Spark ALS on EMR

In this document I'm recording critical steps on achieving movie recommendation on spark on AWS EC2 instances. Totally there are 3 primary steps as following:

1.Set up AWS EMR

2. Go to Zeppelin on port 8890

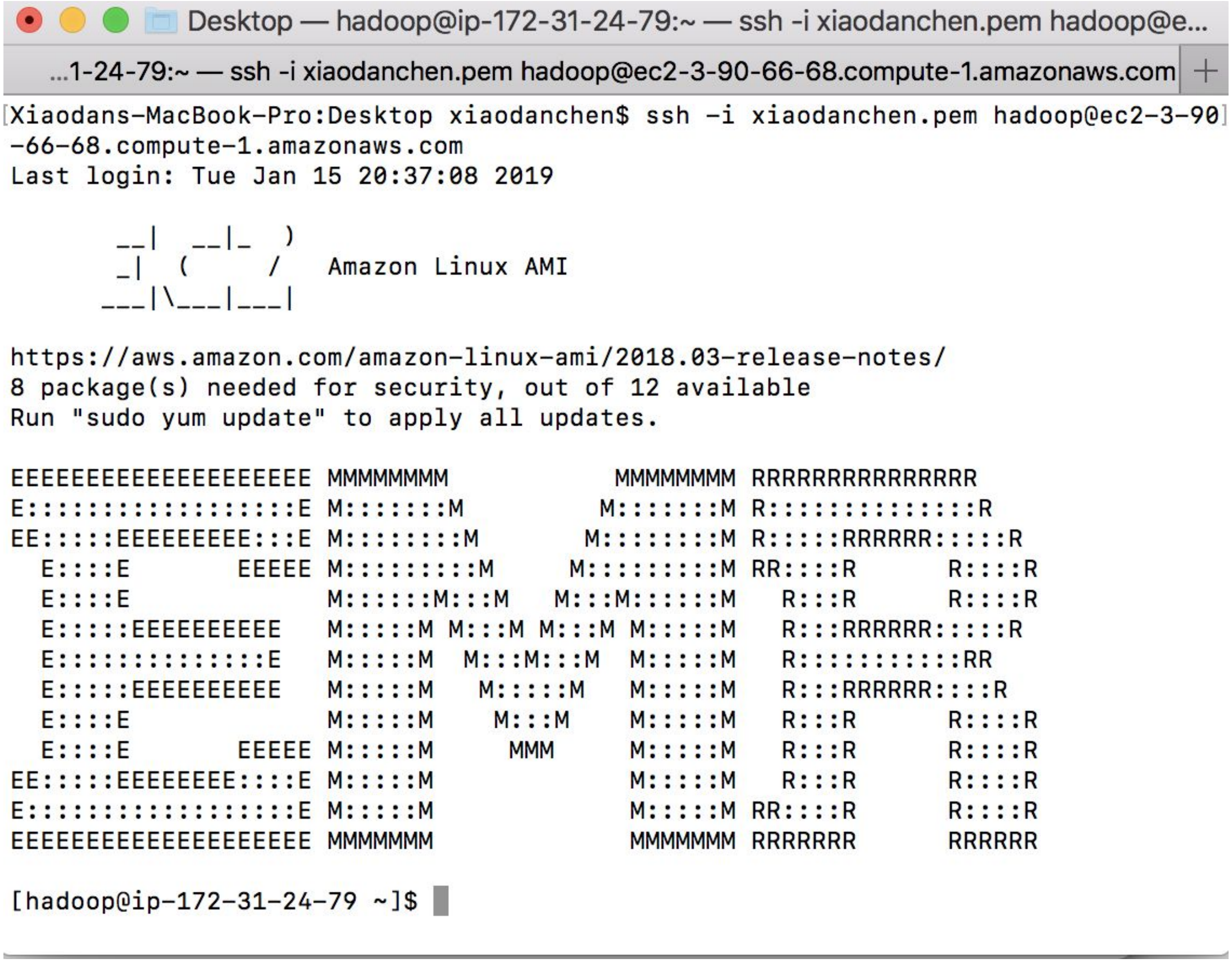
3. Achieving movie recommendation with Spark Mllib ALS algorithm

Here we go.

