S&P 500 Predictions

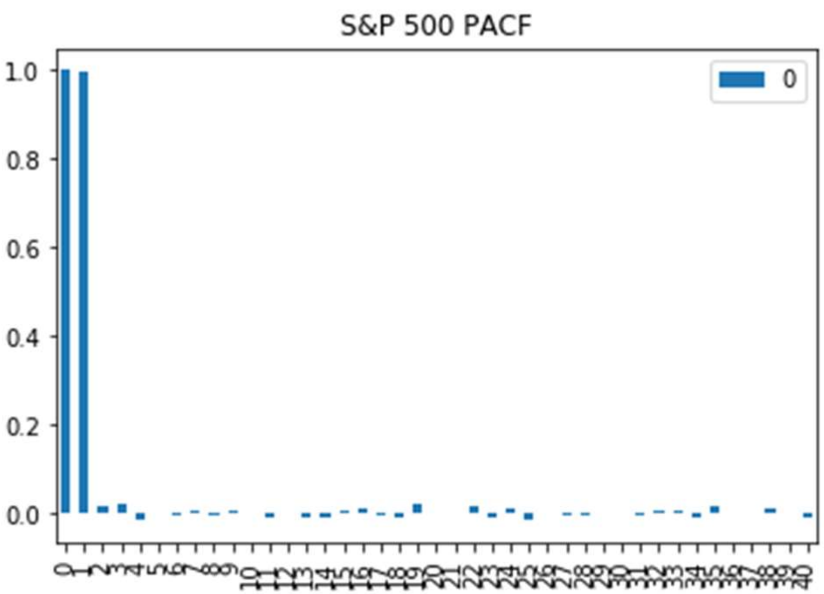
Testing: ARIMA, SARIMA, and LSTM

Actual Values

Date	price
2018-06-20	2767.32
2018-06-21	2749.76
2018-06-22	2754.88
2018-06-25	2717.07
2018-06-26	2723.06
2018-06-27	2699.63
2018-06-28	2716.31
2018-06-29	2718.37

