (USD)')
plt.xlabel('Days')
plt.legend(['Prediction','Close'], loc='upper left')

plt.show()
```


Doge 2021 Price vs Prediction
Prediction
Close
Price (USD)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
50
100
150
200
250
Days

[ ]: