Sklearn

sklearn.liner_model

linear_model:

- RidgeClassifier
- SGDClassifier
- SGDRegressor
- LinearRegression
- LogisticRegression
- Lasso
- etc

документация: http://scikit-learn.org/stable/modules/classes.html#module-sklearn.linear_model (http://scikit-learn.org/stable/modules/classes.html#module-sklearn.linear_model)

примеры: http://scikit-learn.org/stable/modules/linear_model.html#linear-model (http://scikit-learn.org/stable/modules/linear_model.html#linear-model)

In [44]:
```
from matplotlib.colors import ListedColormap
from sklearn import cross_validation, datasets, linear_model, metrics,grid_s

import numpy as np
print(numpy.__version__)
```

```
1.11.1
```

In [45]:
```
%pylab inline
```

```
Populating the interactive namespace from numpy and matplotlib

/Users/tatianaovchinnikova/anaconda/lib/python3.5/site-packages/IPython/c
ore/magics/pylab.py:161: UserWarning: pylab import has clobbered these va
riables: ['colors']
`%matplotlib` prevents importing * from pylab and numpy
  "\n`%matplotlib` prevents importing * from pylab and numpy"
```

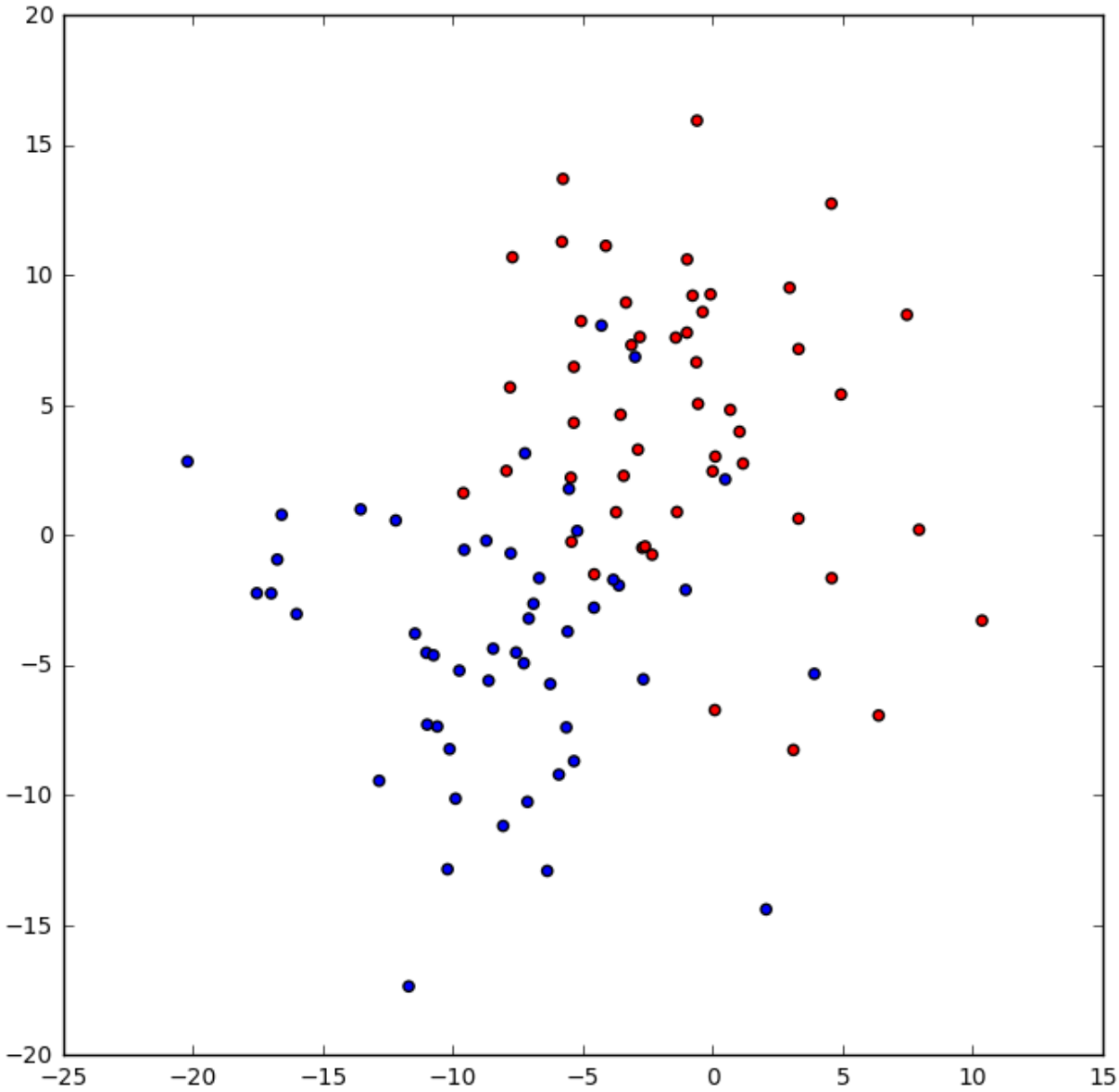
Генерация данных

In [46]:
```
blobs = datasets.make_blobs(centers = 2, cluster_std = 5.5, random_state=1)
```

In [47]:
```
colors = ListedColormap(['red', 'blue'])

pylab.figure(figsize(8, 8))
pylab.scatter([x[0] for x in blobs[0]], [x[1] for x in blobs[0]], c=blobs[1]
```

Out[47]: <matplotlib.collections.PathCollection at 0x10f5e6518>



In [48]:
```
train_data, test_data, train_labels, test_labels = cross_validation.train_te
```

Линейная классификация

RidgeClassifier

In [49]:
```
#создание объекта - классификатора
ridge_classifier = linear_model.RidgeClassifier(random_state = 1)
```

In [50]:
```
#обучение классификатора
ridge_classifier.fit(train_data, train_labels)
```

Out[50]:
```
RidgeClassifier(alpha=1.0, class_weight=None, copy_X=True, fit_intercept=
True,
        max_iter=None, normalize=False, random_state=1, solver='auto',
        tol=0.001)
```

In [51]:
```
#применение обученного классификатора
ridge_predictions = ridge_classifier.predict(test_data)
```

In [52]:
```
print (test_labels)
```

```
[0 0 0 1 0 0 0 0 0 1 0 1 0 1 1 1 0 0 0 1 0 0 0 1 1 1 1 0 0 1]
```

In [53]:
```
print (ridge_predictions)
```

```
[0 0 0 1 0 1 0 0 0 1 0 1 0 1 1 1 1 0 1 1 1 0 0 1 1 1 1 0 0 1]
```

In [54]:
```
#оценка качества классификации
metrics.accuracy_score(test_labels, ridge_predictions)
```

Out[54]:
```
0.8666666666666667
```

In [55]:
```
ridge_classifier.coef_
```

Out[55]:
```
array([[-0.0854443 , -0.07273219]])
```

In [56]:
```
ridge_classifier.intercept_
```

Out[56]:
```
array([-0.31250723])
```

LogisticRegression

In [57]:
```
log_regressor = linear_model.LogisticRegression(random_state = 1)
```

In [58]:
```
log_regressor.fit(train_data, train_labels)
```

Out[58]:
```
LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=Tr
ue,
          intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
          penalty='l2', random_state=1, solver='liblinear', tol=0.0001,
          verbose=0, warm_start=False)
```

In [59]:
```
lr_predictions = log_regressor.predict(test_data)
```

In [60]:
```
lr_proba_predictions = log_regressor.predict_proba(test_data)
```

In [62]:
```
print (test_labels)
```

```
[0 0 0 1 0 0 0 0 0 1 0 1 0 1 1 1 0 0 0 1 0 0 0 1 1 1 1 0 0 1]
```

