In [100]:

```
import pandas as pd

train = pd.read_csv("train.tsv")
test = pd.read_csv("test.tsv")
sample_submission = pd.read_csv("sample_submission.tsv")
train = train.drop("Num", axis=1)
frac = 0.2 # fraction of learning examples used for model fitting

# sample the train set if your don't want to deel with all examples
train = train.sample(frac=frac, random_state=42)
train = train.reset_index().drop('index', axis=1)
test = test.drop("Num", axis=1)
```

In [101]:

```
import xgboost
```

In [13]:

```
train.head()
```

Out[13]:

	y	year	week	shift	item_id	f1	f2	f3	f4	f5	...	f5
0	160500	2014	13	1	20452327	129441.0	104610.0	121114.0	133780.0	122580.0	...	95
1	13107	2014	23	1	20441989	4162.0	6760.0	7210.0	11330.0	6950.0	...	99
2	53402	2013	21	3	20438706	24931.0	30338.0	30690.0	37930.0	21420.0	...	34
3	9676	2013	15	2	20438591	11505.0	13550.0	15360.0	14750.0	12961.0	...	10
4	1336	2014	3	2	20449525	0.0	0.0	0.0	0.0	0.0	...	20

5 rows × 65 columns

In [102]:

```
from matplotlib.colors import ListedColormap
from sklearn import model_selection, datasets, linear_model, metrics
from sklearn.ensemble import GradientBoostingRegressor
from sklearn.model_selection import RandomizedSearchCV, GridSearchCV

import numpy as np
import math
import xgboost as xgb
import scipy.stats as sps

from xgboost.sklearn import XGBRegressor
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import scipy.optimize as opt
```

In [514]:

```
def clean_data(data):
    for i in data.index.values:
#         print(data.loc[i])
        if pd.isnull(data.loc[i].values.any()):
            data = data.drop(i, axis=0)
    return data
```

In [259]:

```
train = clean_data(train)
```

In [77]:

```
def process_data(data):
    good_train = pd.DataFrame()
    created = False
    indices = []
    for i in data.index.values:
        t = data.loc[i]
        w = int(t['week'])
        y = int(t['year'])
        ans = int(t['y'])
        iid = int(t['item_id'])
        filtered = data.query('item_id == {}'.format(iid)).query('year == {}
'.format(y))
        filtered= filtered[filtered.apply(lambda x: x['week'] - x['shift'] =
= w, axis=1)]
        if filtered.shape[0] > 0:
            if (filtered.shape[0] > 1):
                filtered = filtered[0:1]
            indices.append(i)
            new_row = filtered
#             new_row = new_row.reset_index([i]).drop('index', axis=1)
#             print(new_row)
            new_row = new_row.drop('shift', axis=1)
            new_row['week'] = w
            new_row['y'] = ans
#             new_row = new_row.drop(new_row.columns[0], axis=1)
            if created:
                good_train = pd.concat((good_train, new_row))
            else:
                good_train = new_row
                created = True
#     good_train = good_train.reset_index().drop('index', axis=1)
    return good_train, np.array(indices)
```

In [15]:

```
regressor4 = GradientBoostingRegressor(n_estimators=100, max_depth=5, rando
m_state=43)
regressor3 = GradientBoostingRegressor(n_estimators=100, max_depth=5, rando
m_state=43)
```

In [103]:

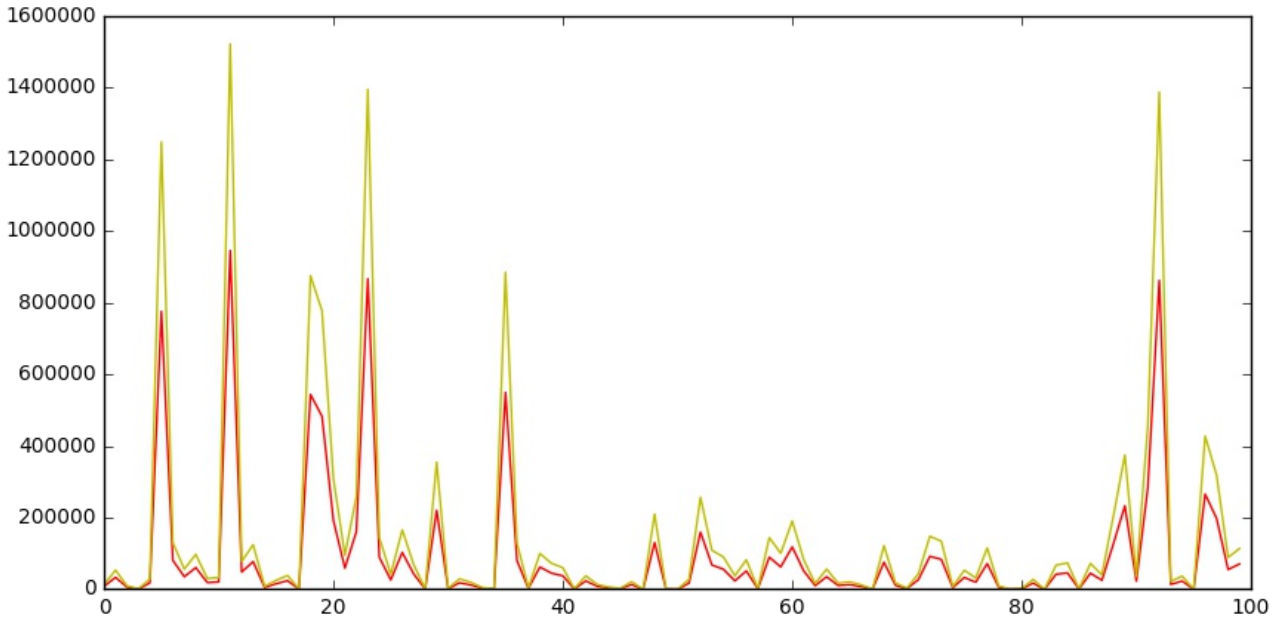
```
train_good, indices = process_data(train)
```

In [104]:

```
f = plt.figure(figsize=(10, 5))
plt.plot(range(100), train_good['f30'][0:100], c='r')
plt.plot(range(100), train_good['y'][0:100], c ='y')
```

Out[104]:

```
[<matplotlib.lines.Line2D at 0x7fe0674eea20>]
```



да у нас просто есть ответы в данных! запустим линейную модель на 30-ом признаке. что-то пошло не так, SMAPE 39.

In [11]:

```
train.query('year==2014').query('item_id==20427450')
```

Out[11]:

	y	year	week	shift	item_id	f1	f2	f3	f4	f5	...	f51
126	82246	2014	10	1	20427450	58042.0	60820.0	63293.0	67251.0	52722.0	...	8433
259	98960	2014	24	2	20427450	30795.0	52521.0	53403.0	75986.0	39886.0	...	5731
605	123348	2014	18	2	20427450	64234.0	54075.0	50841.0	55680.0	53272.0	...	4572
673	85507	2014	12	2	20427450	60820.0	63293.0	67251.0	52722.0	52625.0	...	5845

4 rows × 65 columns

In [105]:

```
train_y = train_good['y']
train_x = train_good.drop('y', axis=1)
```

In [106]:

```
train_x_bad = train.drop('y', axis=1)
train_y_bad = train['y']
```

In [107]:

```
train_y_bad.shape
```

Out[107]:

```
(14491,)
```

In [108]:

```
train_y_bad.shape
```

Out[108]:

```
(14491,)
```

In [109]:

```
train_x.shape
```

Out[109]:

```
(6575, 63)
```

In [110]:

```
train_y_log = np.array([math.log(y_i) for y_i in train_y])
```

In [111]:

```
train_y_bad_log = np.array([math.log(y_i) for y_i in train_y_bad])
```

In [112]:

```
train_x_feauture = pd.DataFrame(train_x['f30'])
```

In [87]:

```
linreg = linear_model.LinearRegression()
linreg.fit(train_x_feauture, train_y_log)
```

Out[87]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=1,
normalize=False)
```

In [113]:

```
regressor7 = XGBRegressor(max_depth=5, n_estimators=100)
regressor7 .fit(train_x_feauture, train_y_log)
```

Out[113]:

```
XGBRegressor(base_score=0.5, colsample_bylevel=1, colsample_bytree=1, gamma
=0,
       learning_rate=0.1, max_delta_step=0, max_depth=5,
       min_child_weight=1, missing=None, n_estimators=100, nthread=-1,
       objective='reg:linear', reg_alpha=0, reg_lambda=1,
       scale_pos_weight=1, seed=0, silent=True, subsample=1)
```

In [32]:

```
cv_params = {'max_depth': [3,5,7],'n_estimators': [70, 80, 100]}
ind_params = {'learning_rate': 0.1, 'seed':0, 'subsample': 0.8,
```

```
'colsample_bytree': 0.8,
             'objective': 'reg:linear'}
```

In [33]:

```
xgbreg = XGBRegressor(**ind_params)
```

In [121]:

```
regressor5 = XGBRegressor(max_depth=5, n_estimators=100)
regressor5 .fit(train_x, train_y_log)
```

Out[121]:

```
XGBRegressor(base_score=0.5, colsample_bylevel=1, colsample_bytree=1, gamma
=0,
       learning_rate=0.1, max_delta_step=0, max_depth=5,
       min_child_weight=1, missing=None, n_estimators=100, nthread=-1,
       objective='reg:linear', reg_alpha=0, reg_lambda=1,
       scale_pos_weight=1, seed=0, silent=True, subsample=1)
```

In [122]:

```
regressor6 = XGBRegressor(max_depth=5, n_estimators=100)
regressor6 .fit(train_x_bad, train_y_bad_log)
```

Out[122]:

```
XGBRegressor(base_score=0.5, colsample_bylevel=1, colsample_bytree=1, gamma
=0,
       learning_rate=0.1, max_delta_step=0, max_depth=5,
       min_child_weight=1, missing=None, n_estimators=100, nthread=-1,
       objective='reg:linear', reg_alpha=0, reg_lambda=1,
       scale_pos_weight=1, seed=0, silent=True, subsample=1)
```

In [201]:

```
gs1 = GridSearchCV(xgbreg, cv_params, scoring=metrics.make_scorer(metrics.m
ean_absolute_error))
gs1.fit(train_x, train_y_log)
```

Out[201]:

```
GridSearchCV(cv=None, error_score='raise',
       estimator=XGBRegressor(base_score=0.5, colsample_bylevel=1,
colsample_bytree=0.8,
       gamma=0, learning_rate=0.1, max_delta_step=0, max_depth=3,
       min_child_weight=1, missing=None, n_estimators=100, nthread=-1,
       objective='reg:linear', reg_alpha=0, reg_lambda=1,
       scale_pos_weight=1, seed=0, silent=True, subsample=0.8),
       fit_params={}, iid=True, n_jobs=1,
       param_grid={'n_estimators': [70, 80, 100], 'min_child_weight': [1, 3
, 5], 'max_depth': [3, 5, 7]},
       pre_dispatch='2*n_jobs', refit=True, return_train_score=True,
       scoring=make_scorer(mean_absolute_error), verbose=0)
```

In [202]:

```
gs2 = GridSearchCV(xgbreg, cv_params, n_jobs=1)
gs2.fit(train_x_bad, train_y_bad_log)
```

Out[202]:

```
GridSearchCV(cv=None, error_score='raise'
```

```
GridSearchCV(cv=None, error_score='raise',
       estimator=XGBRegressor(base_score=0.5, colsample_bylevel=1,
colsample_bytree=0.8,
       gamma=0, learning_rate=0.1, max_delta_step=0, max_depth=3,
       min_child_weight=1, missing=None, n_estimators=100, nthread=-1,
       objective='reg:linear', reg_alpha=0, reg_lambda=1,
       scale_pos_weight=1, seed=0, silent=True, subsample=0.8),
       fit_params={}, iid=True, n_jobs=1,
       param_grid={'n_estimators': [70, 80, 100], 'min_child_weight': [1, 3
, 5], 'max_depth': [3, 5, 7]},
       pre_dispatch='2*n_jobs', refit=True, return_train_score=True,
       scoring=None, verbose=0)
```

In [208]:

```
regressor4 = GradientBoostingRegressor()
gs4 = GridSearchCV(regressor4, cv_params, scoring=metrics.make_scorer(metri
cs.mean_absolute_error))
gs4.fit(train_x, train_y_log)
# regressor4.fit(train_x_bad, train_y_bad_log)
```

Out[208]:

```
GridSearchCV(cv=None, error_score='raise',
       estimator=GradientBoostingRegressor(alpha=0.9,
criterion='friedman_mse', init=None,
             learning_rate=0.1, loss='ls', max_depth=3, max_features=None,
             max_leaf_nodes=None, min_impurity_split=1e-07,
             min_samples_leaf=1, min_samples_split=2,
             min_weight_fraction_leaf=0.0, n_estimators=100,
             presort='auto', random_state=None, subsample=1.0, verbose=0,
             warm_start=False),
       fit_params={}, iid=True, n_jobs=1,
       param_grid={'n_estimators': [70, 80, 100], 'max_depth': [3, 5, 7]},
       pre_dispatch='2*n_jobs', refit=True, return_train_score=True,
       scoring=make_scorer(mean_absolute_error), verbose=0)
```

In [221]:

```
regressor4 = GradientBoostingRegressor(max_depth=5, n_estimators=100)
regressor4 .fit(train_x, train_y_log)
```

Out[221]:

```
GradientBoostingRegressor(alpha=0.9, criterion='friedman_mse', init=None,
             learning_rate=0.1, loss='ls', max_depth=5, max_features=None,
             max_leaf_nodes=None, min_impurity_split=1e-07,
             min_samples_leaf=1, min_samples_split=2,
             min_weight_fraction_leaf=0.0, n_estimators=100,
             presort='auto', random_state=None, subsample=1.0, verbose=0,
             warm_start=False)
```

In [224]:

```
regressor3 = GradientBoostingRegressor(max_depth=5, n_estimators=100)
regressor3 .fit(train_x_bad, train_y_bad_log)
```

Out[224]:

```
GradientBoostingRegressor(alpha=0.9, criterion='friedman_mse', init=None,
             learning_rate=0.1, loss='ls', max_depth=5, max_features=None,
             max_leaf_nodes=None, min_impurity_split=1e-07,
             min_samples_leaf=1, min_samples_split=2,
```

```
            min_weight_fraction_leaf=0.0, n_estimators=100,
            presort='auto', random_state=None, subsample=1.0, verbose=0,
            warm_start=False)
```

In [209]:

```
regressor3 = GradientBoostingRegressor()
gs3 = GridSearchCV(regressor4, cv_params, scoring=metrics.make_scorer(metri
cs.mean_absolute_error))
gs3.fit(train_x_bad, train_y_bad_log)
# regressor3 = GradientBoostingRegressor(n_estimators=100, max_depth=5, ran
dom_state=43)
# regressor3.fit(train_x, train_y_log)
```

Out[209]:

```
GridSearchCV(cv=None, error_score='raise',
       estimator=GradientBoostingRegressor(alpha=0.9,
criterion='friedman_mse', init=None,
             learning_rate=0.1, loss='ls', max_depth=3, max_features=None,
             max_leaf_nodes=None, min_impurity_split=1e-07,
             min_samples_leaf=1, min_samples_split=2,
             min_weight_fraction_leaf=0.0, n_estimators=100,
             presort='auto', random_state=None, subsample=1.0, verbose=0,
             warm_start=False),
       fit_params={}, iid=True, n_jobs=1,
       param_grid={'n_estimators': [70, 80, 100], 'max_depth': [3, 5, 7]},
       pre_dispatch='2*n_jobs', refit=True, return_train_score=True,
       scoring=make_scorer(mean_absolute_error), verbose=0)
```

In [43]:

```
def combine_solutions(cool_reg, simple_reg, test, processed_test,
processed_indices):
    y = simple_reg.predict(test)
    cool_y = cool_reg.predict(processed_test)
    for i, ind in enumerate(processed_indices):
        y[ind] = cool_y[i]
    return y
```

In [48]:

```
def combine_solutions_feature(cool_reg, simple_reg, test, processed_test, p
rocessed_indices):
    y = simple_reg.predict(test)
    processed_test_feature = pd.DataFrame(processed_test['f30'])
    cool_y = cool_reg.predict( processed_test_feature)
    for i, ind in enumerate(processed_indices):
        y[ind] = cool_y[i]
    return y
```

In [44]:

```
def process_test(data):
    good_train = pd.DataFrame()
    created = False
    indices = []
    for i in data.index.values:
        t = data.loc[i]
        w = int(t['week'])
        y = int(t['year'])
```

```
        iid = int(t['item_id'])
        filtered = data.query('item_id == {}'.format(iid)).query('year == {}
'.format(y))
        filtered= filtered[filtered.apply(lambda x: x['week'] - x['shift'] =
= w, axis=1)]
        if filtered.shape[0] > 0:
            if (filtered.shape[0] > 1):
                filtered = filtered[0:1]
            indices.append(i)
            new_row = filtered
#             new_row = new_row.reset_index([i]).drop('index', axis=1)
#             print(new_row)
            new_row = new_row.drop('shift', axis=1)
            new_row['week'] = w
#             new_row = new_row.drop(new_row.columns[0], axis=1)
            if created:
                good_train = pd.concat((good_train, new_row))
            else:
                good_train = new_row
                created = True
#     good_train = good_train.reset_index().drop('index', axis=1)
    return good_train, np.array(indices)
```

In [64]:

```
test = train[0:2000].drop('y', axis=1).reset_index().drop('index', axis=1)
```

In [65]:

```
test_x, indices_test = process_test(test)
```

In [225]:

```
y_final = combine_solutions(regressor4, regressor3, test, test_x,
indices_test)
y_final = np.array([math.exp(y_i) for y_i in y_final])
```

In [218]:

```
y2_final = combine_solutions(gs1, gs3, test, test_x, indices_test)
y2_final = np.array([math.exp(y_i) for y_i in y2_final])
```

In [123]:

```
y3_final = combine_solutions(regressor5, regressor6, test, test_x,
indices_test)
y3_final = np.array([math.exp(y_i) for y_i in y3_final])
```

In [89]:

```
y4_final = combine_solutions_feature(linreg, regressor6, test, test_x, indi
ces_test)
y4_final = np.array([math.exp(y_i) for y_i in y4_final])
```

In [118]:

```
y5_final = combine_solutions_feature(regressor7, regressor6, test, test_x,
indices_test)
```

```
y3_final = np.array([math.exp(y_i) for y_i in y3_final])
```

In [124]:

```
sample_submission['y'] = y3_final
```

In [125]:

```
sample_submission.to_csv("my_submission_log_xgb.tsv", sep=',', index=False)
```

In [82]:

```
train_x_check, train_indices_check = process_test(train_x_bad[0:1000])
```

In [66]:

```
y_real = train[0:2000]['y']
```

In [93]:

```
pred = combine_solutions(gs1, gs2, train_x_bad[0:1000], train_x_check, trai
n_indices_check)
```

In [94]:

```
pred2 = combine_solutions(regressor3, regressor4, train_x_bad[0:1000], trai
n_x_check, train_indices_check)
```

In [226]:

```
metrics.mean_absolute_error(y_final, y_real)
```

Out[226]:

```
21124.200013660262
```

In [219]:

```
metrics.mean_absolute_error(y2_final, y_real)
```

Out[219]:

```
28695.494061718658
```

In [73]:

```
metrics.mean_absolute_error(y4_final, y_real)
```

Out[73]:

```
31471.102919226669
```

In [ ]:

```

```