****

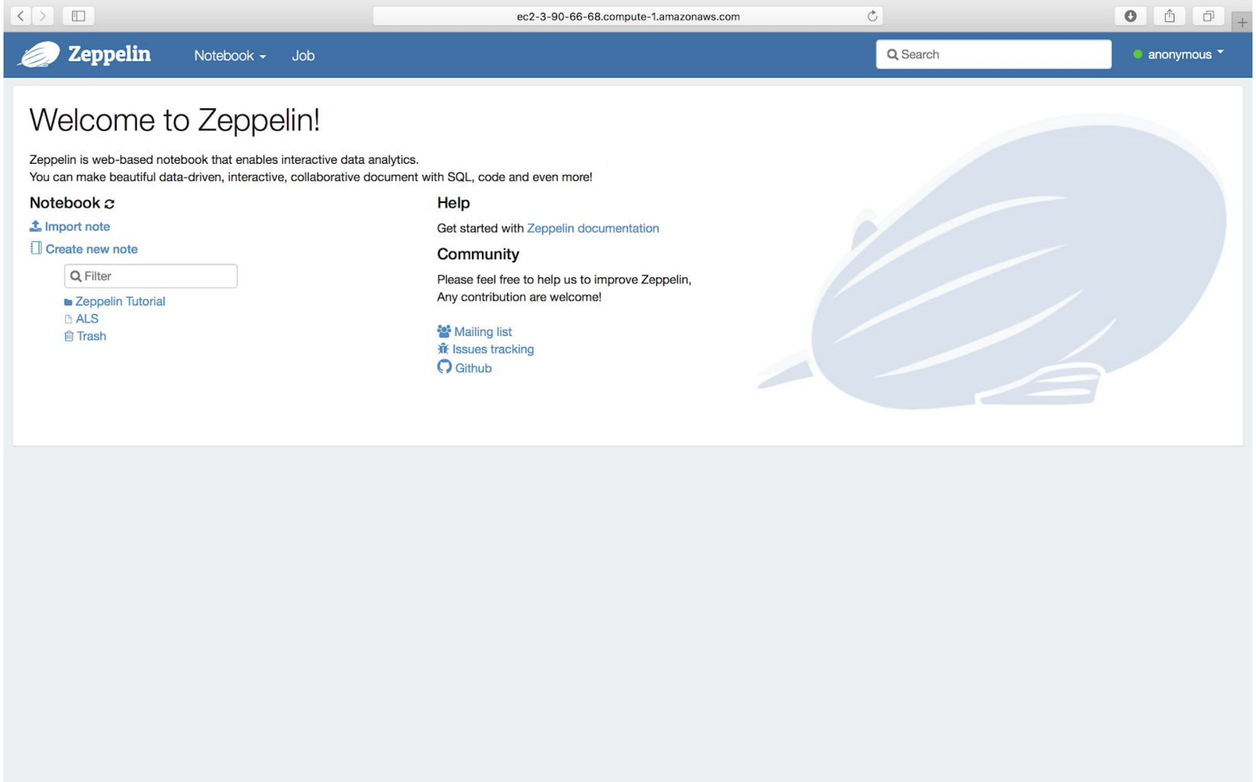
1.Set up AWS EMR

1.1 set AWS EMR and connect it in terminal


Desktop — hadoop@ip-172-31-24-79:~ — ssh -i xiaodanchen.pem hadoop@e...
...1-24-79:~ — ssh -i xiaodanchen.pem hadoop@ec2-3-90-66-68.compute-1.amazonaws.com
+

```
[Xiaodans-MacBook-Pro:Desktop xiaodanchen$ ssh -i xiaodanchen.pem hadoop@ec2-3-90]
-66-68.compute-1.amazonaws.com
Last login: Tue Jan 15 20:37:08 2019

       __|  __|_  )
       _|  (     /   Amazon Linux AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-ami/2018.03-release-notes/
8 package(s) needed for security, out of 12 available
Run "sudo yum update" to apply all updates.

EEEEEEEEEEEEEEEEEEEE MMMMMMMM           MMMMMMMM RRRRRRRRRRRRRRR
E::::::::::::::::::E M:::::::M         M:::::::M R::::::::::::::R
EE:::::EEEEEEEEE:::E M::::::::M       M::::::::M R:::::RRRRRR:::::R
  E::::E       EEEEE M:::::::::M     M:::::::::M RR::::R      R::::R
  E::::E             M::::::M:::M   M:::M::::::M   R:::R      R::::R
  E:::::EEEEEEEEEE   M:::::M M:::M M:::M M:::::M   R:::RRRRRR:::::R
  E::::::::::::::E   M:::::M  M:::M:::M  M:::::M   R:::::::::::RR
  E:::::EEEEEEEEEE   M:::::M   M:::::M   M:::::M   R:::RRRRRR::::R
  E::::E             M:::::M    M:::M    M:::::M   R:::R      R::::R
  E::::E       EEEEE M:::::M     MMM     M:::::M   R:::R      R::::R
EE:::::EEEEEEEE::::E M:::::M             M:::::M   R:::R      R::::R
E::::::::::::::::::E M:::::M             M:::::M RR::::R      R::::R
EEEEEEEEEEEEEEEEEEEE MMMMMMM             MMMMMMM RRRRRRR      RRRRRR

[hadoop@ip-172-31-24-79 ~]$
```

2. Go to Zeppelin on port 8890



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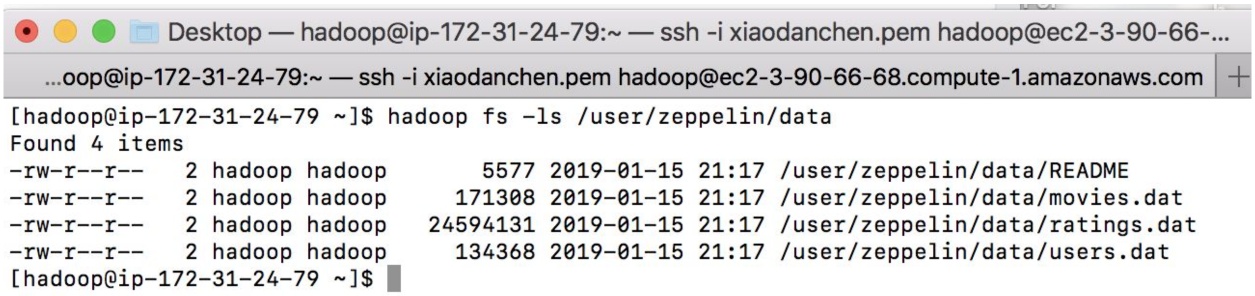
Any contribution are welcome!

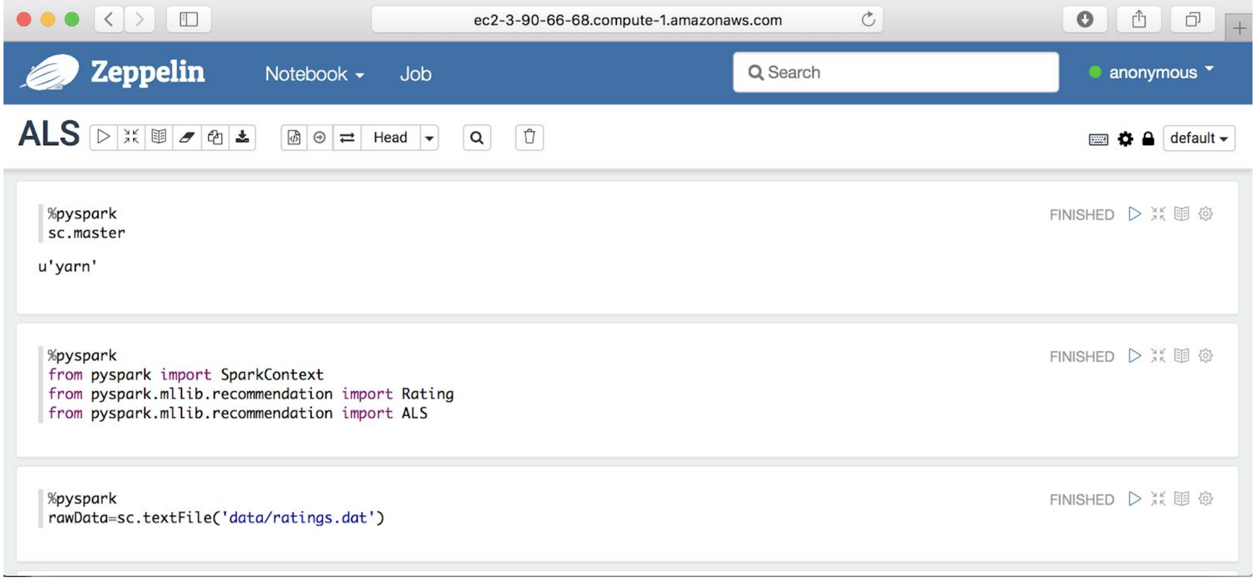
3. Achieving movie recommendation with Spark Mllib ALS algorithm

3.1 download data and save it on HDFS


Desktop — hadoop@ip-172-31-24-79:~ — ssh -i xiaodanchen.pem hadoop@ec2-3-90-66-...
...oop@ip-172-31-24-79:~ — ssh -i xiaodanchen.pem hadoop@ec2-3-90-66-68.compute-1.amazonaws.com

```
[hadoop@ip-172-31-24-79 ~]$ hadoop fs -ls /user/zeppelin/data
Found 4 items
-rw-r--r--   2 hadoop hadoop       5577 2019-01-15 21:17 /user/zeppelin/data/README
-rw-r--r--   2 hadoop hadoop     171308 2019-01-15 21:17 /user/zeppelin/data/movies.dat
-rw-r--r--   2 hadoop hadoop   24594131 2019-01-15 21:17 /user/zeppelin/data/ratings.dat
-rw-r--r--   2 hadoop hadoop     134368 2019-01-15 21:17 /user/zeppelin/data/users.dat
[hadoop@ip-172-31-24-79 ~]$ 
```

3.2 read data from HDFS



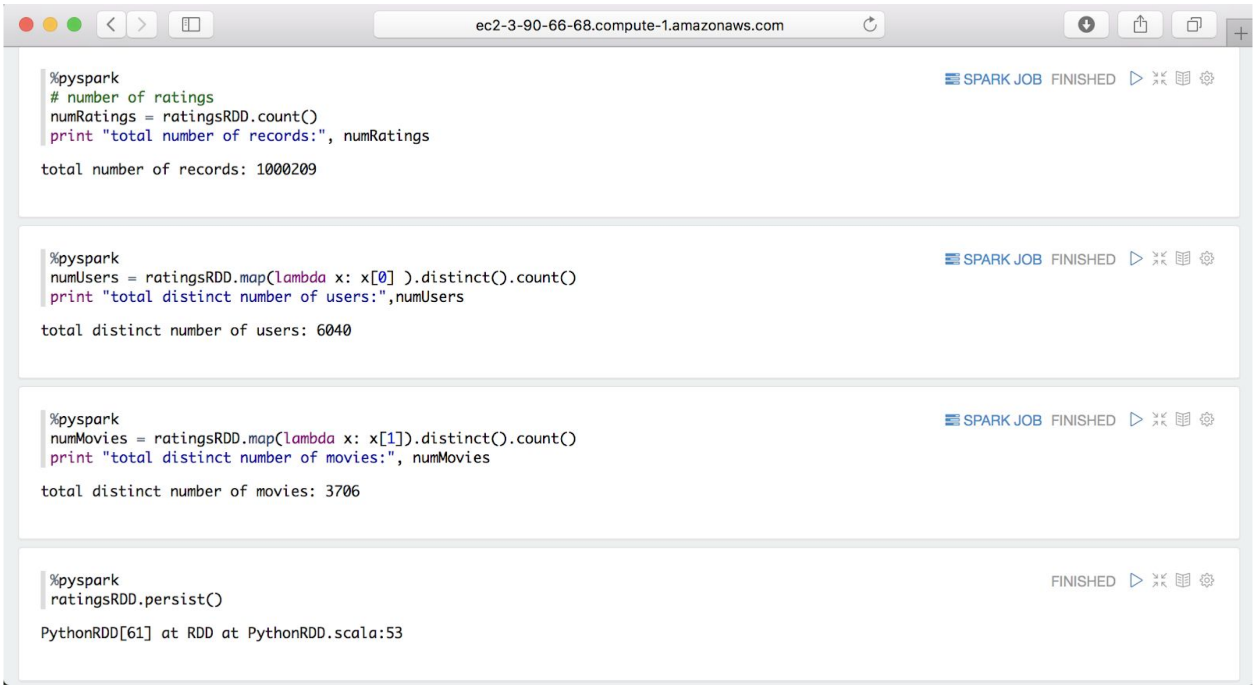
```
%pyspark
sc.master

u'yarn'
```

```
%pyspark
from pyspark import SparkContext
from pyspark.mllib.recommendation import Rating
from pyspark.mllib.recommendation import ALS
```

```
%pyspark
rawData=sc.textFile('data/ratings.dat')
```

3.3 Data stats



```
%pyspark
# number of ratings
numRatings = ratingsRDD.count()
print "total number of records:", numRatings

total number of records: 1000209
```

```
%pyspark
numUsers = ratingsRDD.map(lambda x: x[0] ).distinct().count()
print "total distinct number of users:",numUsers

total distinct number of users: 6040
```

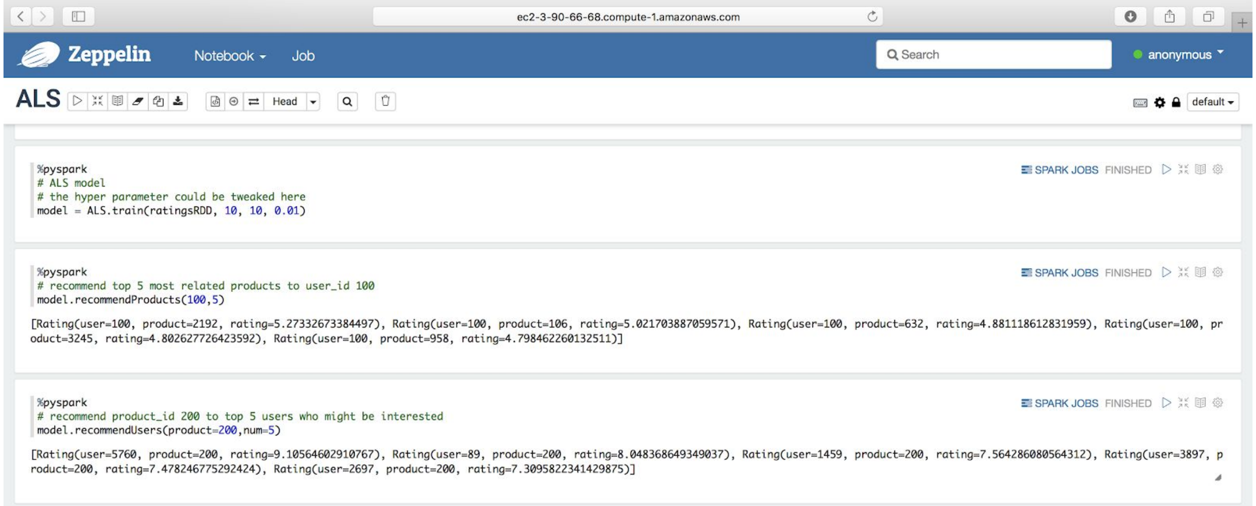
```
%pyspark
numMovies = ratingsRDD.map(lambda x: x[1]).distinct().count()
print "total distinct number of movies:", numMovies

total distinct number of movies: 3706
```

```
%pyspark
ratingsRDD.persist()

PythonRDD[61] at RDD at PythonRDD.scala:53
```

