Import libraries

In [3]:

```
import numpy as np
import pandas as pd
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_log_error
from statsmodels.tsa.deterministic import DeterministicProcess
from prophet import Prophet
from tqdm import tqdm
```

Prepare Dataset

In [4]:

```
path = '../input/store-sales-time-series-forecasting/'

df_train = pd.read_csv(path + 'train.csv',
                       usecols=['store_nbr', 'family', 'date', 'sales'],
                       dtype={'store_nbr': 'category', 'family': 'category', 'sales': 'float32'},
                       parse_dates=['date'], infer_datetime_format=True)

df_train = df_train.set_index(['store_nbr', 'family','date']).sort_index()

sdate = '2017-04-01'
edate = '2017-08-15'
df_train = df_train.unstack(['store_nbr', 'family']).loc[sdate:edate].stack(['store_nbr', 'family']).reset_index().set_index(['st
df_train.head()
```

Out[4]:

		date	sales
store_nbr	**family**		
	AUTOMOTIVE	2017-04-01	9.0
	BABY CARE	2017-04-01	0.0
1	**BEAUTY**	2017-04-01	1.0
	BEVERAGES	2017-04-01	3229.0
	BOOKS	2017-04-01	0.0

In [5]:

```
df_test = pd.read_csv(path + 'test.csv',
                      usecols=['id', 'store_nbr', 'family', 'date'],
                      dtype={'store_nbr': 'category', 'family': 'category'},
                      parse_dates=['date'], infer_datetime_format=True)

df_test = df_test.set_index(['store_nbr', 'family']).sort_index()

df_test.head(15)
```

Out[5]:

		id	date
store_nbr	**family**		
	AUTOMOTIVE	3000888	2017-08-16
	AUTOMOTIVE	3002670	2017-08-17
	AUTOMOTIVE	3004452	2017-08-18
	AUTOMOTIVE	3006234	2017-08-19
	AUTOMOTIVE	3008016	2017-08-20
	AUTOMOTIVE	3009798	2017-08-21
	AUTOMOTIVE	3011580	2017-08-22
1	**AUTOMOTIVE**	3013362	2017-08-23
	AUTOMOTIVE	3015144	2017-08-24
	AUTOMOTIVE	3016926	2017-08-25
	AUTOMOTIVE	3018708	2017-08-26
	AUTOMOTIVE	3020490	2017-08-27
	AUTOMOTIVE	3022272	2017-08-28
	AUTOMOTIVE	3024054	2017-08-29
	AUTOMOTIVE	3025836	2017-08-30

In [6]:

```
def get_train_dataframe(index):
    data = df_train.loc[index].reset_index().drop(columns=['store_nbr', 'family'])
    data = data.rename(columns = {"date" : "ds", "sales": "y"})
    return data

def get_index():
    for index in df_test.index.unique():
        yield index

def get_forecast(data):
    model = Prophet()
    model.fit(data)
    future = model.make_future_dataframe(periods=16)
    forecast = model.predict(future)
    return model, forecast

def get_predictions(forecast, index):
    data = df_test.loc[index].reset_index().drop(columns=['store_nbr', 'family'])
    merged = data.merge(forecast[['ds', 'yhat']].tail(16), left_on=['date'], right_on=['ds'])
    return merged.drop(columns=['date', 'ds'])
```

In [7]:

```
import warnings; warnings.simplefilter('ignore')
```

In [9]:

```
indices = tqdm(iter(get_index()), total=len(df_test.index.unique()), file=None)

concatenated = pd.DataFrame()

for index in indices:
    data = get_train_dataframe(index)
    model, forecast = get_forecast(data)
#     model.plot(forecast)
    pred = get_predictions(forecast, index)
    concatenated = pd.concat([concatenated, pred], axis=0)
```

```
  0%|          | 0/1782 [00:00<?, ?it/s]20:18:22 - cmdstanpy - INFO - Chain [1] start processing
20:18:22 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 2/1782 [00:01<18:54,  1.57it/s]20:18:23 - cmdstanpy - INFO - Chain [1] start processing
20:18:23 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 3/1782 [00:02<20:37,  1.44it/s]20:18:24 - cmdstanpy - INFO - Chain [1] start processing
20:18:24 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 4/1782 [00:02<19:13,  1.54it/s]20:18:25 - cmdstanpy - INFO - Chain [1] start processing
20:18:25 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 5/1782 [00:03<20:30,  1.44it/s]20:18:25 - cmdstanpy - INFO - Chain [1] start processing
20:18:25 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 6/1782 [00:04<19:44,  1.50it/s]20:18:26 - cmdstanpy - INFO - Chain [1] start processing
20:18:26 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 7/1782 [00:04<20:49,  1.42it/s]20:18:27 - cmdstanpy - INFO - Chain [1] start processing
20:18:27 - cmdstanpy - INFO - Chain [1] done processing
  0%|          | 8/1782 [00:05<19:32,  1.51it/s]20:18:27 - cmdstanpy - INFO - Chain [1] start processing
20:18:27 - cmdstanpy - INFO - Chain [1] done processing
  1%|          | 9/1782 [00:06<19:02,  1.55it/s]20:18:28 - cmdstanpy - INFO - Chain [1] start processing
20:18:28 - cmdstanpy - INFO - Chain [1] done processing
  1%|          | 10/1782 [00:06<20:17,  1.45it/s]20:18:29 - cmdstanpy - INFO - Chain [1] start processing
```

In [10]:

```
concatenated
```

Out[10]:

	id	yhat
0	3000888	4.124438
1	3002670	4.809972
2	3004452	6.391270
3	3006234	5.481249
4	3008016	2.327886
...	...	...
11	3022271	22.016718
12	3024053	14.694082
13	3025835	13.970793
14	3027617	12.645896
15	3029399	12.755803

28512 rows × 2 columns

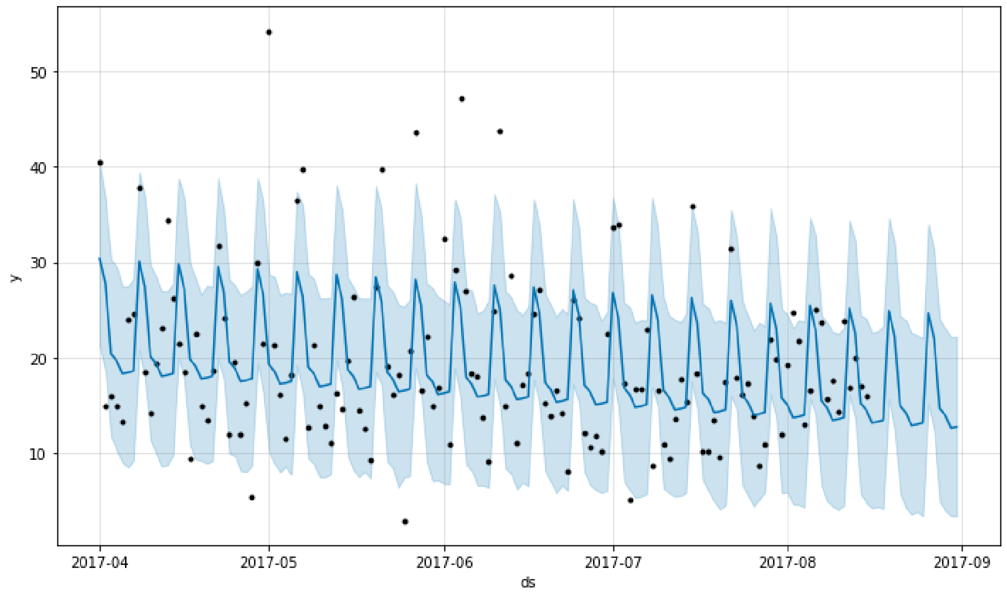
In [11]:

```
concatenated['yhat'] = concatenated['yhat'].apply(lambda x: 0 if x < 0 else x)
concatenated.rename(columns={'yhat': 'sales'}).to_csv('/kaggle/working/prophet.csv', index=False)
```

In [12]:

```
model.plot(forecast)
```

Out[12]:


y
ds