

CS5542 Big Data Apps and Analytics

LAB ASSIGNMENT #5

1. Image Classification

The spark program for image classification is run on several data sets including data set provided from the source code. The program is run on three different data sets: **data**, **data2**, **DataLab4**. The data set **data** contains images of 10 categories, namely bibimap, jiaozi, omelet, oden, rice, sausage, spaghetti, sushi, tempura and toast. These are partitioned into two test sets test and test2 and train set train. The program uses RANDOM FORESTS for classification of the features extracted from the SIFT and SURF. K-means clustering is used, the data is divided into trees (10). The below are the screen shots of the output generated on this **data** data set:

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

image_classification_Windows src main scala IApp.scala

Project 20.jpg 21.jpg 22.jpg 23.jpg 24.jpg 25.jpg 26.jpg 27.jpg 28.jpg 29.jpg

IApp

```
1  /* ... */
4
5 import ...
18
19 object IApp {
20   val featureVectorsCluster = new mutable.MutableList[String]
21
22   val IMAGE_CATEGORIES = List("rice", "tempura", "toast", "bibimbap", "sushi", "spaghetti", "sausage", "oden", "omelet", "jiaozi")
23   //val IMAGE_CATEGORIES = List("Accordion", "Airplanes", "Anchor", "Ant", "Barrel", "Bass", "Beaver", "Binocular", "Bonsai")
```

Run: IPApp IPApp IPApp IPApp

(1.0, 3)
(2.0, 3)
(5.0, 3)
(2.0, 3)

Confusion matrix

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0.0 | 2.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 3.0 | 0.0 |
| 0.0 | 1.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 |
| 0.0 | 1.0 | 3.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 | 0.0 | 1.0 |
| 0.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 |
| 0.0 | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 1.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 1.0 | 0.0 | 1.0 |

