NETFLIX RECOMMENDATION SYSTEM

CSYE7200 34322 BIG-DATA SYS ENGR USING SCALA SEC 01 - SPRING 2018

Team - 1

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OUR PROPOSAL

- WITH THE HELP OF USER DATA AND RATINGS.
- GENERATE A RELEVANT SUGGESTION BASED ON PAST AVAILABLE DATASET.
- RECOMMENDING HIGHEST PREDICTED RATING TO A PARTICULAR USER.
- MEETING THE DEADLINE OF THE PROJECT.

USE CASE/ ACTOR

ACTOR

- USER WILL BE THE SOLE ACTOR OF THE SYSTEM

USE CASE

- USER WILL BELOW OPERATIONS:
    - LOGIN
    - PROVIDING RATING FOR MOVIES
- THE APPLICATION WILL PROVIDE LIST OF MOVIES WITH HIGHLY PREDICTED RATINGS

DETAILS OF DATA

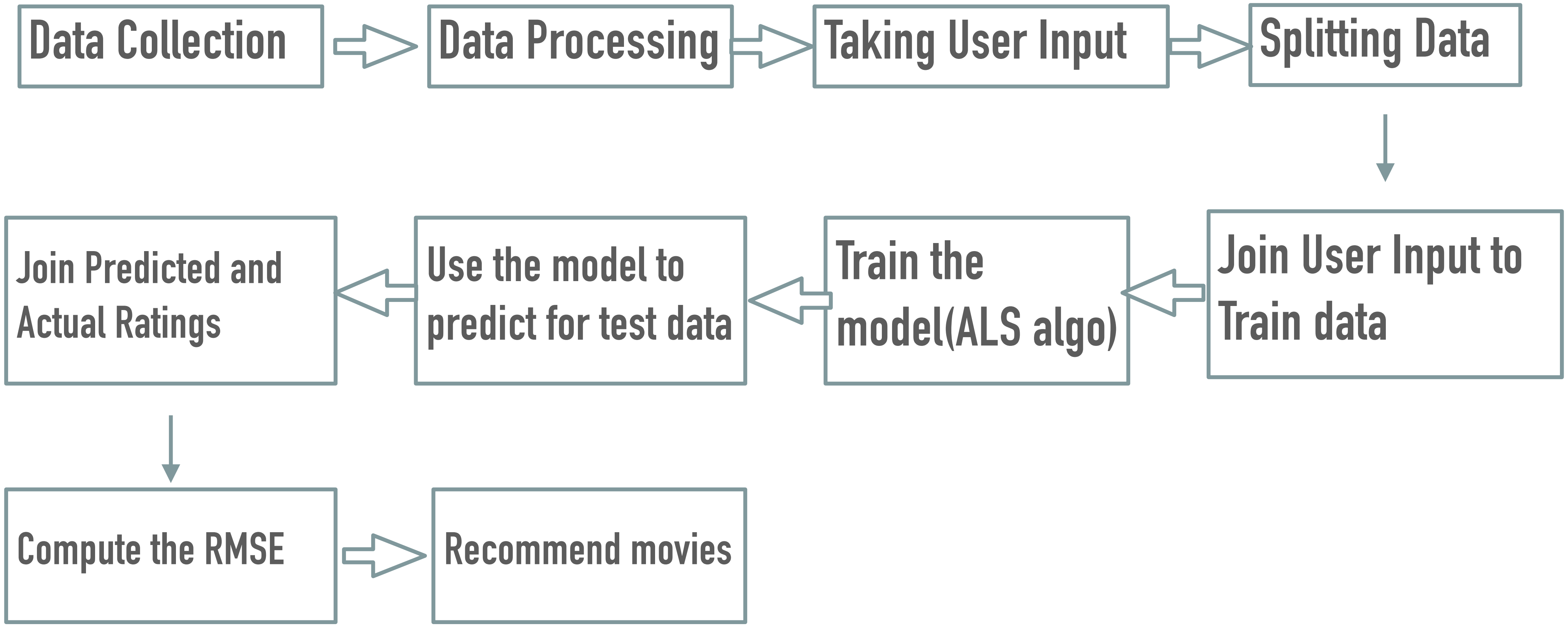
ACTUAL DATA:

- **RATINGS DATA : 10048050**
- **MOVIES : 17770**
- **USER: 480189**

DATA USED (HEAP SIZE ISSUE):

- **RATING DATA : 5010199**
- **MOVIES : 1000**
- **USERS: 404555**

WORKFLOW



Data Collection

Data Processing

Taking User Input

Splitting Data

Join User Input to Train data

Train the model(ALS algo)

Use the model to predict for test data

Join Predicted and Actual Ratings

Compute the RMSE

Recommend movies

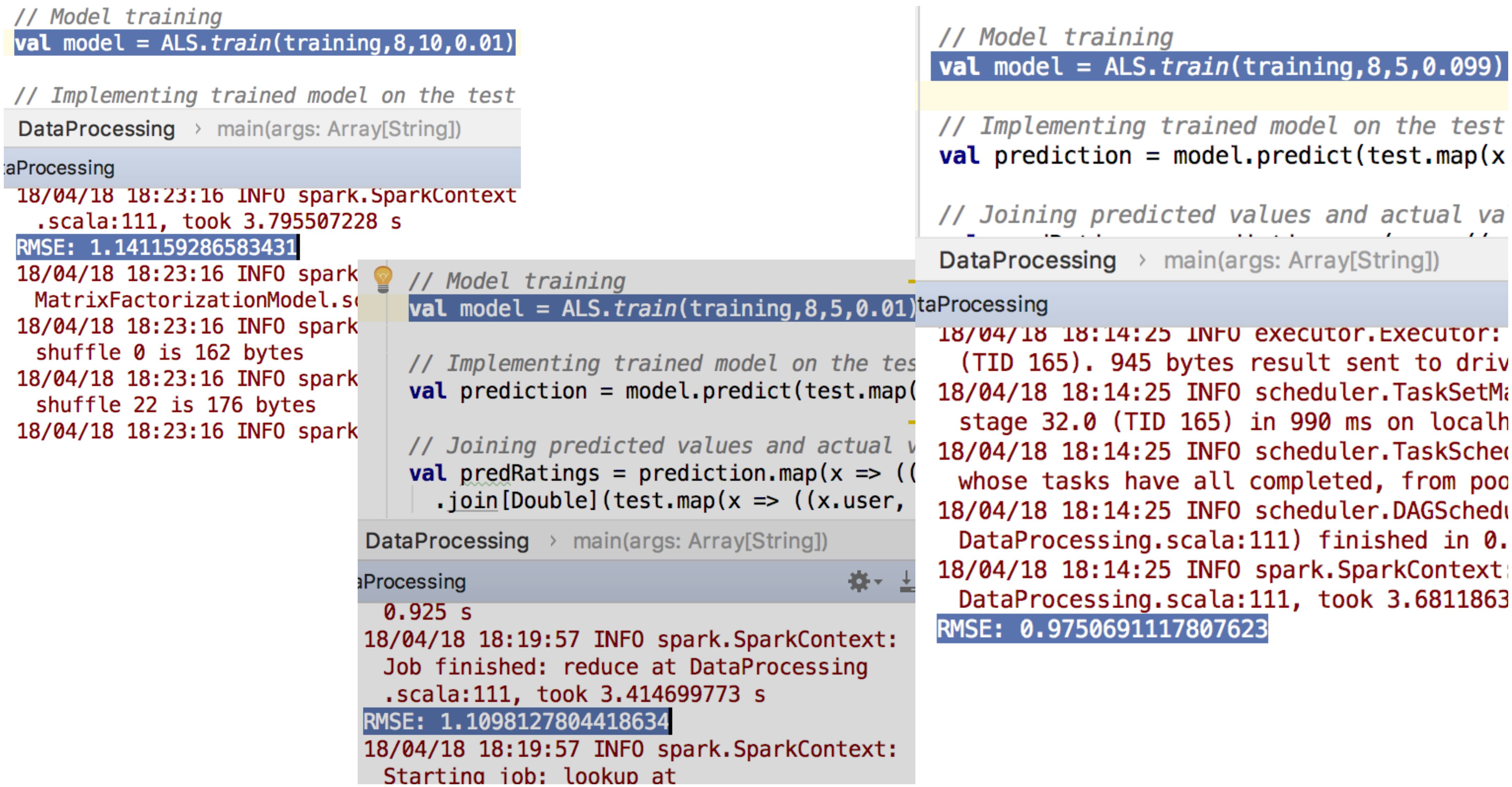
PREDICTION ACCURACY

ROOT MEAN SQUARE ERROR(RMSE)

RMSE IS THE PARAMETER USED TO MEASURE THE DIFFERENCE BETWEEN THE PREDICTED VALUES AND THE ACTUAL VALUES.

$$\mathrm{RMSE} = \sqrt{\sum \frac{(y_{pred} - y_{ref})^2}{N}}$$

RMSE FOR DIFFERENT RUNS



```
// Model training
val model = ALS.train(training,8,10,0.01)

// Implementing trained model on the test
```

```
18/04/18 18:23:16 INFO spark.SparkContext
  .scala:111, took 3.795507228 s
RMSE: 1.141159286583431
18/04/18 18:23:16 INFO spark
  MatrixFactorizationModel.s
18/04/18 18:23:16 INFO spark
  shuffle 0 is 162 bytes
18/04/18 18:23:16 INFO spark
  shuffle 22 is 176 bytes
18/04/18 18:23:16 INFO spark
```

```
// Model training
val model = ALS.train(training,8,5,0.01)

// Implementing trained model on the tes
val prediction = model.predict(test.map(

// Joining predicted values and actual v
val predRatings = prediction.map(x => ((
  .join[Double](test.map(x => ((x.user,
```

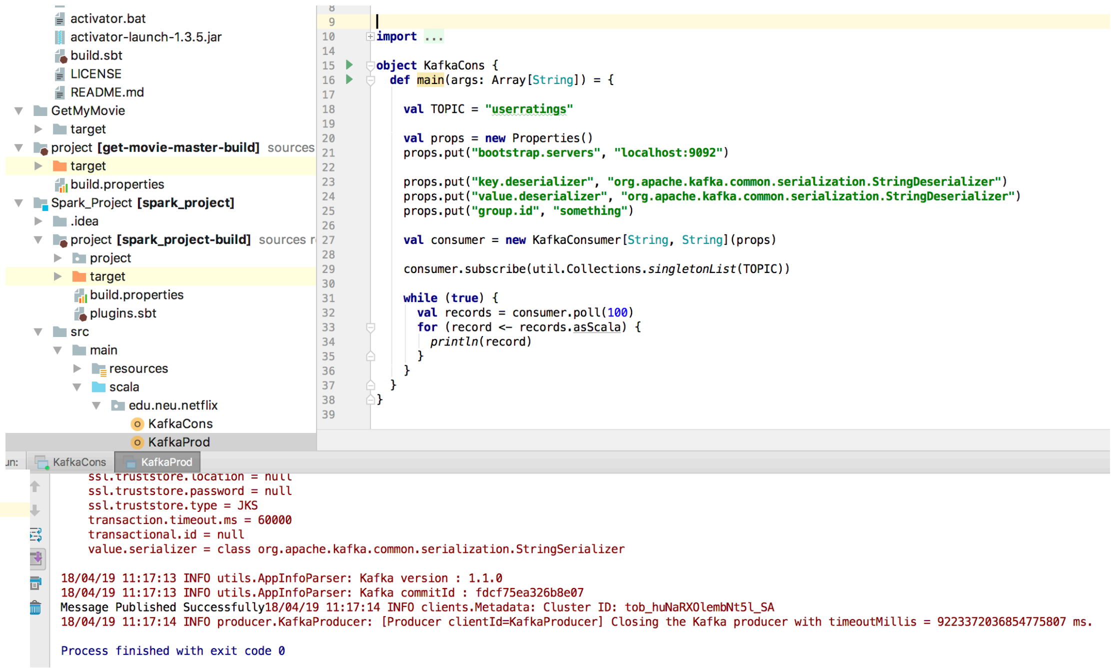
```
  0.925 s
18/04/18 18:19:57 INFO spark.SparkContext:
  Job finished: reduce at DataProcessing
  .scala:111, took 3.414699773 s
RMSE: 1.1098127804418634
18/04/18 18:19:57 INFO spark.SparkContext:
  Starting job: lookup at
```

```
// Model training
val model = ALS.train(training,8,5,0.099)

// Implementing trained model on the test
val prediction = model.predict(test.map(x

// Joining predicted values and actual va
```

```
18/04/18 18:14:25 INFO executor.Executor:
  (TID 165). 945 bytes result sent to driv
18/04/18 18:14:25 INFO scheduler.TaskSetMa
  stage 32.0 (TID 165) in 990 ms on localh
18/04/18 18:14:25 INFO scheduler.TaskSche
  whose tasks have all completed, from poo
18/04/18 18:14:25 INFO scheduler.DAGSched
  DataProcessing.scala:111) finished in 0.
18/04/18 18:14:25 INFO spark.SparkContext:
  DataProcessing.scala:111, took 3.6811863
RMSE: 0.9750691117807623
```

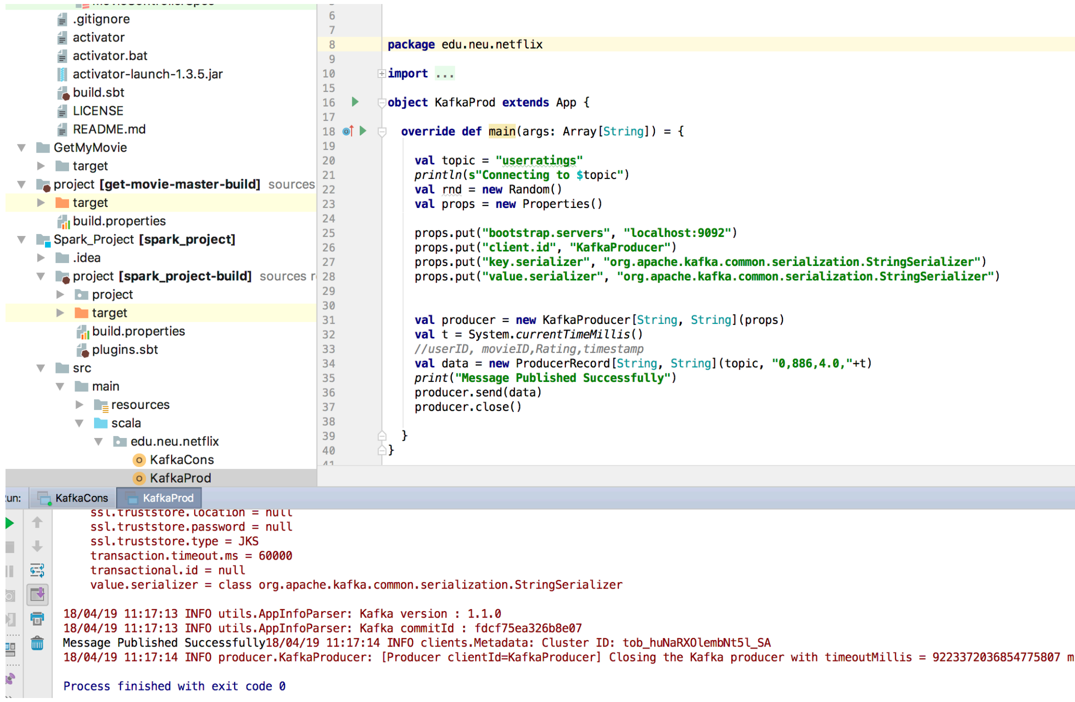
APPLICATION AND USER INTERFACE

KAFKA PRODUCER AND CONSUMER



```scala

import ...

object KafkaCons {
  def main(args: Array[String]) = {

    val TOPIC = "userratings"

    val props = new Properties()
    props.put("bootstrap.servers", "localhost:9092")

    props.put("key.deserializer", "org.apache.kafka.common.serialization.StringDeserializer")
    props.put("value.deserializer", "org.apache.kafka.common.serialization.StringDeserializer")
    props.put("group.id", "something")

    val consumer = new KafkaConsumer[String, String](props)

    consumer.subscribe(util.Collections.singletonList(TOPIC))

    while (true) {
      val records = consumer.poll(100)
      for (record <- records.asScala) {
        println(record)
      }
    }
  }
}
```

```
    ssl.truststore.location = null
    ssl.truststore.password = null
    ssl.truststore.type = JKS
    transaction.timeout.ms = 60000
    transactional.id = null
    value.serializer = class org.apache.kafka.common.serialization.StringSerializer

18/04/19 11:17:13 INFO utils.AppInfoParser: Kafka version : 1.1.0
18/04/19 11:17:13 INFO utils.AppInfoParser: Kafka commitId : fdcf75ea326b8e07
Message Published Successfully18/04/19 11:17:14 INFO clients.Metadata: Cluster ID: tob_huNaRXOlembNt5l_SA
18/04/19 11:17:14 INFO producer.KafkaProducer: [Producer clientId=KafkaProducer] Closing the Kafka producer with timeoutMillis = 9223372036854775807 ms.

Process finished with exit code 0
```



```scala

package edu.neu.netflix

import ...

object KafkaProd extends App {

  override def main(args: Array[String]) = {

    val topic = "userratings"
    println(s"Connecting to $topic")
    val rnd = new Random()
    val props = new Properties()

    props.put("bootstrap.servers", "localhost:9092")
    props.put("client.id", "KafkaProducer")
    props.put("key.serializer", "org.apache.kafka.common.serialization.StringSerializer")
    props.put("value.serializer", "org.apache.kafka.common.serialization.StringSerializer")


    val producer = new KafkaProducer[String, String](props)
    val t = System.currentTimeMillis()
    //userID, movieID,Rating,timestamp
    val data = new ProducerRecord[String, String](topic, "0,886,4.0,"+t)
    print("Message Published Successfully")
    producer.send(data)
    producer.close()

  }
}
```

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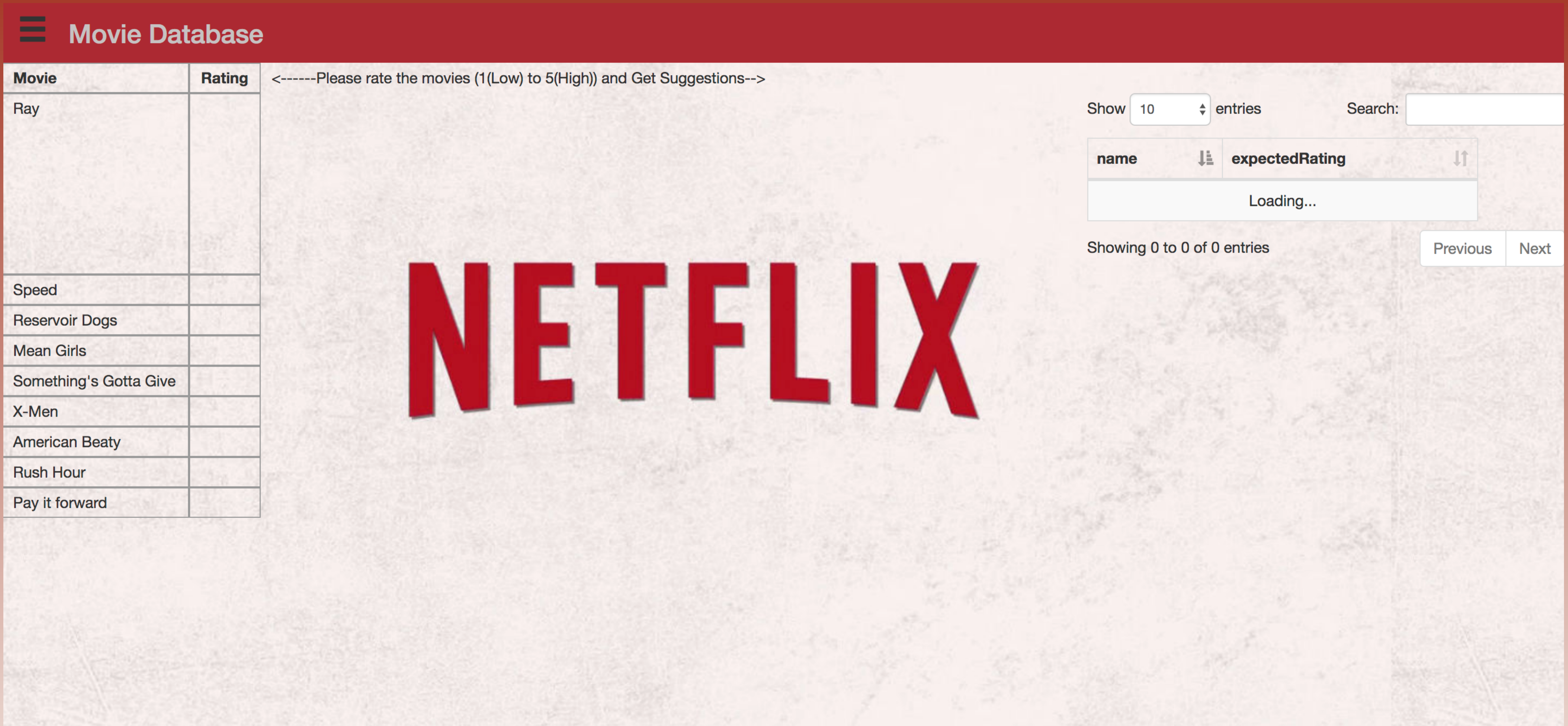

Movie Database

Movie	Rating
Ray	
Speed	
Reservoir Dogs	
Mean Girls	
Something's Gotta Give	
X-Men	
American Beaty	
Rush Hour	
Pay it forward	

<------Please rate the movies (1(Low) to 5(High)) and Get Suggestions-->

Show 10 entries

Search:

name	expectedRating
Loading...	

Showing 0 to 0 of 0 entries

ACCEPTANCE CRITERIA

- APPLICATION SHOULD BE ABLE TO HANDLE AT LEAST 2500 REQUESTS SIMULTANEOUSLY AND THE MODEL SHOULD BE SCALABLE TO ADD NEW DATA SOURCES AS AND WHEN REQUIRED.
- ACHIEVE >90% ACCURACY USING PROBE DATASET.

CHALLENGES FACED

- SPARK, SCALA, KAFKA AND PLAY FRAMEWORK COMPATIBILITY ISSUE
- RESTRUCTURING DATA TO USE INTO CORRECT FORMAT
- OVERFITTING OF THE MODEL
- TUNING THE MODEL
- HEAP SIZE ISSUE

USING PLAY FRAMEWORK

- IMPLEMENTED MVC
- INTEGRATING SPARK
- IMPLEMENTED MOCKITO FOR APPLICATION ,MOVIE CONTROLLER SPEC TO TEST VARIOUS FEATURES

USING PLAY FRAMEWORK

- **TASK COMPLETED**
    - DATA PROCESSING
    - TAKING USER INPUT
    - PREDICTION GENERATING
- **TASK TO BE COMPLETED**
    - USER INTERFACE

GITHUB REPOSITORY LINK

https://github.com/reddyse/Big-Data-Engineering-Using-Scala

THANK YOU...