Report for lab assignment 8

Huang Wei ID: 9
Ting Xia ID: 30

1. Question:

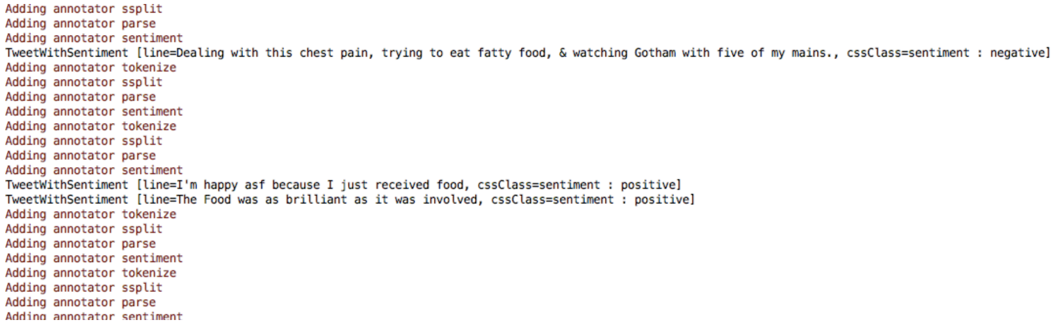
Sentimental analysis using twitter streaming (related to your project).

Description:

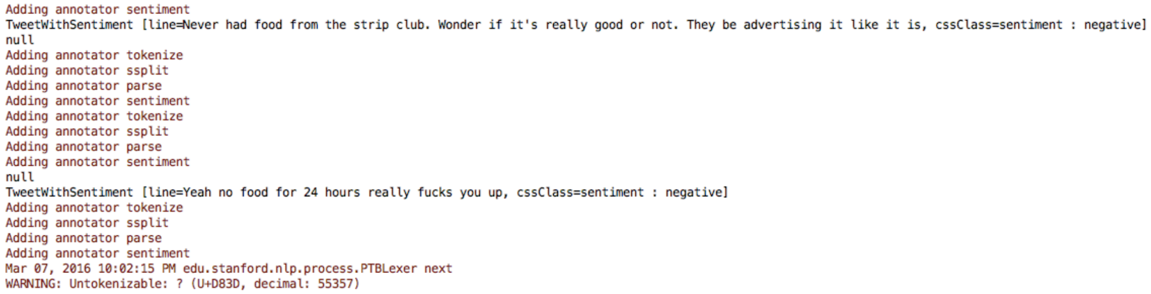
Our application can collect the tweets according to the keyword specified (here the keyword is “food”). Then class “TwitterSentimentalAnalysis” will collecte the tweets (count: 20) and class “SentimentAnalyzer” will do sentimental analysis for the collected 20 tweets. The analysis result will be printed out in the log.

Screenshots:

Analysis result



```
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
TweetWithSentiment [line=Dealing with this chest pain, trying to eat fatty food, & watching Gotham with five of my mains., cssClass=sentiment : negative]
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
TweetWithSentiment [line=I'm happy asf because I just received food, cssClass=sentiment : positive]
TweetWithSentiment [line=The Food was as brilliant as it was involved, cssClass=sentiment : positive]
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
```



```
Adding annotator sentiment
TweetWithSentiment [line=Never had food from the strip club. Wonder if it's really good or not. They be advertising it like it is, cssClass=sentiment : negative]
null
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
null
TweetWithSentiment [line=Yeah no food for 24 hours really fucks you up, cssClass=sentiment : negative]
Adding annotator tokenize
Adding annotator ssplit
Adding annotator parse
Adding annotator sentiment
Mar 07, 2016 10:02:15 PM edu.stanford.nlp.process.PTBLexer next
WARNING: Untokenizable: ? (U+D83D, decimal: 55357)
```

2. Question:

Make recommendations (related to your own project)

a. Training Data: the Twitter Streaming/categorized data (The categorization here would be from your previous lab 5&6).

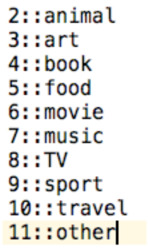
b. Testing Dataset e.g., UserId, Category, Rating (Twitter Streaming & Smart device data)

c. The rating based on sentiment analysis, retweet count would be interesting.

d. Expected outcome is to make a recommendation based on user profile (e.g., preferences, location, gender, age)

Description:

Step 1: Define 10 categories:



```
2::animal
3::art
4::book
5::food
6::movie
7::music
8::TV
9::sport
10::travel
11::other
```

Step 2: Collect tweets as training data to categorize the tweets into these 10 categories using keywords searching.

Step 3: Test data from collecting tweets again for recommendation training. In order to do rating, four items from tweets should be collected:

1) UserId. It's the tweet's userId which should be converted into integer.
2) Category. It is analyzed using feature extraction – TF-IDF by the training data collected in step 2.
3) Rating. Use sentiment analysis to give the rating for each tweet.

4) Timestamp. Tweet creation time which should be converted into integer.

Test data is also collected from device. Four items will be recorded:

1) UserId. Since the data is collected from device, the userId is specified as "8888"
2) Category. It is analyzed using feature extraction – TF-IDF by the training data collected in step 2.
3) Rating. Use sentiment analysis to give the rating for each test data.
4) Timestamp. Get the time user's input.

These four items should be written into one file called "rating.txt".

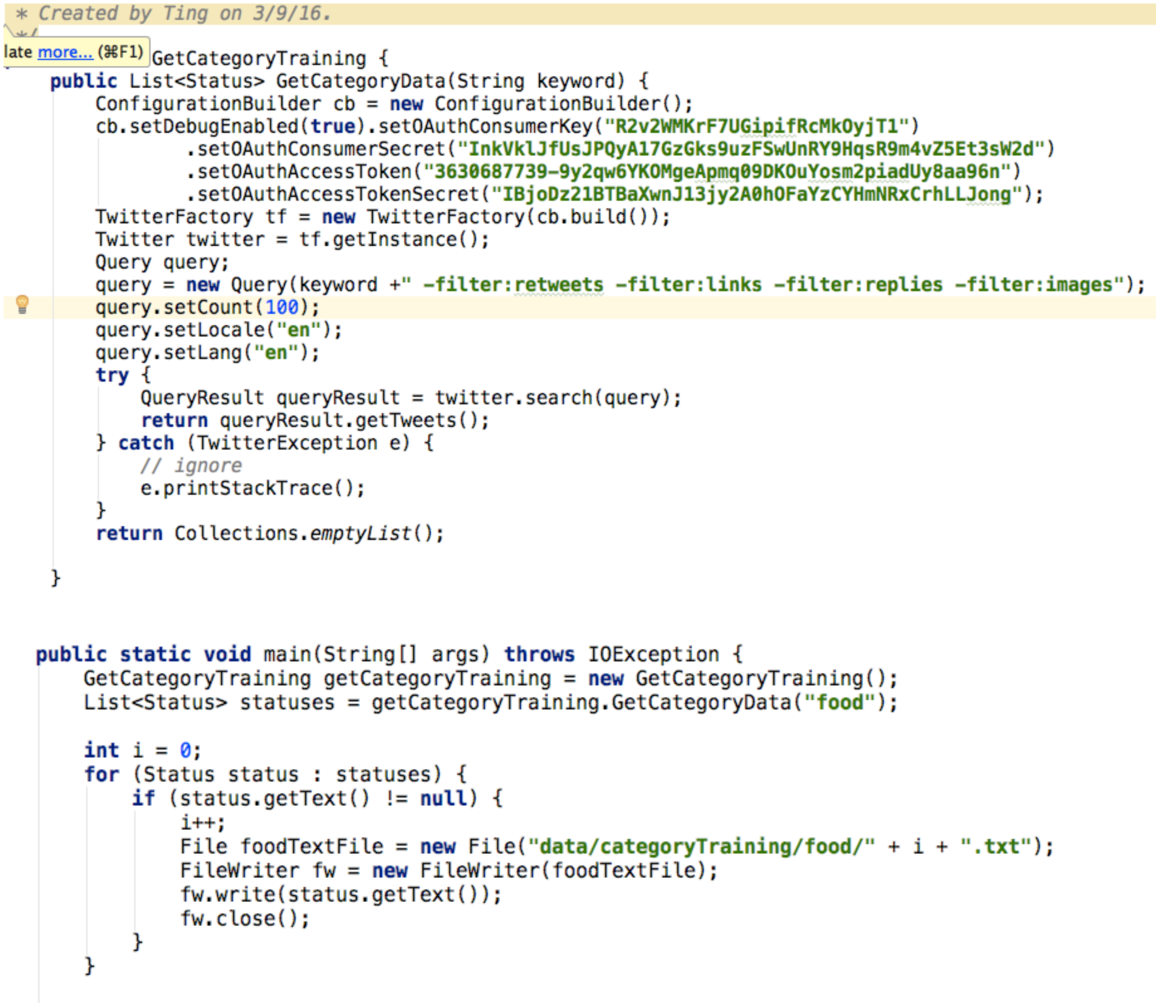
Step 4: Get the category mapping file called "category.txt".

Step 5: Get the recommendation for one particular user. The recommendation is the categories that the user prefers.

Step 6: Send the results to the smartphone/smartwatch

Screenshots:

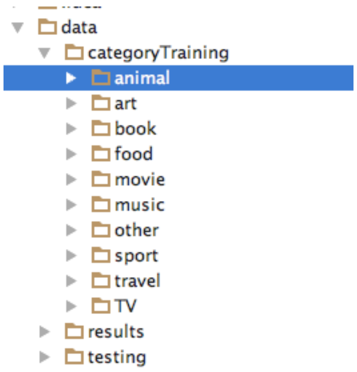
Example of getting category training data.



```
 * Created by Ting on 3/9/16.
 */
late more... (⌘F1) GetCategoryTraining {
    public List<Status> GetCategoryData(String keyword) {
        ConfigurationBuilder cb = new ConfigurationBuilder();
        cb.setDebugEnabled(true).setOAuthConsumerKey("R2v2WMKrF7UGipifRcMkOyjT1")
                .setOAuthConsumerSecret("InkVklJfUsJPQyA17GzGks9uzFSwUnRY9HqsR9m4vZ5Et3sW2d")
                .setOAuthAccessToken("3630687739-9y2qw6YKOMgeApmq09DKOuYosm2piadUy8aa96n")
                .setOAuthAccessTokenSecret("IBjoDz21BTBaXwnJ13jy2A0hOFaYzCYHmNRxCrhLLJong");
        TwitterFactory tf = new TwitterFactory(cb.build());
        Twitter twitter = tf.getInstance();
        Query query;
        query = new Query(keyword +" -filter:retweets -filter:links -filter:replies -filter:images");
        query.setCount(100);
        query.setLocale("en");
        query.setLang("en");
        try {
            QueryResult queryResult = twitter.search(query);
            return queryResult.getTweets();
        } catch (TwitterException e) {
            // ignore
            e.printStackTrace();
        }
        return Collections.emptyList();

    }


  public static void main(String[] args) throws IOException {
      GetCategoryTraining getCategoryTraining = new GetCategoryTraining();
      List<Status> statuses = getCategoryTraining.GetCategoryData("food");

      int i = 0;
      for (Status status : statuses) {
          if (status.getText() != null) {
              i++;
              File foodTextFile = new File("data/categoryTraining/food/" + i + ".txt");
              FileWriter fw = new FileWriter(foodTextFile);
              fw.write(status.getText());
              fw.close();
          }
      }
```

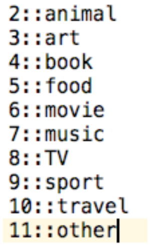
Finally 100 txt files for each category was collected.

File structure:



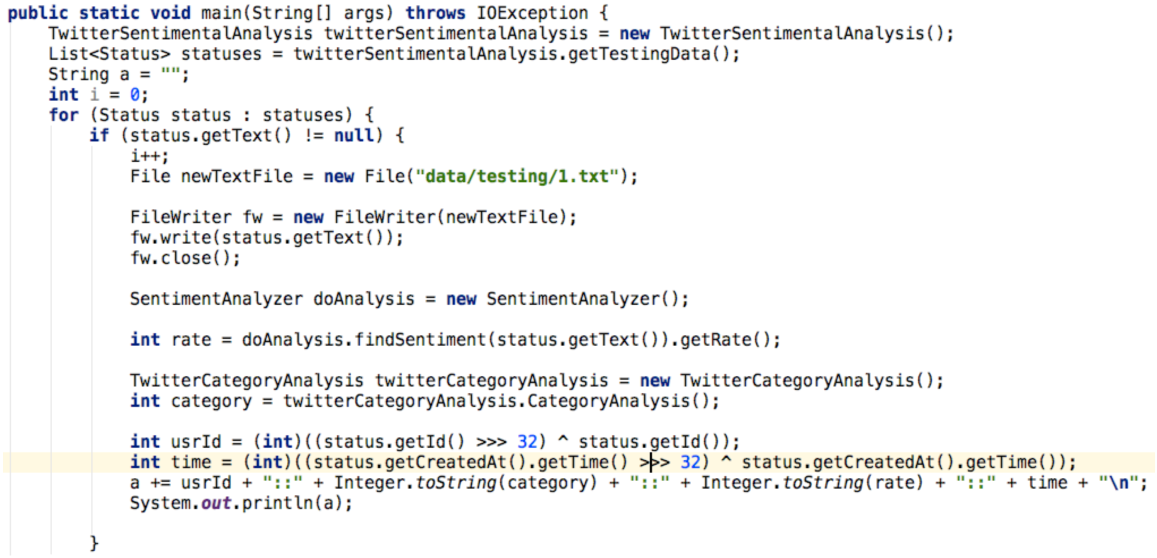
```
▼ data
    ▼ categoryTraining
        ▶ animal
        ▶ art
        ▶ book
        ▶ food
        ▶ movie
        ▶ music
        ▶ other
        ▶ sport
        ▶ travel
        ▶ TV
    ▶ results
    ▶ testing
```

Category mapping:



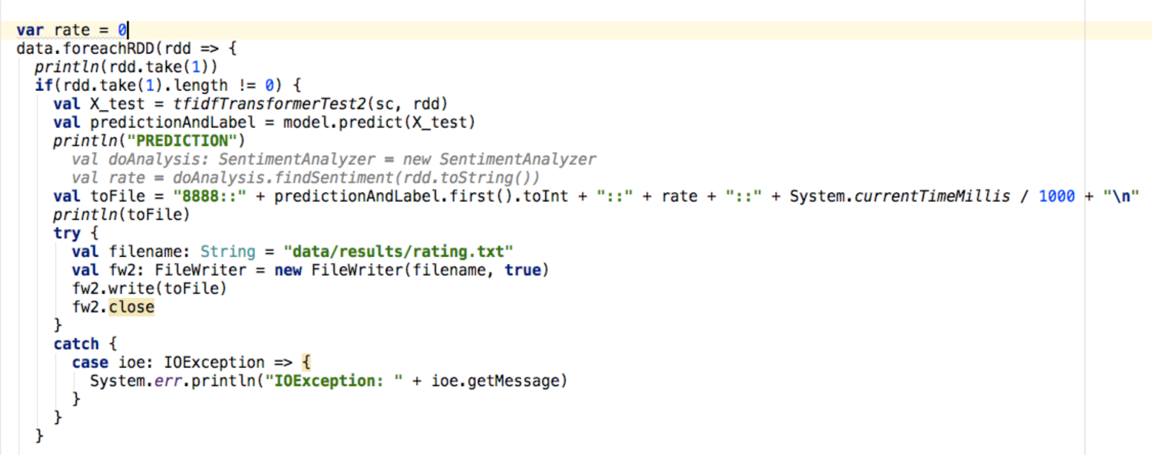
```
2::animal
3::art
4::book
5::food
6::movie
7::music
8::TV
9::sport
10::travel
11::other
```

Collect data from tweets and do sentimental analysis and category analysis:



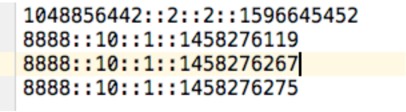
```java
public static void main(String[] args) throws IOException {
    TwitterSentimentalAnalysis twitterSentimentalAnalysis = new TwitterSentimentalAnalysis();
    List<Status> statuses = twitterSentimentalAnalysis.getTestingData();
    String a = "";
    int i = 0;
    for (Status status : statuses) {
        if (status.getText() != null) {
            i++;
            File newTextFile = new File("data/testing/1.txt");

            FileWriter fw = new FileWriter(newTextFile);
            fw.write(status.getText());
            fw.close();

            SentimentAnalyzer doAnalysis = new SentimentAnalyzer();

            int rate = doAnalysis.findSentiment(status.getText()).getRate();

            TwitterCategoryAnalysis twitterCategoryAnalysis = new TwitterCategoryAnalysis();
            int category = twitterCategoryAnalysis.CategoryAnalysis();

            int usrId = (int)((status.getId() >>> 32) ^ status.getId());
            int time = (int)((status.getCreatedAt().getTime() >>> 32) ^ status.getCreatedAt().getTime());
            a += usrId + "::" + Integer.toString(category) + "::" + Integer.toString(rate) + "::" + time + "\n";
            System.out.println(a);

        }
```

Collect training data form recommendation from device and do sentimental analysis and category analysis (the only problem is: streaming data cannot analyzed directly with sentimental analysis. Not sure what's the problem is. Also, the category analysis seemed always got "travel", but absolutely, for some cases, the category was not "travel")



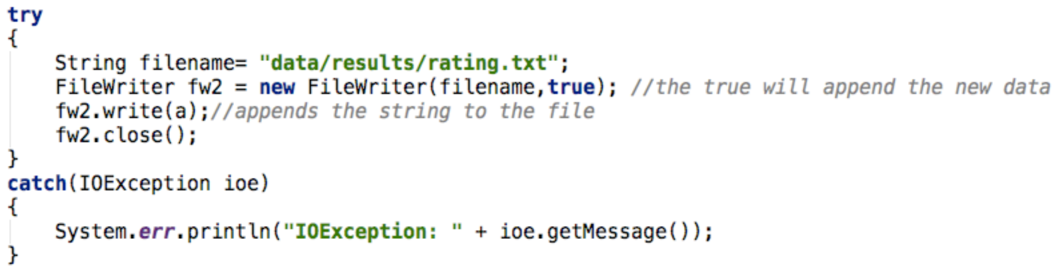
```
var rate = 0
data.foreachRDD(rdd => {
  println(rdd.take(1))
  if(rdd.take(1).length != 0) {
    val X_test = tfidfTransformerTest2(sc, rdd)
    val predictionAndLabel = model.predict(X_test)
    println("PREDICTION")
      val doAnalysis: SentimentAnalyzer = new SentimentAnalyzer
      val rate = doAnalysis.findSentiment(rdd.toString())
    val toFile = "8888::" + predictionAndLabel.first().toInt + "::" + rate + "::" + System.currentTimeMillis / 1000 + "\n"
    println(toFile)
    try {
      val filename: String = "data/results/rating.txt"
      val fw2: FileWriter = new FileWriter(filename, true)
      fw2.write(toFile)
      fw2.close
    }
    catch {
      case ioe: IOException => {
        System.err.println("IOException: " + ioe.getMessage)
      }
    }
  }
```

Data collected by device:



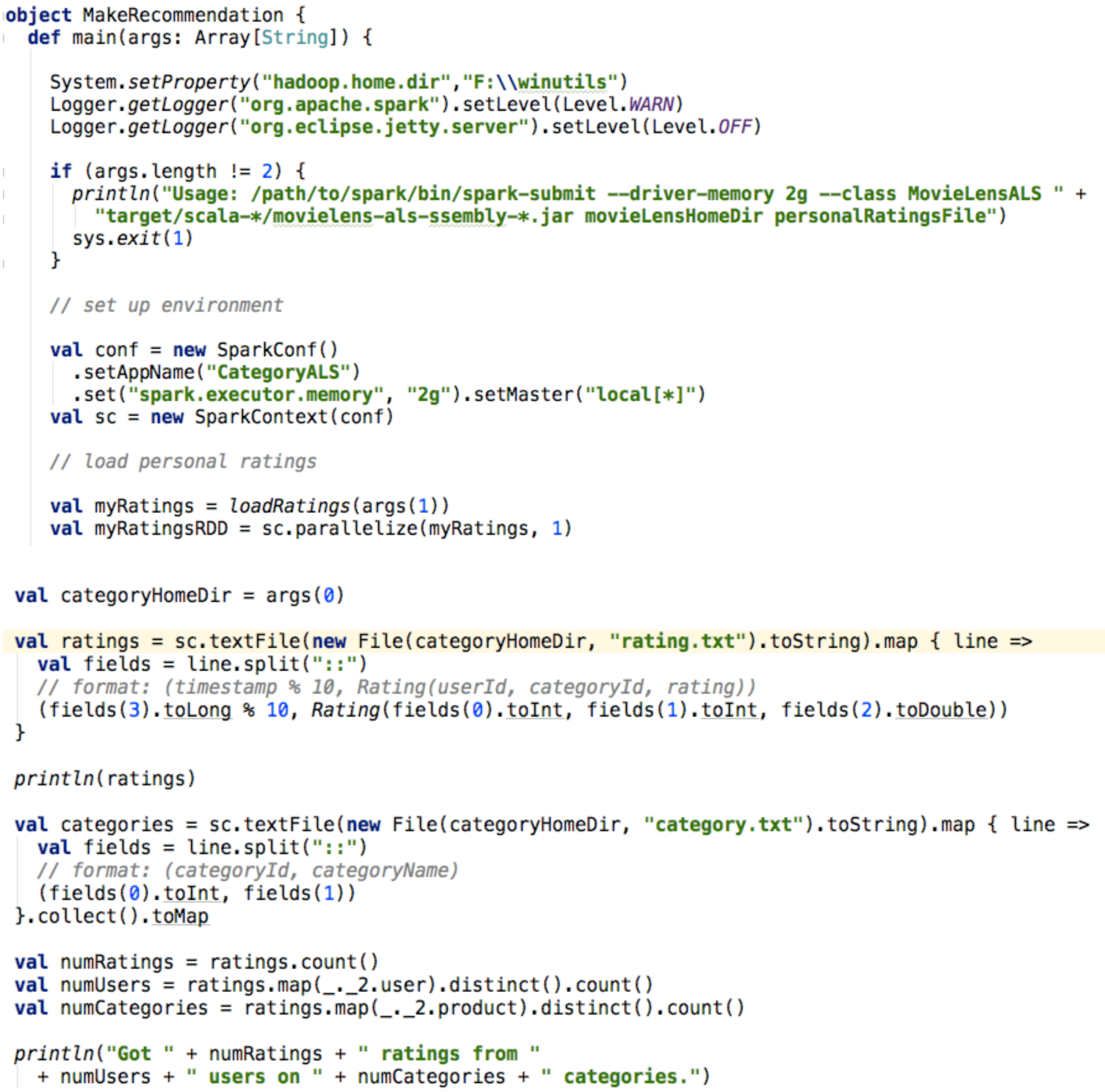
```
1048856442::2::2::1596645452
8888::10::1::1458276119
8888::10::1::1458276267
8888::10::1::1458276275
```