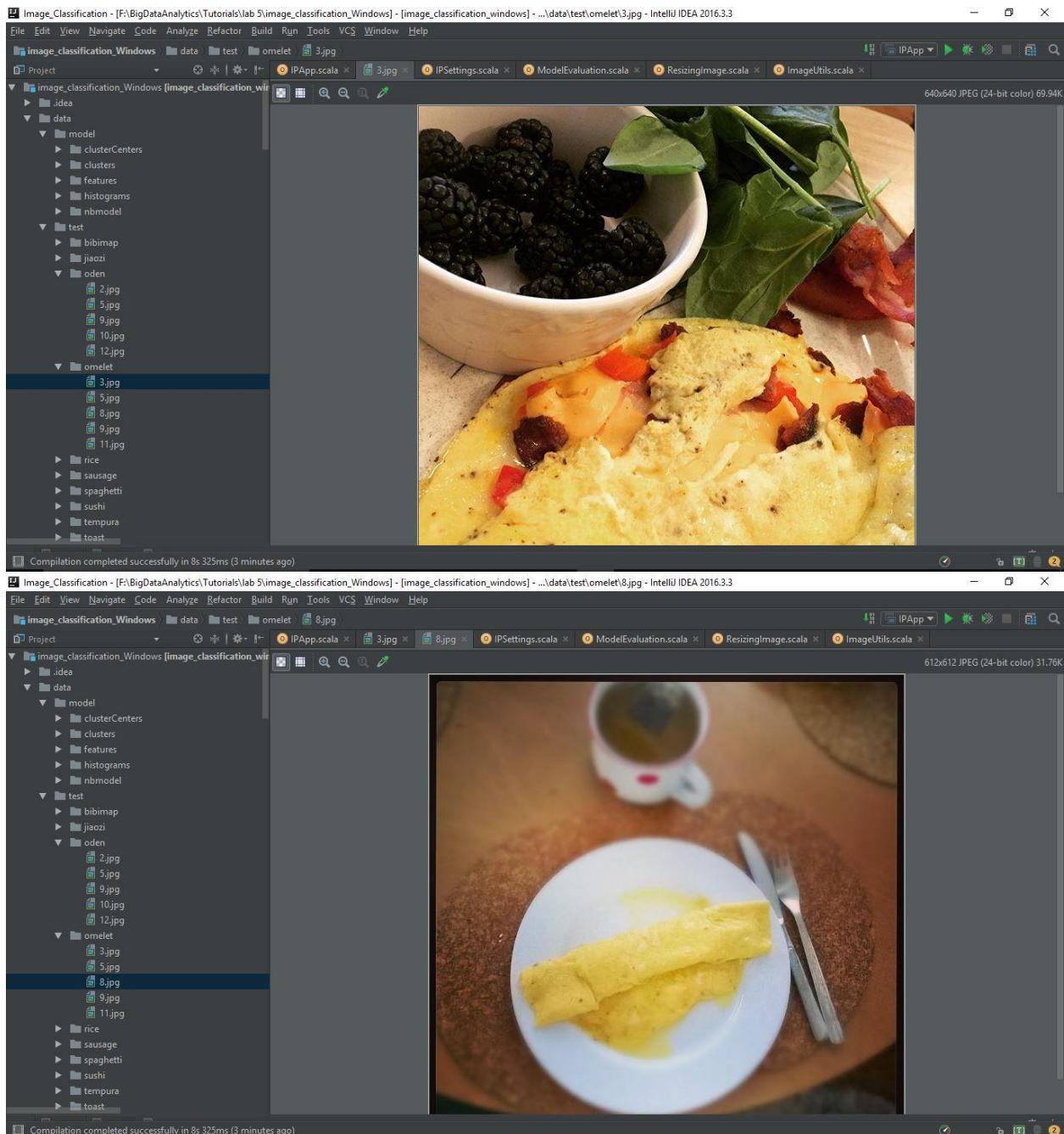
0.24

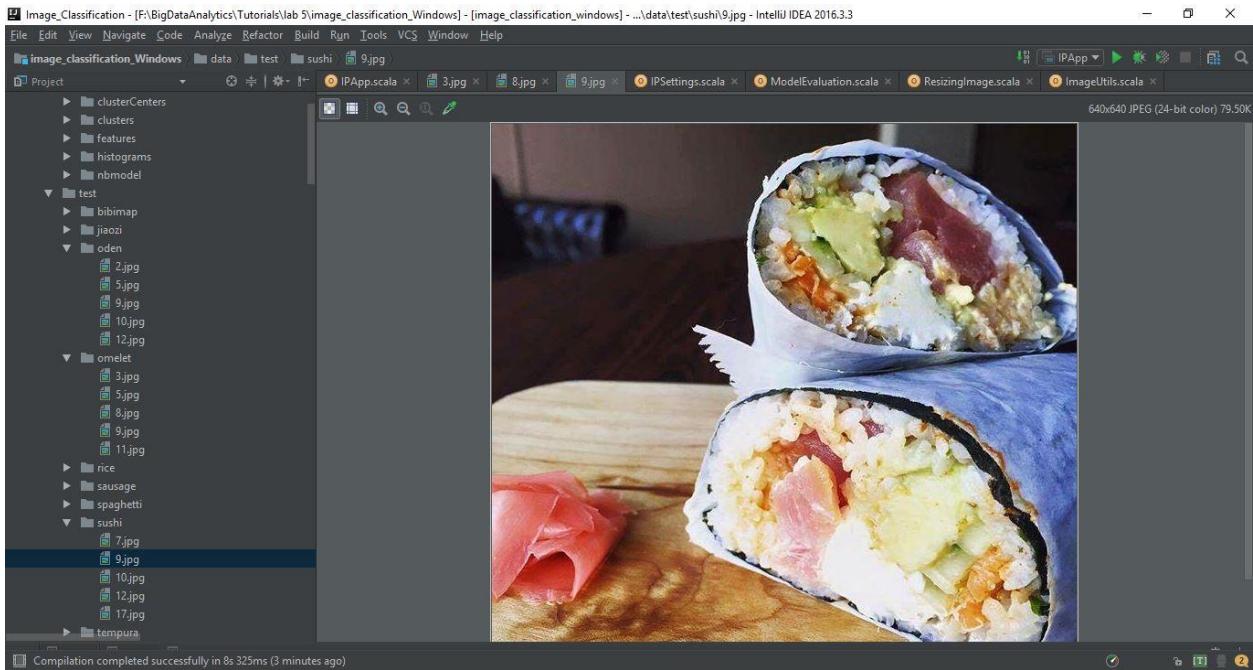
17/02/22 20:19:22 INFO RemoteActorRefProvider\$RemotingTerminator: Shutting down remote daemon.

17/02/22 20:19:22 INFO RemoteActorRefProvider\$RemotingTerminator: Remote daemon shut down; proceeding with flushing remote transports.

Process finished with exit code 0

Compilation completed successfully in 8s 325ms (2 minutes ago) 2890:1 LF: UTF-8: 2





From the confusion matrix obtained, the accuracy is 0.24 i.e 24 % accuracy on the test data sets. The data2 data set contains 9 categories of images like airplanes, bonsai, Buddha, airplanes etc. The outputs form data sets data2:

```
image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - ...\\src\\main\\scala\\IPApp.scala - IntelliJ IDEA 2016.3.3
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
Run IPApp IPApp IPApp IPApp
17/02/22 20:05:24 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:24 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:24 INFO InternalParquetRecordReader: block read in memory in 141 ms. row count = 100
17/02/22 20:05:24 INFO InternalParquetRecordReader: block read in memory in 141 ms. row count = 100
17/02/22 20:05:24 INFO InternalParquetRecordReader: block read in memory in 141 ms. row count = 100
17/02/22 20:05:24 INFO InternalParquetRecordReader: block read in memory in 141 ms. row count = 100
400 5
Histogram size : (400, 1)
Histogram : [ 0.0012132977, 0.0041252123, 0.002669255, 0.0031545742, 0.0019412764, 0.0021639358, 0.0019412764, 0.0033972336, 7.2797865E-4, 0.0012132977, 0.0055811694, 0.0036398931, 0.00
--Histogram size : 400
17/02/22 20:05:31 INFO FileInputFormat: Total input paths to process : 1
17/02/22 20:05:31 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 20:05:31 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 20:05:31 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 20:05:31 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 20:05:32 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:32 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:32 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:32 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 170 records.
17/02/22 20:05:32 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:32 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:32 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 259 records.
17/02/22 20:05:32 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 170
17/02/22 20:05:32 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:32 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:32 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 204 records.
17/02/22 20:05:32 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:32 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 259
17/02/22 20:05:32 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:32 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 204
17/02/22 20:05:32 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:32 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 287 records.
17/02/22 20:05:32 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:32 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:32 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 287
Predicting test image : accordian as anchor
```



```

Image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - [image_classification_windows] - ...\\src\\main\\scala\\IPApp.scala - IntelliJ IDEA 2016.3.3
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
image_classification_Windows
Run: IPApp IPApp IPApp
--Histogram size : 400
17/02/22 20:05:37 INFO FileInputFormat: Total input paths to process : 1
17/02/22 20:05:37 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:37 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:37 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:38 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:38 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 170 records.
17/02/22 20:05:38 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:38 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:38 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 170
17/02/22 20:05:38 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:38 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 259 records.
17/02/22 20:05:38 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:38 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:38 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 259
17/02/22 20:05:38 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:38 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 204 records.
17/02/22 20:05:38 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:38 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:38 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 204
Predicting test image : accordions as bonsai
file:///F:/BigDataAnalytics/Tutorials/lab 5/image_classification_Windows/data/test2/accordion/12.jpg
17/02/22 20:05:38 INFO FileInputFormat: Total input paths to process : 1
17/02/22 20:05:38 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:38 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:38 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:38 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:38 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:38 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:38 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:38 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 287 records.
17/02/22 20:05:38 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:38 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:38 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 287
All files are up-to-date (6 minutes ago)

```



```

Image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - [image_classification_windows] - ...\\src\\main\\scala\\IPApp.scala - IntelliJ IDEA 2016.3.3
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
image_classification_Windows
Run: IPApp IPApp IPApp
17/02/22 20:05:40 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:40 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 100
17/02/22 20:05:40 INFO ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:40 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 20:05:40 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:40 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:40 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 100
400 5
Histogram size : (400, 1)
Histogram : [ 0.0019540791, 0.0058622374, 9.770396E-4, 0.0019540791, 0.0014655594, 0.009281876, 9.770396E-4, 0.0034196386, 0.0053737178, 0.0053737178, 0.0048851976, 9.770396E-4, 0.00390
--Histogram size : 400
17/02/22 20:05:41 INFO FileInputFormat: Total input paths to process : 1
17/02/22 20:05:41 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:41 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:41 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:41 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:05:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 170 records.
17/02/22 20:05:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 170
17/02/22 20:05:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 259 records.
17/02/22 20:05:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 259
17/02/22 20:05:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:05:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 204 records.
17/02/22 20:05:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 204
17/02/22 20:05:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:05:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:05:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 204
All files are up-to-date (6 minutes ago)