In [63]:
```
print (lr_predictions)
```

```
[0 1 1 1 0 1 0 0 0 1 0 1 0 1 1 1 1 0 1 1 1 0 0 1 1 1 1 0 0 1]
```

In [64]:
```
print (lr_proba_predictions)
```

```
[[ 0.99873457  0.00126543]
 [ 0.38956803  0.61043197]
 [ 0.45000737  0.54999263]
 [ 0.00536816  0.99463184]
 [ 0.70965944  0.29034056]
 [ 0.23304944  0.76695056]
 [ 0.98983143  0.01016857]
 [ 0.9709671   0.0290329 ]
 [ 0.93909394  0.06090606]
 [ 0.15103335  0.84896665]
 [ 0.90324667  0.09675333]
 [ 0.0100448   0.9899552 ]
 [ 0.82338574  0.17661426]
 [ 0.05238427  0.94761573]
 [ 0.00443451  0.99556549]
 [ 0.00102911  0.99897089]
 [ 0.20817393  0.79182607]
 [ 0.91074564  0.08925436]
 [ 0.22580526  0.77419474]
 [ 0.00101709  0.99898291]
 [ 0.09600944  0.90399056]
 [ 0.99367624  0.00632376]
 [ 0.9779897   0.0220103 ]
 [ 0.29889823  0.70110177]
 [ 0.00210487  0.99789513]
 [ 0.00929423  0.99070577]
 [ 0.2670277   0.7329723 ]
 [ 0.85210662  0.14789338]
 [ 0.98871444  0.01128556]
 [ 0.00407572  0.99592428]]
```

In [65]:
```
print (metrics.accuracy_score(test_labels, lr_predictions))
```

```
0.8
```

In [66]:
```
print (metrics.accuracy_score(test_labels, ridge_predictions))
```

```
0.866666666667
```

Оценка качества по cross-validation

cross_val_score

In [67]:
```
ridge_scoring = cross_validation.cross_val_score(ridge_classifier, blobs[0],
```

In [68]:
```
lr_scoring = cross_validation.cross_val_score(log_regressor, blobs[0], blobs
```

In [69]:
```
lr_scoring
```

Out[69]:
```
array([ 0.7,  0.9,  0.9,  0.9,  1. ,  1. ,  0.7,  0.9,  0.9,  0.8])
```

In [71]:
```
print ('Ridge mean:{}, max:{}, min:{}, std:{}'.format(ridge_scoring.mean(),
                                                      ridge_scoring.min(), ri
```

```
Ridge mean:0.8800000000000001, max:1.0, min:0.7, std:0.08717797887081348
```

In [72]:
```
print ('Log mean:{}, max:{}, min:{}, std:{}'.format(lr_scoring.mean(), lr_sc
                                                    lr_scoring.min(), lr_scor
```

```
Log mean:0.8700000000000001, max:1.0, min:0.7, std:0.10049875621120892
```

cross_val_score с заданными scorer и cv_strategy

In [73]:
```
scorer = metrics.make_scorer(metrics.accuracy_score)
```

In [74]:
```
cv_strategy = cross_validation.StratifiedShuffleSplit(blobs[1], n_iter = 20
```

In [75]:
```
ridge_scoring = cross_validation.cross_val_score(ridge_classifier, blobs[0],
```

In [76]:
```
lr_scoring = cross_validation.cross_val_score(log_regressor, blobs[0], blobs
```

In [77]:
```
print ('Ridge mean:{}, max:{}, min:{}, std:{}'.format(ridge_scoring.mean(),
                                                      ridge_scoring.min(), ri
```

```
Ridge mean:0.8700000000000001, max:1.0, min:0.7666666666666667, std:0.059
535236998305825
```

In [78]:
```
print ('Log mean:{}, max:{}, min:{}, std:{}'.format(lr_scoring.mean(), lr_sc
                                                    lr_scoring.min(), lr_scor
```

```
Log mean:0.8766666666666667, max:1.0, min:0.7666666666666667, std:0.06155
395104206462
```

In [ ]:
```

```

In [ ]:
```

```