Write the collected data into file:



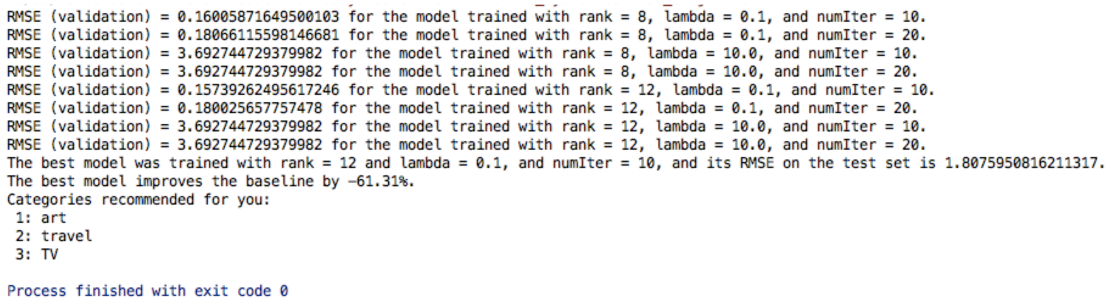
```
try
{
    String filename= "data/results/rating.txt";
    FileWriter fw2 = new FileWriter(filename,true); //the true will append the new data
    fw2.write(a);//appends the string to the file
    fw2.close();
}
catch(IOException ioe)
{
    System.err.println("IOException: " + ioe.getMessage());
}
```

Recommendation of user’s category preference(partial code):