```

Image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - [image_classification_windows] - ...\\src\\main\\scala\\IPApp.scala - IntelliJ IDEA 2016.3.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Run: IPApp IPApp IPApp

```

17/02/22 20:06:40 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:06:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 20:06:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:06:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:06:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 100
17/02/22 20:06:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 20:06:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:06:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 20:06:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:06:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:06:42 INFO InternalParquetRecordReader: block read in memory in 4 ms. row count = 100
17/02/22 20:06:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 100
17/02/22 20:06:42 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:42 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 20:06:42 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 20:06:42 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:06:42 INFO InternalParquetRecordReader: block read in memory in 0 ms. row count = 100
400 5
Histogram size : (400, 1)
Histogram : [ 0.0, 0.005053341, 0.0039303764, 0.0011229647, 5.6148233E-4, 0.014037059, 5.6148233E-4, 0.0, 5.6148233E-4, 5.6148233E-4, 0.0011229647, 0.0, 5.6148233E-4, 0.0,
--Histogram size : 400
17/02/22 20:06:43 INFO FileInputFormat: Total input paths to process: 1
17/02/22 20:06:44 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:06:44 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:06:44 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:06:44 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 20:06:45 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:45 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:45 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:45 NARM ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptCon
17/02/22 20:06:45 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 204 records.
17/02/22 20:06:45 INFO InternalParquetRecordReader: at row 0. reading next block

```

All files are up-to-date (6 minutes ago)

Image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - [image_classification_windows] - ...\\data2\\test\\barrel\\31.jpg - IntelliJ IDEA 2016.3.3

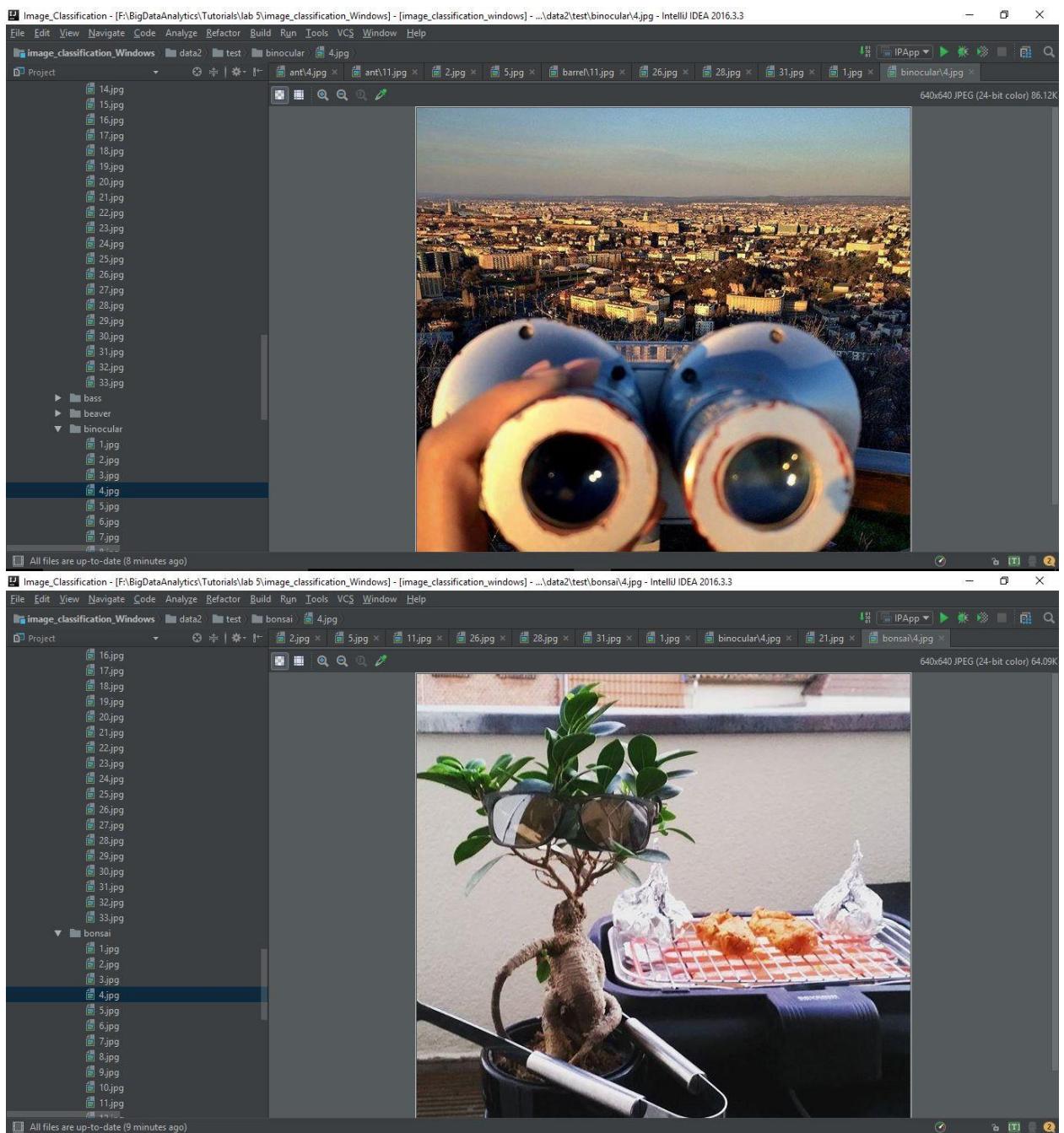
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