3.4 model and part of the code



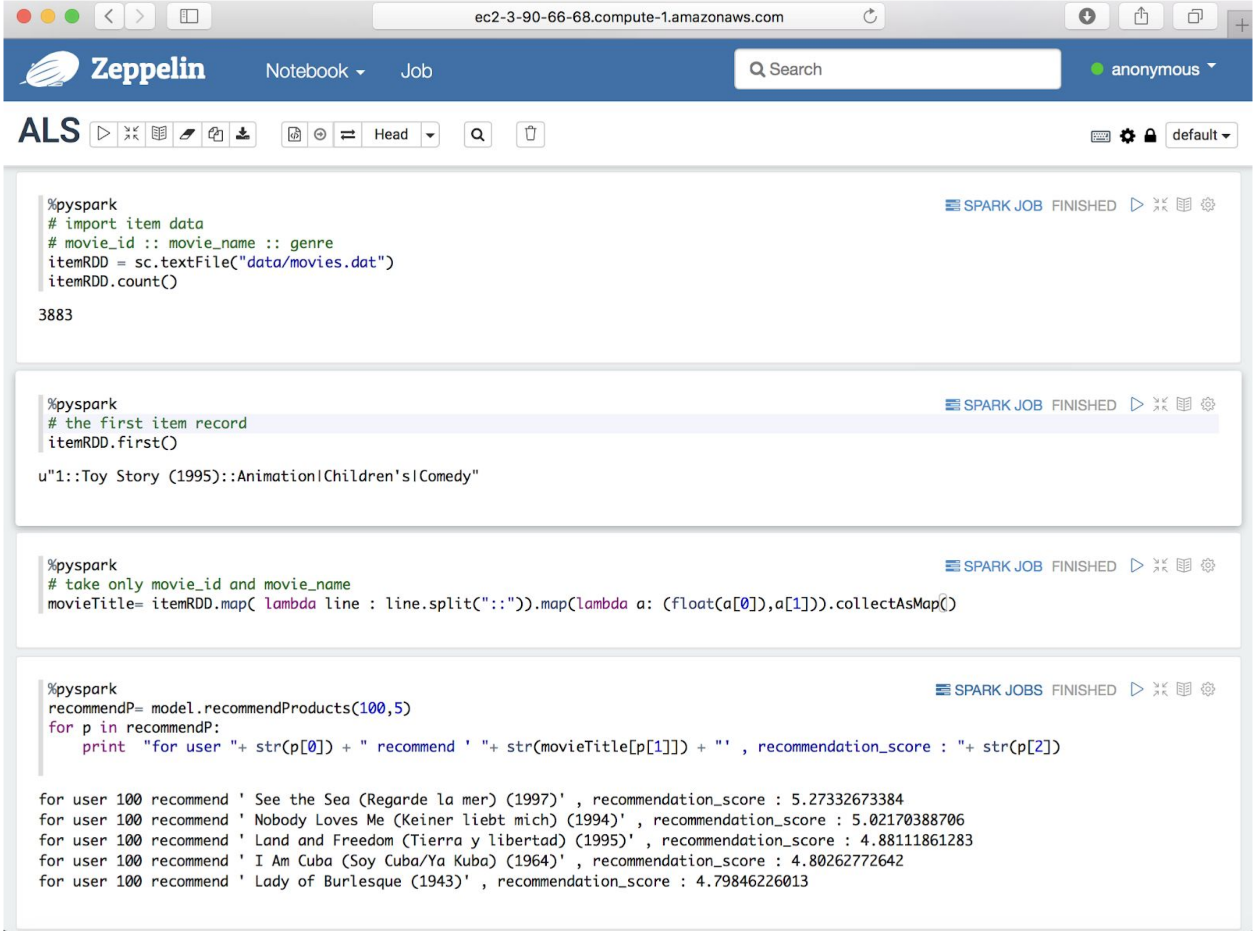
```
%pyspark
# ALS model
# the hyper parameter could be tweaked here
model = ALS.train(ratingsRDD, 10, 10, 0.01)
```

```
%pyspark
# recommend top 5 most related products to user_id 100
model.recommendProducts(100,5)

[Rating(user=100, product=2192, rating=5.27332673384497), Rating(user=100, product=106, rating=5.021703887059571), Rating(user=100, product=632, rating=4.881118612831959), Rating(user=100, pr
oduct=3245, rating=4.802627726423592), Rating(user=100, product=958, rating=4.798462260132511)]
```

```
%pyspark
# recommend product_id 200 to top 5 users who might be interested
model.recommendUsers(product=200,num=5)

[Rating(user=5760, product=200, rating=9.10564602910767), Rating(user=89, product=200, rating=8.048368649349037), Rating(user=1459, product=200, rating=7.564286080564312), Rating(user=3897, p
roduct=200, rating=7.478246775292424), Rating(user=2697, product=200, rating=7.3095822341429875)]
```



```
%pyspark
# import item data
# movie_id :: movie_name :: genre
itemRDD = sc.textFile("data/movies.dat")
itemRDD.count()

3883
```

```
%pyspark
# the first item record
itemRDD.first()

u"1::Toy Story (1995)::Animation|Children's|Comedy"
```

```
%pyspark
# take only movie_id and movie_name
movieTitle= itemRDD.map( lambda line : line.split("::")).map(lambda a: (float(a[0]),a[1])).collectAsMap()
```

```
%pyspark
recommendP= model.recommendProducts(100,5)
for p in recommendP:
    print  "for user "+ str(p[0]) + " recommend ' "+ str(movieTitle[p[1]]) + "' , recommendation_score : "+ str(p[2])

for user 100 recommend ' See the Sea (Regarde la mer) (1997)' , recommendation_score : 5.27332673384
for user 100 recommend ' Nobody Loves Me (Keiner liebt mich) (1994)' , recommendation_score : 5.02170388706
for user 100 recommend ' Land and Freedom (Tierra y libertad) (1995)' , recommendation_score : 4.88111861283
for user 100 recommend ' I Am Cuba (Soy Cuba/Ya Kuba) (1964)' , recommendation_score : 4.80262772642
for user 100 recommend ' Lady of Burlesque (1943)' , recommendation_score : 4.79846226013
```