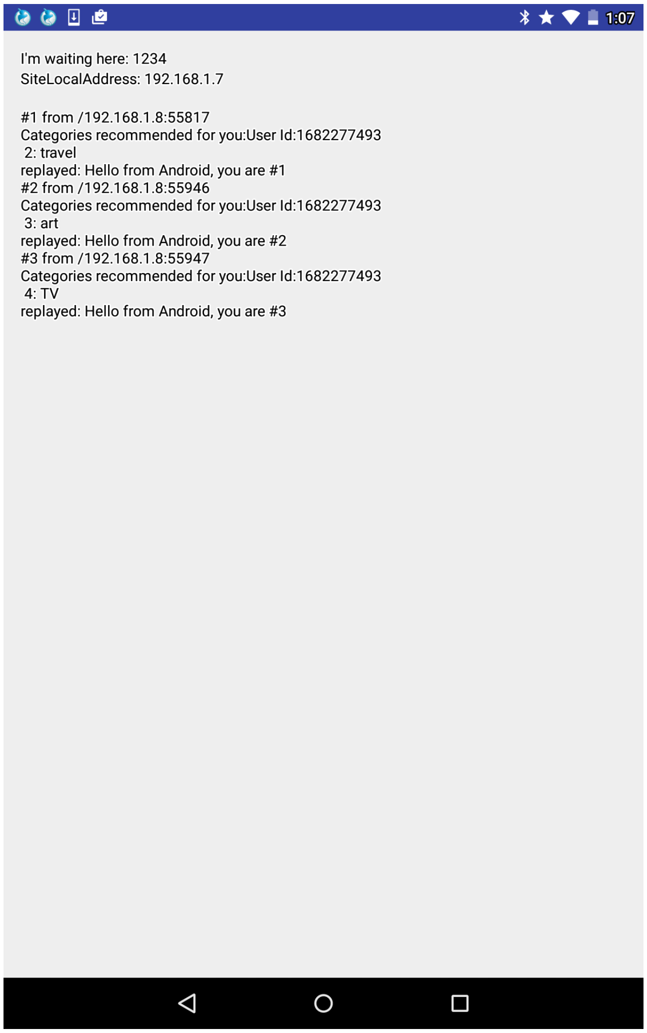
```
object MakeRecommendation {
  def main(args: Array[String]) {

    System.setProperty("hadoop.home.dir","F:\\winutils")
    Logger.getLogger("org.apache.spark").setLevel(Level.WARN)
    Logger.getLogger("org.eclipse.jetty.server").setLevel(Level.OFF)

    if (args.length != 2) {
      println("Usage: /path/to/spark/bin/spark-submit --driver-memory 2g --class MovieLensALS " +
        "target/scala-*/movielens-als-ssembly-*.jar movieLensHomeDir personalRatingsFile")
      sys.exit(1)
    }

    // set up environment

    val conf = new SparkConf()
      .setAppName("CategoryALS")
      .set("spark.executor.memory", "2g").setMaster("local[*]")
    val sc = new SparkContext(conf)

    // load personal ratings

    val myRatings = loadRatings(args(1))
    val myRatingsRDD = sc.parallelize(myRatings, 1)


val categoryHomeDir = args(0)

val ratings = sc.textFile(new File(categoryHomeDir, "rating.txt").toString).map { line =>
  val fields = line.split("::")
  // format: (timestamp % 10, Rating(userId, categoryId, rating))
  (fields(3).toLong % 10, Rating(fields(0).toInt, fields(1).toInt, fields(2).toDouble))
}

println(ratings)

val categories = sc.textFile(new File(categoryHomeDir, "category.txt").toString).map { line =>
  val fields = line.split("::")
  // format: (categoryId, categoryName)
  (fields(0).toInt, fields(1))
}.collect().toMap

val numRatings = ratings.count()
val numUsers = ratings.map(_._2.user).distinct().count()
val numCategories = ratings.map(_._2.product).distinct().count()

println("Got " + numRatings + " ratings from "
  + numUsers + " users on " + numCategories + " categories.")
```

Result log



```
RMSE (validation) = 0.16005871649500103 for the model trained with rank = 8, lambda = 0.1, and numIter = 10.
RMSE (validation) = 0.18066115598146681 for the model trained with rank = 8, lambda = 0.1, and numIter = 20.
RMSE (validation) = 3.692744729379982 for the model trained with rank = 8, lambda = 10.0, and numIter = 10.
RMSE (validation) = 3.692744729379982 for the model trained with rank = 8, lambda = 10.0, and numIter = 20.
RMSE (validation) = 0.15739262495617246 for the model trained with rank = 12, lambda = 0.1, and numIter = 10.
RMSE (validation) = 0.180025657757478 for the model trained with rank = 12, lambda = 0.1, and numIter = 20.
RMSE (validation) = 3.692744729379982 for the model trained with rank = 12, lambda = 10.0, and numIter = 10.
RMSE (validation) = 3.692744729379982 for the model trained with rank = 12, lambda = 10.0, and numIter = 20.
The best model was trained with rank = 12 and lambda = 0.1, and numIter = 10, and its RMSE on the test set is 1.8075950816211317.
The best model improves the baseline by -61.31%.
Categories recommended for you:
 1: art
 2: travel
 3: TV

Process finished with exit code 0
```

Results sent to smartphone:



```
I'm waiting here: 1234
SiteLocalAddress: 192.168.1.7

#1 from /192.168.1.8:55817
Categories recommended for you:User Id:1682277493
 2: travel
replayed: Hello from Android, you are #1
#2 from /192.168.1.8:55946
Categories recommended for you:User Id:1682277493
 3: art
replayed: Hello from Android, you are #2
#3 from /192.168.1.8:55947
Categories recommended for you:User Id:1682277493
 4: TV
replayed: Hello from Android, you are #3
```