ARIMA_function

February 25, 2018

```
In [1]: import warnings
        warnings.filterwarnings("ignore")
```

```
In [4]: import pandas as pd
        from statsmodels.tsa.seasonal import seasonal_decompose
        import matplotlib.pyplot as plt
        from statsmodels.tsa.stattools import adfuller
        from statsmodels.graphics.tsaplots import plot_acf
        from statsmodels.graphics.tsaplots import plot_pacf
        from statsmodels.tsa.arima_model import ARIMA
        from sklearn.metrics import mean_squared_error as mse
        import numpy as np
```

#
Reading data

```
In [5]: df_xl = pd.read_excel('test.xls', sheetname="Data" ,dtype={ '_5000': float})
        df_xl = df_xl.drop(['_10','_50','_100','_500','_1000'], axis=1)

        df_xl.reset_index(inplace=True)
        df_xl['Date'] = pd.to_datetime(df_xl['DATE'])
        df_xl = df_xl.set_index('DATE')
```

```
In [6]: def ARIMA_X_ARIMA(df_ts,amount_of_years):
            # First ARIMA
            model1 = ARIMA(df_ts._5000[:-12], order=(2,0,2))
            model_fit1 = model1.fit(disp=0)
            output_ARIMA1 = model_fit1.forecast(steps=12)[0]

            train_jan = pd.DataFrame()
            train_feb = pd.DataFrame()
            train_mar = pd.DataFrame()
            train_apr = pd.DataFrame()
            train_may = pd.DataFrame()
            train_jun = pd.DataFrame()
            train_jul = pd.DataFrame()
            train_aug = pd.DataFrame()
            train_sep = pd.DataFrame()
```

```
train_oct = pd.DataFrame()
train_nov = pd.DataFrame()
train_dec = pd.DataFrame()

for i in range(amount_of_years):
    train_jan = train_jan.append(df_xl.ix[0+i*12])
    train_feb = train_feb.append(df_xl.ix[1+i*12])
    train_mar = train_mar.append(df_xl.ix[2+i*12])
    train_apr = train_apr.append(df_xl.ix[3+i*12])
    train_may = train_may.append(df_xl.ix[4+i*12])
    train_jun = train_jun.append(df_xl.ix[5+i*12])
    train_jul = train_jul.append(df_xl.ix[6+i*12])
    train_aug = train_aug.append(df_xl.ix[7+i*12])
    train_sep = train_sep.append(df_xl.ix[8+i*12])
    train_oct = train_oct.append(df_xl.ix[9+i*12])
    train_nov = train_nov.append(df_xl.ix[10+i*12])
    train_dec = train_dec.append(df_xl.ix[11+i*12])

arima2_result = np.array([])
arima2_train_data = [[train_jan],
                 [train_feb],
                 [train_mar],
                 [train_apr],
                 [train_may],
                 [train_jun],
                 [train_jul],
                 [train_aug],
                 [train_sep],
                 [train_oct],
                 [train_nov],
                 [train_dec]
                ]

for i in range(12):
    model2 = ARIMA(arima2_train_data[i][0]._5000, order=(1,0,0))
    model_fit2 = model2.fit(disp=0)
    arima2_month_forecast = model_fit2.forecast(steps=1)[0]
    arima2_result = np.append(arima2_result,arima2_month_forecast)

arima2_result = np.nan_to_num(arima2_result)

z = df_ts._5000[-12:]
arima1 = output_ARIMA1
arima2 = arima2_result

alpha_12 = np.array([])
for i in range(12):
    alpha_12 = np.append(alpha_12,np.array([(z[i]-arima2[i])/(arima1[i]-arima2[i])]
alpha_12 = alpha_12[(alpha_12 <= 1.0) & (alpha_12 >= 0.0)]

alpha = np.mean(alpha_12)
beta = 1. - alpha
final_forecast = np.array([])

for i in range(12):
    final_forecast = np.append(final_forecast, alpha*arima1[i]+beta*arima2[i])

mse_result = mse(final_forecast,df_ts._5000[-12:])

plt.plot(df_xl.index[-12:],df_xl._5000[-12:], color='b', label='Real')
plt.plot(df_xl.index[-12:],final_forecast, color='r', label='Forecasted')
plt.grid(color='#999999', linestyle='dashed', linewidth=1, alpha=0.8)
plt.legend(bbox_to_anchor=(0., 1.02, 1., .102), loc=3, ncol=2, mode="expand", borde
plt.xlabel('')
plt.xticks(rotation=45, ha='right')
plt.ylabel('')
plt.show()

return (final_forecast,mse_result)
```

```
In [7]: a,b = ARIMA_X_ARIMA(df_xl,3)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\statsmodels\base\model.py:496: ConvergenceWarning:
  "Check mle_retvals", ConvergenceWarning)
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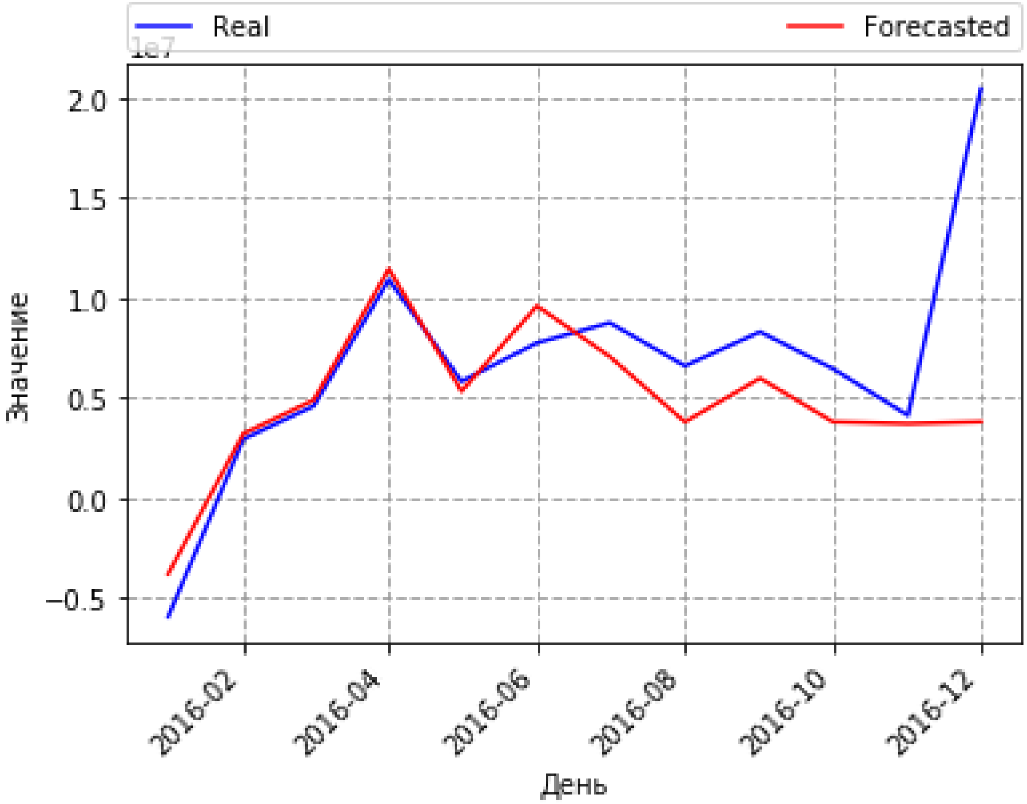
  "Check mle_retvals", ConvergenceWarning)
```



```
In [8]: print(a,b)
```

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[ -3813812.30566544   3202850.02453935   4888774.46111664
  11450307.00128902   5325279.79639007   9602601.84874697
   7064592.26601777   3789874.46500832   5978902.79112634
   3795509.39169105   3703933.13181896   3796810.25998719] 2.57948724397e+13
```