ARIMA

3,1,2

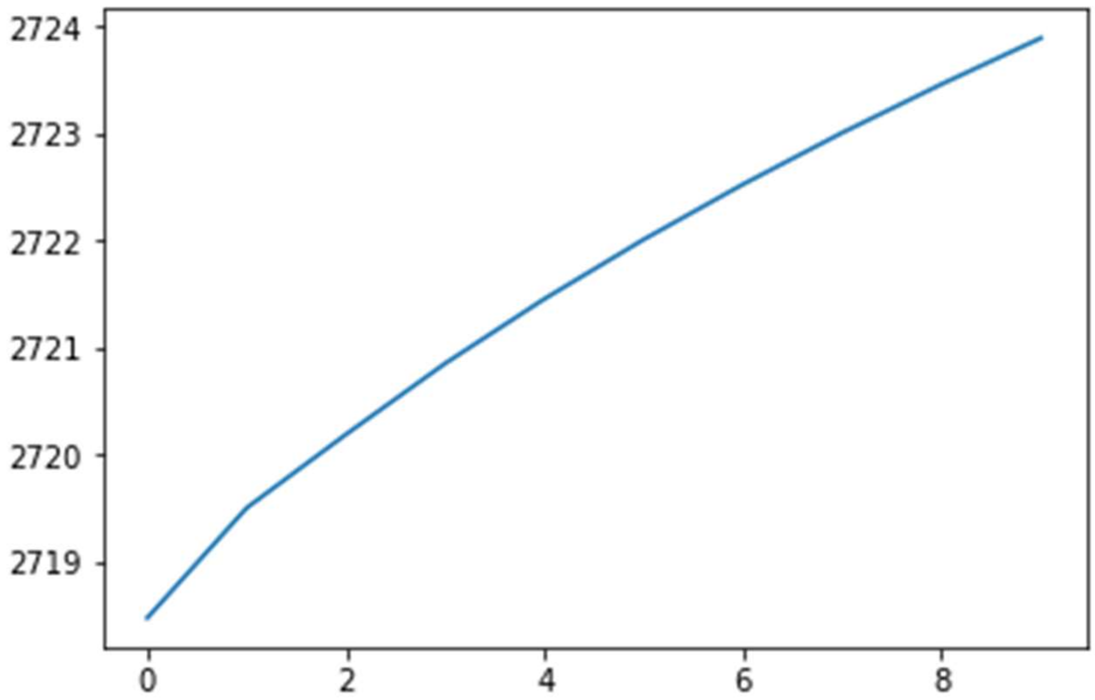


ARIMA Model Results

Dep. Variable:	D.y	No. Observations:		8191		
Model:	ARIMA(3, 1, 2)	Log Likelihood	-32239.319			
Method:	css-mle	S.D. of innovations		12.391		
Date:	Thu, 05 Sep 2019		AIC	64492.637		
Time:	04:59:27	BIC	64541.713			
Sample:	1	HQIC	64509.415			
coef	std err	z	P>|z|	[0.025	0.975]	
const	0.3067	0.110	2.790	0.005	0.091	0.522
ar.L1.D.y	0.5085	0.227	2.242	0.025	0.064	0.953
ar.L2.D.y	0.2369	0.160	1.480	0.139	-0.077	0.551
ar.L3.D.y	0.0345	0.014	2.445	0.015	0.007	0.062
ma.L1.D.y	-0.5662	0.227	-2.498	0.012	-1.010	-0.122
ma.L2.D.y	-0.2571	0.170	-1.512	0.131	-0.590	0.076
Roots						
Real	Imaginary	Modulus	Frequency			
AR.1	1.1911	-0.0000j	1.1911	-0.0000		
AR.2	-4.0317	-2.8461j	4.9351	-0.4022		
AR.3	-4.0317	+2.8461j	4.9351	0.4022		
MA.1	1.1577	+0.0000j	1.1577	0.0000		
MA.2	-3.3602	+0.0000j	3.3602	0.5000		

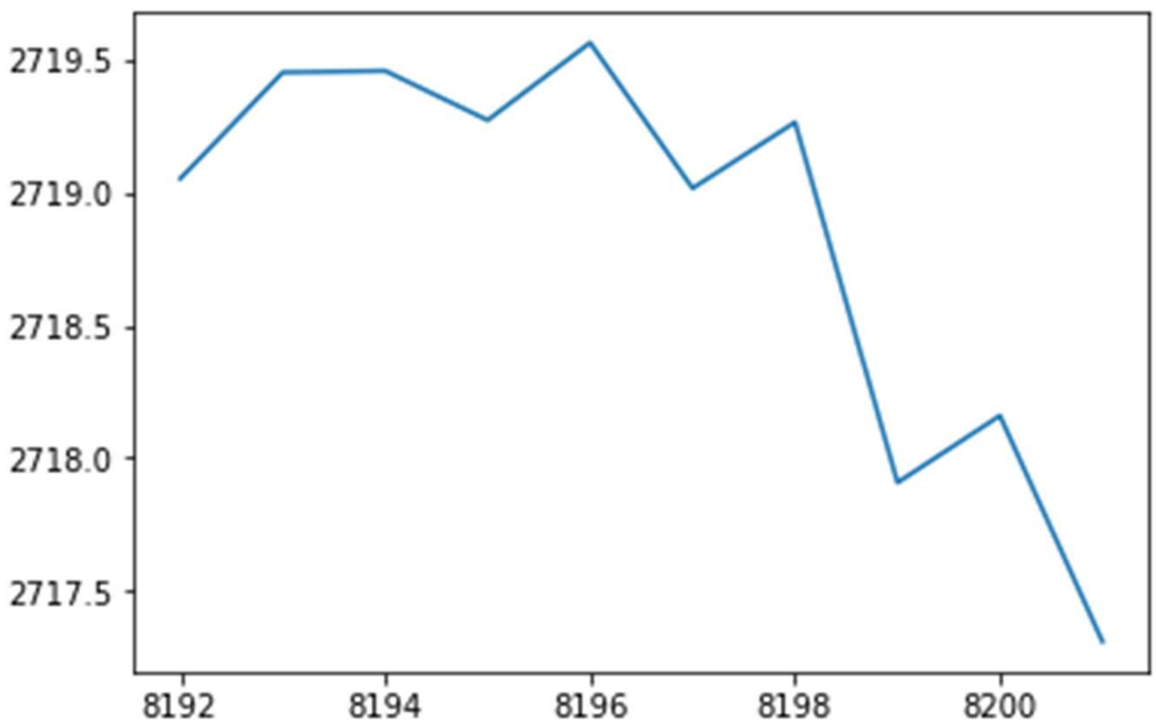
ARIMA

N Step = 10



SARIMA

2,1,2
N Step = 10



LSTM

n_features = 1
n_steps = 10
hidden_neurons = 20
dropout_parameter = .20
epoch = 100
batch_size= 20
forecast_horizon = 10

Forecast: 2732.9097, 2748.6748, 2764.2898, 2779.867 , 2795.1277, 2810.4238, 2825.1252, 2839.9272, 2854.3193, 2868.9182

Actual Future Values compared to Models

Date	Price
2018 06 29	2,718.37
2018 07 02	2,726.71
2018 07 03	2,713.22

Date (SARIMA)	Price
2018 06 29	2719.052938
2018 07 02	2719.452440
2018 07 03	2719.458334

Date (ARIMA)	Price
2018 06 29	2718.4787512
2018 07 02	2719.50571797
2018 07 03	2720.19219124

Date (LSTM)	Price
2018 06 29	2732.9097
2018 07 02	2748.6748,
2018 07 03	2764.2898