data acquisition

In [1]:

```
import tushare as ts
import torch
import pandas as pd
import talib
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```
print(f'tushare version:{ts.__version__}')
print(f'torch version:{torch.__version__}')
print(f'pandas version:{pd.__version__}')
print(f'talib version:{talib.__version__}')
```

```
tushare version:1.2.62
torch version:1.3.1
pandas version:0.20.3
talib version:0.4.19
```

In [3]:

```
class Args:
    def __init__(self):
        self.stock_code = '000001.SH'
        self.startdate = '20100901'
        self.enddate = '20190901'
        self.predict_col='close'
        self.ratio = 0.2
        self.window_size = 50
        self.input_dim = 8
        self.hidden_dim = 32
        self.num_layers = 2
        self.output_dim = 1
        self.num_epochs = 50
        self.features = []

args = Args()
```

these two following blocks are exclusive for each other

the first one is for downloading data

the second one is for loading data if you have already downloaded what you need.

In [4]:

```
ts.set_token('1fe161e9d8fb8b8e53c863528c68dba6a690f64bdafe6579586b1d17')
pro = ts.pro_api()
df = pro.index_daily(ts_code=args.stock_code, start_date=args.startdate, end_date=args.enddate)
df1 = pd.DataFrame(df)
path = args.stock_code + '.csv'
df1.to_csv(path)
```

In [ ]:

```
df1 = pd.read_csv('../'+args.stock_code+'.csv',index_col=0)
```

In [6]:

```
df1.head()
```

Out[6]:

	ts_code	trade_date	close	open	high	low	pre_close	change	pct_
0	000001.SH	20190830	2886.2365	2907.3825	2914.5767	2874.1028	2890.9192	-4.6827	-0.
1	000001.SH	20190829	2890.9192	2895.9991	2898.6046	2878.5878	2893.7564	-2.8372	-0.(
2	000001.SH	20190828	2893.7564	2901.6267	2905.4354	2887.0115	2902.1932	-8.4368	-0.:
3	000001.SH	20190827	2902.1932	2879.5154	2919.6444	2879.4060	2863.5673	38.6259	1.:
4	000001.SH	20190826	2863.5673	2851.0158	2870.4939	2849.2381	2897.4253	-33.8580	-1.

In [7]:

```
df1 = df1[['trade_date','open', 'high', 'close', 'low', 'vol', 'change']]
df1 = df1.sort_values(by='trade_date').reset_index()
```

In [8]:

```
df1.drop('index',axis=1,inplace=True)
```

In [9]:

```
df1.head()
```

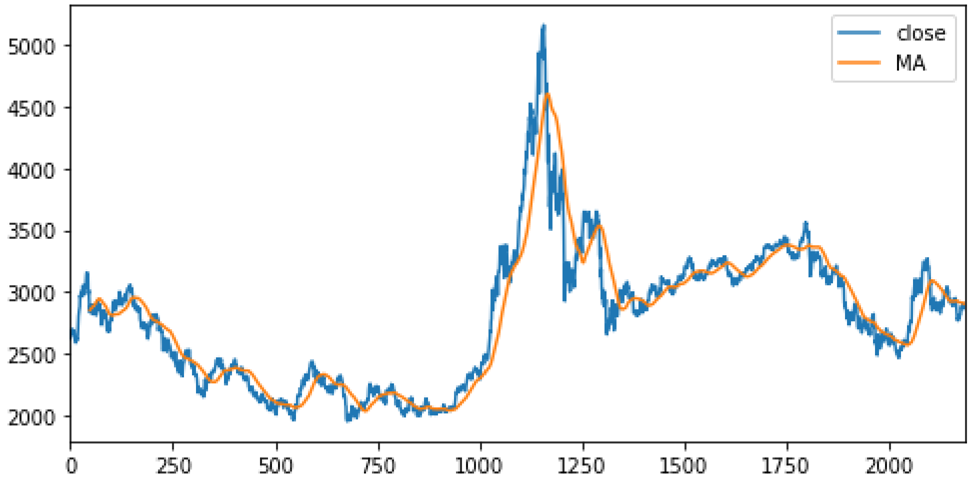
Out[9]:

	trade_date	open	high	close	low	vol	change
0	20100901	2641.053	2662.876	2622.882	2604.487	127164940.0	-15.916
1	20100902	2646.893	2659.978	2655.776	2636.418	124076238.0	32.894
2	20100903	2658.129	2660.539	2655.394	2631.851	129456526.0	-0.382
3	20100906	2667.195	2698.601	2696.250	2664.239	144209066.0	40.856
4	20100907	2698.218	2704.933	2698.363	2679.023	112231539.0	2.113

feature engineering and preprocessing

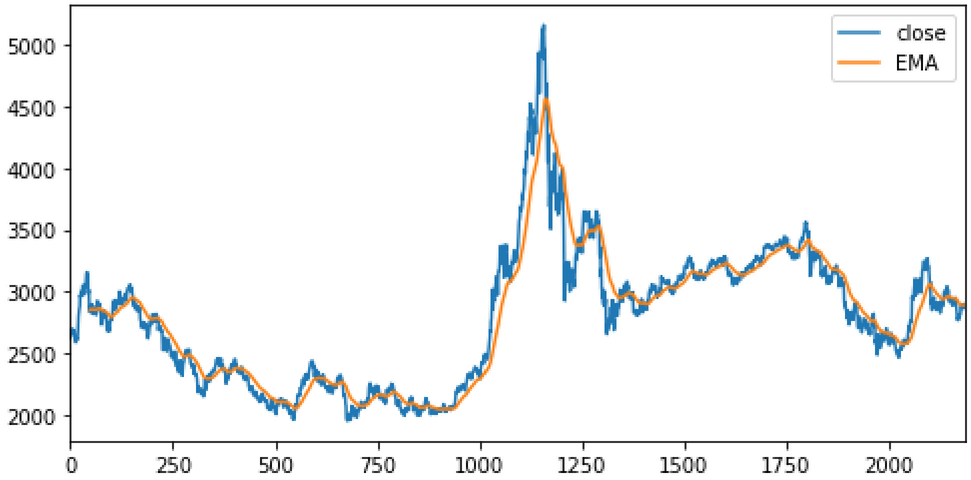
In [10]:

```
df1['MA'] = talib.SMA(df1['close'],args.window_size-1)
df1[['close','MA']].plot(figsize=(8,4))
plt.show()
```



In [11]:

```
df1['EMA'] = talib.EMA(df1['close'], timeperiod = args.window_size-1)
df1[['close','EMA']].plot(figsize=(8,4))
plt.show()
```

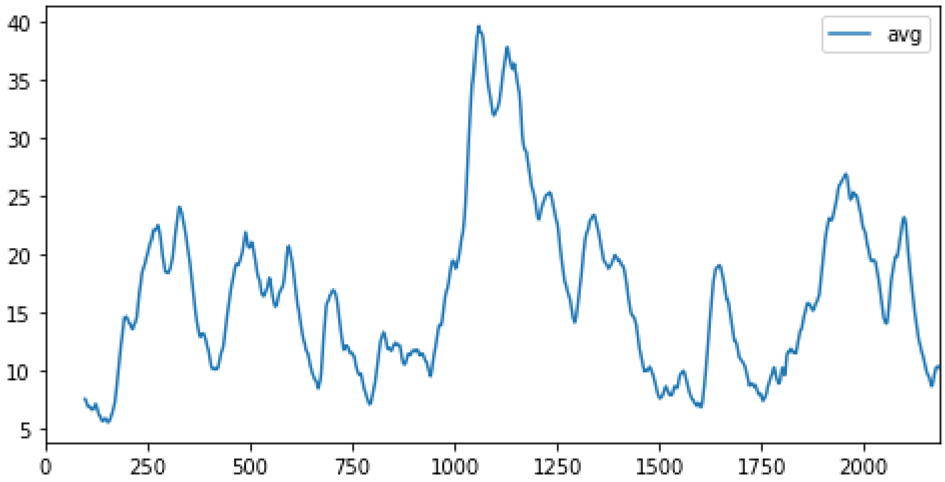


In [12]:

```
df1['avg'] = talib.ADX(df1['high'],df1['low'], df1['close'], timeperiod=args.window_size-1)
df1[['avg']].plot(figsize=(8,4))
```

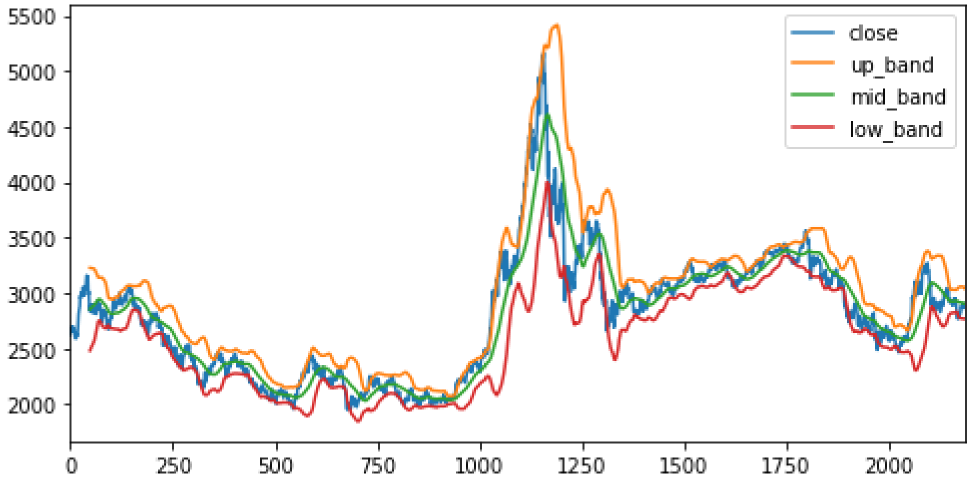
Out[12]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x213f3a2dd68>
```



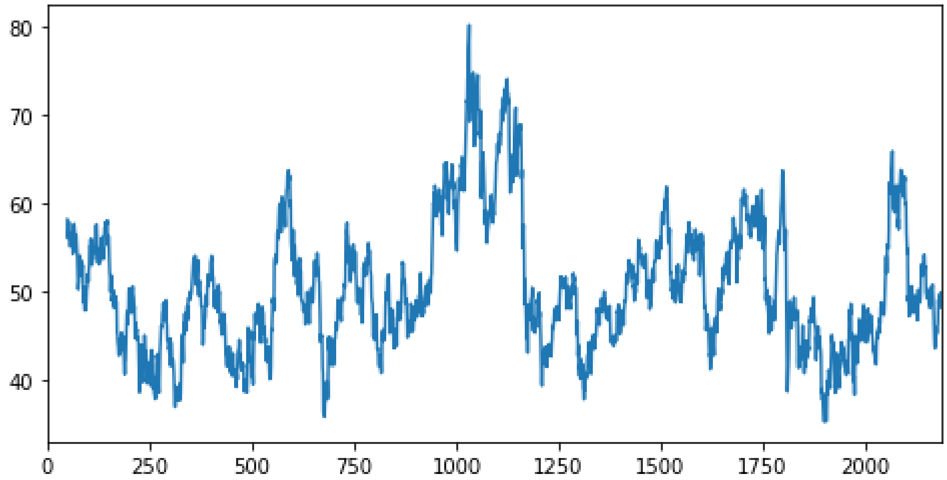
In [13]:

```
df1['up_band'], df1['mid_band'], df1['low_band'] =   \
                         talib.BBANDS(df1['close'], timeperiod =args.window_size-1)
df1[['close','up_band','mid_band','low_band']].plot(figsize=
                                    (8,4))
plt.show()
```



In [14]:

```
df1['Relative'] = talib.RSI(df1['close'],args.window_size-1)
df1['Relative'].plot(figsize=(8,4))
plt.show()
```



In [15]:

```
df1.head()
```

Out[15]:

	trade_date	open	high	close	low	vol	change	MA	EMA	avg
0	20100901	2641.053	2662.876	2622.882	2604.487	127164940.0	-15.916	NaN	NaN	NaN
1	20100902	2646.893	2659.978	2655.776	2636.418	124076238.0	32.894	NaN	NaN	NaN
2	20100903	2658.129	2660.539	2655.394	2631.851	129456526.0	-0.382	NaN	NaN	NaN
3	20100906	2667.195	2698.601	2696.250	2664.239	144209066.0	40.856	NaN	NaN	NaN
4	20100907	2698.218	2704.933	2698.363	2679.023	112231539.0	2.113	NaN	NaN	NaN

In [16]:

```
pd.DataFrame(df1,columns=['close','MA','EMA','avg','up_band','mid_band','low_band','Relative']).corr
```

Out[16]:

	close	MA	EMA	avg	up_band	mid_band	low_band	Relative
close	1.000000	0.938284	0.954983	0.322579	0.915107	0.938284	0.888154	0.419223
MA	0.938284	1.000000	0.996809	0.265890	0.975259	1.000000	0.946630	0.152466
EMA	0.954983	0.996809	1.000000	0.272899	0.970114	0.996809	0.946573	0.183448
avg	0.322579	0.265890	0.272899	1.000000	0.395924	0.265890	0.052625	0.170900
up_band	0.915107	0.975259	0.970114	0.395924	1.000000	0.975259	0.851954	0.171131
mid_band	0.938284	1.000000	0.996809	0.265890	0.975259	1.000000	0.946630	0.152466
low_band	0.888154	0.946630	0.946573	0.052625	0.851954	0.946630	1.000000	0.111623
Relative	0.419223	0.152466	0.183448	0.170900	0.171131	0.152466	0.111623	1.000000

In [18]:

```
args.features = ['MA','EMA','avg','up_band','mid_band','low_band','Relative']
args.input_dim = 1+len(args.features)
```

In [19]:

```
df1.dropna(inplace=True)
```

In [20]:

```
df1.head()
```

Out[20]:

	trade_date	open	high	close	low	vol	change	MA	
97	20110127	2690.825	2753.001	2749.150	2677.210	105569163.0	40.336	2819.615694	27
98	20110128	2741.314	2759.440	2752.750	2733.291	85427992.0	3.600	2816.843939	27
99	20110131	2751.527	2790.921	2790.694	2748.538	91502814.0	37.944	2814.932163	27
100	20110201	2795.071	2805.049	2798.960	2785.296	73350092.0	8.266	2814.333755	27
101	20110209	2778.701	2804.208	2774.065	2764.867	87257788.0	-24.895	2812.581286	27

In [21]:

```
from sklearn.preprocessing import MinMaxScaler

price = df1.loc[:,[args.predict_col]+args.features]
print(price.shape)
for i in range(len(price.columns)):
    scaler = MinMaxScaler(feature_range=(-1, 1))
    price.iloc[:,i] = scaler.fit_transform(price.iloc[:,i].values.reshape(-1,1))
```

```
(2091, 8)
```

In [22]:

```
price.head()
```

Out[22]:

	close	MA	EMA	avg	up_band	mid_band	low_band	Relative
97	-0.503076	-0.388487	-0.400866	-0.882651	-0.473565	-0.388487	-0.220899	-0.328692
98	-0.500838	-0.390640	-0.402327	-0.885574	-0.475344	-0.390640	-0.223283	-0.323373
99	-0.477243	-0.392126	-0.402526	-0.891563	-0.477235	-0.392126	-0.223898	-0.267709
100	-0.472103	-0.392591	-0.402455	-0.898810	-0.477582	-0.392591	-0.224470	-0.255708
101	-0.487584	-0.393953	-0.403177	-0.903982	-0.478743	-0.393953	-0.225921	-0.294767

In [23]:

```
import numpy as np

'''
    for the input stock,
    slice it for a lookback size and make one step further,
    ratio determines the size of train and test set,
    choose the last price of every slice as label
'''
def split_data(stock, lookback, ratio=0.2):
    data_raw = stock
    assert type(data_raw)==np.ndarray,f'{type(data_raw)}'
    data = []

    # create all possible sequences of length seq_len
    for index in range(len(data_raw) - lookback):
        data.append(data_raw[index: index + lookback])

    data = np.array(data);
    test_set_size = int(np.round(ratio*data.shape[0]));
    train_set_size = data.shape[0] - (test_set_size);

    x_train = data[:train_set_size,:-1,:]
    y_train = np.expand_dims(data[:train_set_size,-1,0],-1)

    x_test = data[train_set_size:,:-1]
    y_test = np.expand_dims(data[train_set_size:,-1,0],-1)

    return [x_train, y_train, x_test, y_test]


lookback = args.window_size # choose sequence length
x_train, y_train, x_test, y_test = split_data(price.values, lookback,args.ratio)
```

In [24]:

```
x_train.shape,y_train.shape,x_test.shape,y_test.shape
```

Out[24]:

```
((1633, 49, 8), (1633, 1), (408, 49, 8), (408, 1))
```

In [25]:

```
import torch
import torch.nn as nn
x_train = torch.from_numpy(x_train).type(torch.Tensor)
x_test = torch.from_numpy(x_test).type(torch.Tensor)
y_train_lstm = torch.from_numpy(y_train).type(torch.Tensor)
y_test_lstm = torch.from_numpy(y_test).type(torch.Tensor)
y_train_gru = torch.from_numpy(y_train).type(torch.Tensor)
y_test_gru = torch.from_numpy(y_test).type(torch.Tensor)
```

train model

In [26]:

```
'''
    create lstm model with nn.lstm receiving batch-first data
    and fully connected layer as model head
'''
class LSTM(nn.Module):
    def __init__(self, input_dim, hidden_dim, num_layers, output_dim):
        super(LSTM, self).__init__()
        self.hidden_dim = hidden_dim
        self.num_layers = num_layers

        self.lstm = nn.LSTM(input_dim, hidden_dim, num_layers, batch_first=True)
        self.fc = nn.Linear(hidden_dim, output_dim)
    def forward(self, x):
        h0 = torch.zeros(self.num_layers, x.size(0), self.hidden_dim).requires_grad_()
        c0 = torch.zeros(self.num_layers, x.size(0), self.hidden_dim).requires_grad_()
        out, (hn, cn) = self.lstm(x, (h0.detach(), c0.detach()))
        out = self.fc(out[:, -1, :])
        return out
```

In [27]:

```
class RMSELoss(torch.nn.Module):
    def __init__(self, eps=1e-6):
        super().__init__()
        self.mse = torch.nn.MSELoss()
        self.eps = eps

    def forward(self,yhat,y):
        loss = torch.sqrt(self.mse(yhat,y) + self.eps)
        return loss

model = LSTM(input_dim=args.input_dim, hidden_dim=args.hidden_dim, output_dim=args.output_dim, num_
criterion = RMSELoss()
optimiser = torch.optim.Adam(model.parameters(), lr=0.01)
```

In [28]:

```
import time
hist = np.zeros(args.num_epochs)
start_time = time.time()
lstm = []
for t in range(args.num_epochs):
    y_train_pred = model(x_train)
    loss = criterion(y_train_pred, y_train_lstm)
    print("Epoch ", t, "RMSE: ", loss.item())
    hist[t] = loss.item()
    optimiser.zero_grad()
    loss.backward()
    optimiser.step()

training_time = time.time()-start_time
print("Training time: {}".format(training_time))
```

```
Epoch  0 RMSE:  0.5927897691726685
Epoch  1 RMSE:  0.414679557085037 23
Epoch  2 RMSE:  0.2788410484790802
Epoch  3 RMSE:  0.2601878345012665
Epoch  4 RMSE:  0.19342826306819916
Epoch  5 RMSE:  0.1738848239183426
Epoch  6 RMSE:  0.12605254352092743
Epoch  7 RMSE:  0.15506480634212494
Epoch  8 RMSE:  0.12611150741577148
Epoch  9 RMSE:  0.13612493872642517
Epoch  10 RMSE:  0.1127084493637085
Epoch  11 RMSE:  0.10228176414966583
Epoch  12 RMSE:  0.10556686669588089
Epoch  13 RMSE:  0.09160139411687851
Epoch  14 RMSE:  0.09810870885848999
Epoch  15 RMSE:  0.09352695941925049
Epoch  16 RMSE:  0.08058962970972061
Epoch  17 RMSE:  0.08233870565891266
Epoch  18 RMSE:  0.06909185647964478
Epoch  19 RMSE:  0.07150274515151978
Epoch  20 RMSE:  0.06615596264600754
Epoch  21 RMSE:  0.06685240566730499
Epoch  22 RMSE:  0.06289684772491455
Epoch  23 RMSE:  0.0627349317073822
Epoch  24 RMSE:  0.0585382841527462
Epoch  25 RMSE:  0.05810284987092018
Epoch  26 RMSE:  0.05550035461783409
Epoch  27 RMSE:  0.05654608830809593
Epoch  28 RMSE:  0.054951563477516174
Epoch  29 RMSE:  0.054869990795850754
Epoch  30 RMSE:  0.05271974205970764
Epoch  31 RMSE:  0.05305636301636696
Epoch  32 RMSE:  0.051205143332481384
Epoch  33 RMSE:  0.05187383666345596
Epoch  34 RMSE:  0.05060450732707977
Epoch  35 RMSE:  0.05094056576490402
Epoch  36 RMSE:  0.049269407987594604
Epoch  37 RMSE:  0.049737416207790375
Epoch  38 RMSE:  0.047298744320869446
Epoch  39 RMSE:  0.04885104298591614
Epoch  40 RMSE:  0.04649141803383827
Epoch  41 RMSE:  0.04815277084708214
Epoch  42 RMSE:  0.04623742774128914
Epoch  43 RMSE:  0.04665074124932289
Epoch  44 RMSE:  0.04617607593536377
Epoch  45 RMSE:  0.04538152739405632
Epoch  46 RMSE:  0.04606514796614647
Epoch  47 RMSE:  0.04464830458164215
Epoch  48 RMSE:  0.04501032829284668
Epoch  49 RMSE:  0.044183991849422455
Training time: 38.757325649261475
```

evaluate model

In [29]:

```
with torch.no_grad():
    y_test_pred = model(x_test)
    loss = criterion(y_test_pred, y_test_lstm)
loss
```

Out[29]:

```
tensor(0.0391)
```

In [30]:

```
y_test_pred
# y_test_lstm
```

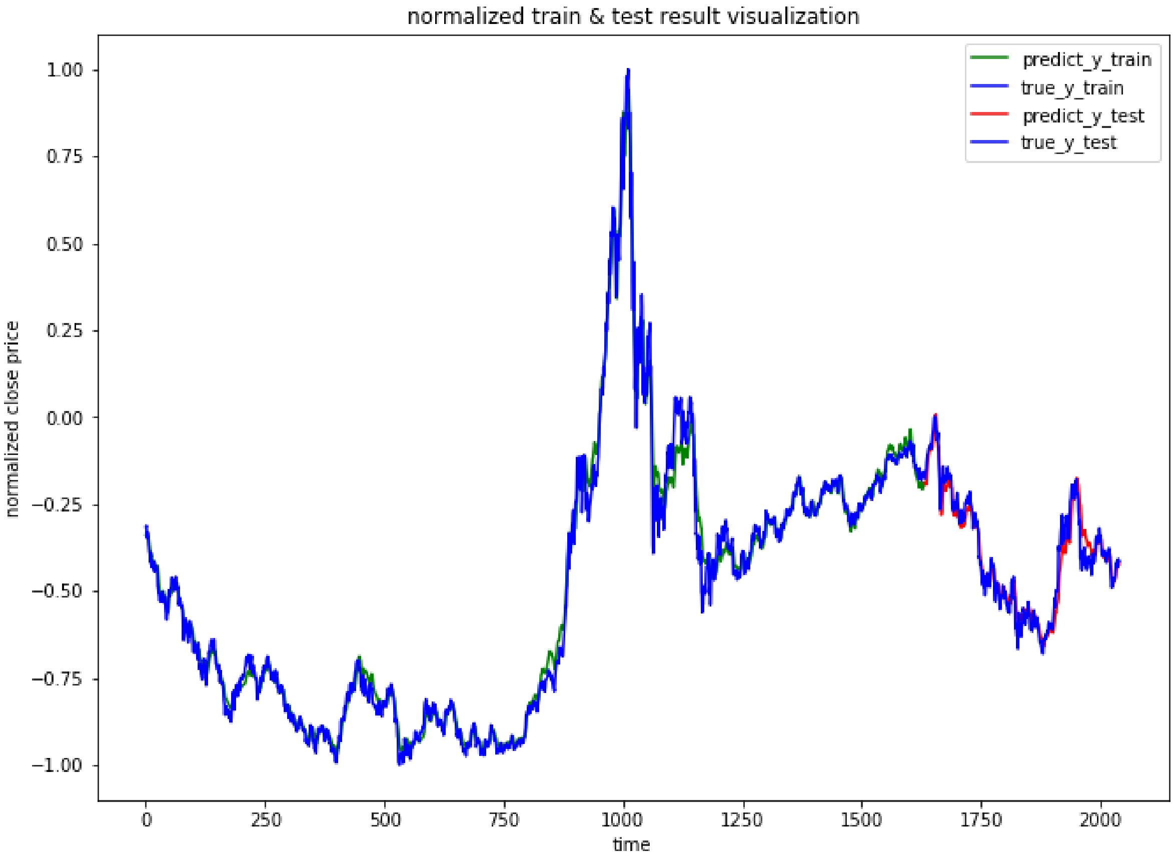
```
        [-0.1052],
        [-0.0986],
        [-0.0935],
        [-0.0901],
        [-0.0876],
        [-0.0943],
        [-0.0920],
        [-0.0856],
        [-0.0709],
        [-0.0555],
        [-0.0419],
        [-0.0205],
        [-0.0012],
        [ 0.0050],
        [ 0.0078],
        [-0.0071],
        [-0.0360],
        [-0.0594],
        [-0.0840],
        [-0.0926],
```

In [31]:

```
import matplotlib.pyplot as plt
%matplotlib inline
final_y_train_pred = model(x_train)



fig =plt.figure(figsize=(24,8))
'''-----------------------------------------------normalized data visualization-------------------
plt.subplot(121)
t_train = np.arange(0,len(y_train_lstm))
plt.plot(t_train,final_y_train_pred.detach(),color='g',label='predict_y_train')
plt.plot(t_train,y_train_lstm,color='b',label='true_y_train')

t_test = np.arange(len(y_train_lstm),len(y_train_lstm)+len(y_test_lstm))
plt.plot(t_test,y_test_pred.detach(),color='r',label='predict_y_test')
plt.plot(t_test,y_test_lstm,color='b',label='true_y_test')

plt.title('normalized train & test result visualization')
plt.xlabel('time')
plt.ylabel('normalized close price')
plt.legend()

'''-----------------------------------------------real data visualization-------------------------
# plt.subplot(122)
# real_y_train = scaler.inverse_transform(y_train_lstm)
# real_y_train_pred = scaler.inverse_transform(final_y_train_pred.detach())
# real_y_test = scaler.inverse_transform(y_test_lstm)
# real_y_test_pred = scaler.inverse_transform(y_test_pred.detach())

# t_train = np.arange(0,len(y_train_lstm))
# plt.plot(t_train,real_y_train_pred,color='g',label='predict_y_train')
# plt.plot(t_train,real_y_train,color='b',label='true_y_train')

# t_test = np.arange(len(y_train_lstm),len(y_train_lstm)+len(y_test_lstm))
# plt.plot(t_test,real_y_test_pred,color='r',label='predict_y_test')
# plt.plot(t_test,real_y_test,color='b',label='true_y_test')

# plt.title('real train & test result visualization')
# plt.xlabel('time')
# plt.ylabel('real close price')
# plt.legend()
```

Out[31]:

```
'-----------------------------------------------real data visualization------------
--------------------------------------'
```

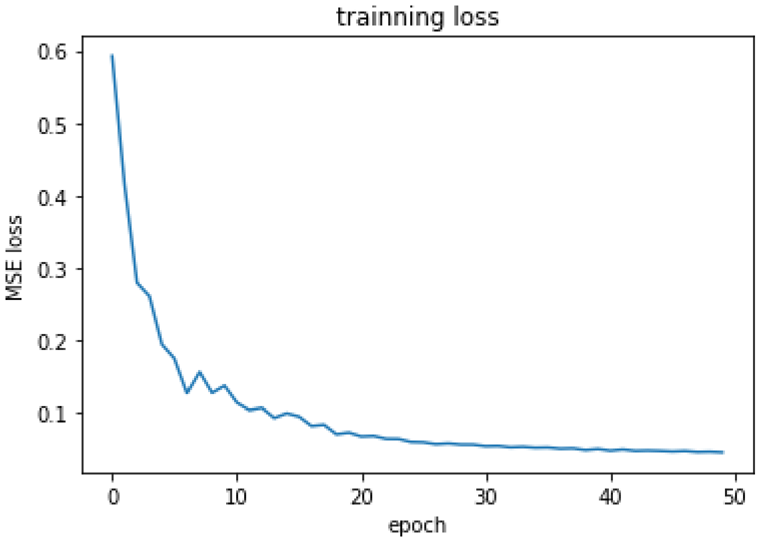


In [32]:

```
plt.plot(hist)
plt.title('trainning loss')
plt.xlabel('epoch')
plt.ylabel('MSE loss')
```

Out[32]:

```
Text(0, 0.5, 'MSE loss')
```



test model

In [33]:

```
df2 = pro.index_daily(ts_code=args.stock_code, start_date=args.enddate, end_date='20201220')
df2.to_csv(args.stock_code+'_test.csv')
df2 = df2[['trade_date','open', 'high', 'close', 'low', 'vol', 'change']]
df2 = df2.sort_values(by='trade_date')
```

In [34]:

```
df2 = df2.sort_values(by='trade_date').reset_index()
df2.drop('index',axis=1,inplace=True)
df2
```

Out[34]:

	trade_date	open	high	close	low	vol	change
0	20190902	2886.9418	2928.4793	2924.1063	2883.6823	202786807.0	37.8698
1	20190903	2925.9422	2930.1538	2930.1538	2915.1974	189001216.0	6.0475
2	20190904	2927.7470	2957.4116	2957.4116	2925.8825	225495907.0	27.2578
3	20190905	2972.6619	3015.8443	2985.8648	2972.6619	305438706.0	28.4532
4	20190906	2996.6216	2999.9434	2999.6013	2981.5983	216826035.0	13.7365
5	20190909	3023.7780	3026.2398	3024.7388	3005.6949	243377752.0	25.1375
6	20190910	3027.4103	3027.4103	3021.2024	3005.3825	240012947.0	-3.5364
7	20190911	3029.9334	3030.5570	3008.8118	3004.2152	229837362.0	-12.3906
8	20190912	3016.6267	3033.4730	3031.2351	3005.1948	196968701.0	22.4233
9	20190916	3041.9220	3042.9284	3030.7544	3020.0495	221878959.0	-0.4807
10	20190917	3023.7109	3023.7109	2978.1178	2970.5704	223338061.0	-52.6366
11	20190918	2984.0837	2996.4022	2985.6586	2982.4003	168046699.0	7.5408
12	20190919	2992.9222	2999.2789	2999.2789	2975.3978	162690615.0	13.6203
13	20190920	3004.8142	3011.3400	3006.4467	2996.1929	182145302.0	7.1678
14	20190923	2998.3995	2998.3995	2977.0767	2960.8270	168139450.0	-29.3700
15	20190924	2979.4752	3002.8967	2985.3406	2973.7601	163902761.0	8.2639
16	20190925	2977.6676	2977.6676	2955.4325	2955.4325	168543135.0	-29.9081
17	20190926	2964.4776	2970.0354	2929.0875	2928.2589	188932541.0	-26.3450
18	20190927	2929.4860	2939.0789	2932.1670	2920.9300	132905777.0	3.4616
19	20190930	2927.9165	2936.4820	2905.1892	2905.1892	116646811.0	-26.9778
20	20191008	2905.7559	2933.0163	2913.5704	2905.7559	125535812.0	8.3812
21	20191009	2902.0751	2924.8566	2924.8566	2891.5394	130424144.0	11.2862
22	20191010	2923.7069	2949.2404	2947.7106	2918.2284	134239752.0	22.8540
23	20191011	2954.8189	2980.7875	2973.6558	2943.0137	161203746.0	25.9452
24	20191014	2993.9617	3026.3834	3007.8834	2989.8125	208614802.0	34.2276
25	20191015	3005.6646	3005.6646	2991.0459	2986.3033	155376904.0	-16.8375
26	20191016	2992.6103	3010.4241	2978.7124	2975.9233	149885496.0	-12.3335
27	20191017	2979.9929	2986.7191	2977.3342	2969.5680	122527614.0	-1.3782
28	20191018	2982.3417	2987.2035	2938.1413	2933.2424	149990678.0	-39.1929
29	20191021	2933.8969	2940.3246	2939.6179	2917.6884	132475107.0	1.4766
...	...	...	...	...	...	...	...
285	20201109	3329.4285	3380.8235	3373.7337	3329.4285	310219771.0	61.5747
286	20201110	3387.6219	3387.6219	3360.1485	3346.1715	278701113.0	-13.5852

	trade_date	open	high	close	low	vol	change
287	20201111	3354.0247	3365.8360	3342.2025	3339.0407	271204653.0	-17.9460
288	20201112	3344.4562	3350.2848	3338.6788	3329.4850	216501309.0	-3.5237
289	20201113	3327.2293	3327.2293	3310.1046	3291.6425	227898364.0	-28.5742
290	20201116	3325.6209	3346.9692	3346.9692	3313.6469	279593761.0	36.8646
291	20201117	3347.1513	3347.6979	3339.8950	3323.9506	283632479.0	-7.0742
292	20201118	3337.3315	3358.8938	3347.3034	3333.9916	287531259.0	7.4084
293	20201119	3339.0864	3367.3328	3363.0876	3330.4496	253262992.0	15.7842
294	20201120	3359.5966	3380.1489	3377.7267	3356.3086	261271219.0	14.6391
295	20201123	3384.1039	3431.6529	3414.4899	3377.9862	373872047.0	36.7632
296	20201124	3407.4087	3413.9263	3402.8225	3396.2436	300994144.0	-11.6674
297	20201125	3417.5150	3423.4853	3362.3274	3362.3274	322110207.0	-40.4951
298	20201126	3360.0609	3371.4537	3369.7334	3344.2822	255886822.0	7.4060
299	20201127	3373.8434	3408.3071	3408.3071	3364.4919	280649894.0	38.5737
300	20201130	3418.1583	3456.7365	3391.7551	3391.7551	384989968.0	-16.5520
301	20201201	3388.9867	3457.6354	3451.9384	3386.9113	316188980.0	60.1833
302	20201202	3453.5181	3465.7288	3449.3805	3435.8712	312811114.0	-2.5579
303	20201203	3448.5403	3452.1612	3442.1359	3428.8044	298459930.0	-7.2446
304	20201204	3436.7291	3448.4036	3444.5814	3417.0484	256276705.0	2.4455
305	20201207	3446.6478	3449.5782	3416.6037	3414.3142	254522508.0	-27.9777
306	20201208	3417.6936	3428.6618	3410.1771	3403.0263	226907328.0	-6.4266
307	20201209	3416.0782	3422.5360	3371.9640	3371.9156	260747424.0	-38.2131
308	20201210	3365.7310	3384.8875	3373.2758	3357.7531	247308304.0	1.3118
309	20201211	3381.0080	3383.1783	3347.1910	3325.1720	298617158.0	-26.0848
310	20201214	3349.5340	3371.1291	3369.1201	3338.6263	239807926.0	21.9291
311	20201215	3366.5813	3373.5579	3367.2326	3348.4192	225667402.0	-1.8875
312	20201216	3371.2632	3378.6626	3366.9832	3359.1705	220813976.0	-0.2494
313	20201217	3367.2770	3406.1547	3404.8732	3354.0112	275463631.0	37.8900
314	20201218	3400.4855	3413.8134	3394.8960	3382.7508	280992641.0	-9.9772

315 rows × 7 columns

In [37]:

```
df2['MA'] = talib.SMA(df2['close'],args.window_size-1)
df2['EMA'] = talib.EMA(df2['close'], timeperiod = args.window_size-1)
df2['avg'] = talib.ADX(df2['high'],df2['low'], df2['close'], timeperiod=args.window_size-1)
df2['Relative'] = talib.RSI(df2['close'],args.window_size-1)
df2['up_band'], df2['mid_band'], df2['low_band'] =   \
                         talib.BBANDS(df2['close'], timeperiod =args.window_size-1)
df2 = df2.dropna()
```

```
D:\Anaconda\envs\pytorch3.6\lib\site-packages\ipykernel_launcher.py:1: SettingWithCo
pyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  """Entry point for launching an IPython kernel.
D:\Anaconda\envs\pytorch3.6\lib\site-packages\ipykernel_launcher.py:2: SettingWithCo
pyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)

D:\Anaconda\envs\pytorch3.6\lib\site-packages\ipykernel_launcher.py:3: SettingWithCo
pyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  This is separate from the ipykernel package so we can avoid doing imports until
D:\Anaconda\envs\pytorch3.6\lib\site-packages\ipykernel_launcher.py:4: SettingWithCo
pyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  after removing the cwd from sys.path.
D:\Anaconda\envs\pytorch3.6\lib\site-packages\ipykernel_launcher.py:6: SettingWithCo
pyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
```

In [38]:

```
price = df2[[args.predict_col]+args.features]
for i in range(len(price.columns)):
    scaler = MinMaxScaler(feature_range=(-1, 1))
    price.iloc[:,i] = scaler.fit_transform(price.iloc[:,i].values.reshape(-1,1))
```

```
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
thCopyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
thCopyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
thCopyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
thCopyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
thCopyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
thCopyWarning:
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: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
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Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
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D:\Anaconda\envs\pytorch3.6\lib\site-packages\pandas\core\indexing.py:601: SettingWi
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Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/in
dexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/i
ndexing.html#indexing-view-versus-copy)
  self.obj[item_labels[indexer[info_axis]]] = value
```

In [39]:

```
def test_data_process(stock, lookback):
    data_raw = stock
    assert type(data_raw)==np.ndarray,f'{type(data_raw)}'
    data = []

    # create all possible sequences of length seq_len
    for index in range(len(data_raw) - lookback):
        data.append(data_raw[index: index + lookback])

    data = np.array(data);
    print(data.shape)
    x = data[:,:-1,:]
    y = np.expand_dims(data[:,-1,0],-1)
    return [x,y]

x,y = test_data_process(price.values,args.window_size)
x.shape,y.shape
```

```
(71, 50, 8)
```

Out[39]:

```
((71, 49, 8), (71, 1))
```

In [40]:

```
x = torch.from_numpy(x).type(torch.Tensor)
y = torch.from_numpy(y).type(torch.Tensor)

with torch.no_grad():
    y_pred = model(x)
    loss = criterion(y_pred,y)
loss
```

Out[40]:

```
tensor(0.2707)
```

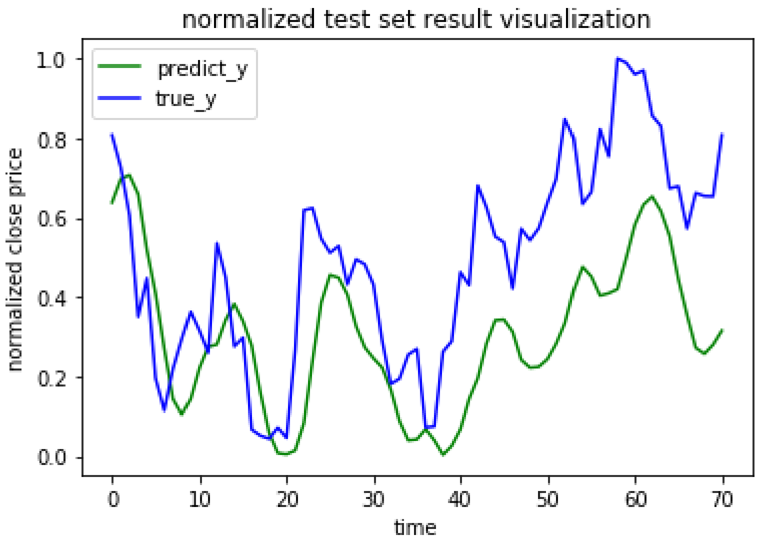
In [41]:

```
t_train = np.arange(0,len(y))
plt.plot(t_train, y_pred.detach(),color=’g’,label=’predict_y’)
plt.plot(t_train, y.detach(),color=’b’,label=’true_y’)

plt.title(’normalized test set result visualization’)
plt.xlabel(’time’)
plt.ylabel(’normalized close price’)
plt.legend()
```

Out[41]:

```
<matplotlib.legend.Legend at 0x21385f70ef0>
```



In [42]:

```
up = np.array(y.detach())[:,0]>np.array(x.detach())[:,-1,0]
up_pred = np.array(y_pred.detach())[:,0]>np.array(x.detach())[:,-1,0]
np.mean(up==up_pred)
```

Out[42]:

```
0.5492957746478874
```