image_classification_Windows data2 test barrel 31.jpg

Project 7.jpg 1.jpg 4.jpg ant11.jpg 2.jpg 5.jpg barrel11.jpg 26.jpg 28.jpg 31.jpg

640x640 JPEG (24-bit color) 68.89K

All files are up-to-date (3 minutes ago)



The screenshot shows the IntelliJ IDEA interface with the following details:

- Project Structure:** The project is named "image_classification_Windows". It contains a "data2" folder with subfolders "model", "test", and "src". The "src" folder contains "IPApp.scala", "IPSettings.scala", "ModelEvaluation.scala", "ResizingImage.scala", and "Utils.scala".
- Code Editor:** The main editor window displays the content of `IPApp.scala`. The code defines a `IPApp` object with a `main` method. It includes imports, a constructor, and a `def extractDescriptors` method. The code uses annotations like `@param` and `@return`.
- Terminal Output:** The bottom panel shows the terminal output of the application's execution. It includes logs from `NativeCodeLoader`, `Slf4jLogger`, `Remoting`, `SparkUI`, and `FileInputFormat`. It also shows the termination of the node allocation process.
- Status Bar:** The status bar at the bottom indicates the file is up-to-date (4 minutes ago), the line number is 16661, the column is LF, the encoding is UTF-8, and there are tabs for "IPApp" and "IPApp" (with a green icon).

The data set could not provide full output, but models were generated. The output for **DataLab4** is also obtained with DataLab4 containing 6 categories of images namely airplane, apple, cats, eggs, noodles, wolves. Here are the screen shots from the output for DataLab4:

Image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - [image_classification_windows] - ...\\src\\main\\scala\\IPApp.scala - IntelliJ IDEA 2016.3.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

IPApp.scala IPSettings.scala ModelEvaluation.scala ResizingImage.scala ImageUtils.scala

```

  Project image_classification_Windows [image_classification_windows]
    > .idea
    > data
      > model
        > clusterCenters
        > clusters
        > features
        > histograms
        > rbmodel
      > test
        > bibimap
        > jiaoxi
        > odem
          > 2.jpg

```

IPApp extractDescriptors(...)

```

37     val data = images.map {
38       case (name, contents) => {
39         val desc = ImageUtils.descriptors(name.split("file:/")(1))
40         val list = ImageUtils.matToString(desc)
41         println("-- " + list.size)
42         list
43     }
44   }.reduce((x, y) => x :: y)
45
46   val featuresSeq = sc.parallelize(data)
47
48   featuresSeq.saveAsTextFile(IPSettings.FEATURES_PATH)
49
50   println("Total size : " + data.size)
51 }

```

Run: IPApp IPApp IPApp

```

17/02/22 20:27:25 INFO InternalParquetRecordReader: at row 0, reading next block
17/02/22 20:27:25 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:27:25 INFO InternalParquetRecordReader: block read in memory in 0 ms, row count = 204
Exception in thread "main" java.lang.IndexOutOfBoundsException: 6
  at scala.collection.LinearSeqOptimized$class.apply(LinearSeqOptimized.scala:65)
  at scala.collection.immutable.List.apply(List.scala:84)
  at IPApp$$anonfun$main$1.apply(IPApp.scala:305)
  at IPApp$$anonfun$main$1.apply(IPApp.scala:298)
  at scala.collection.IndexedSeqOptimized$class.foreach(IndexedSeqOptimized.scala:33)
  at scala.collection.mutable.ArrayOps$ofRef.foreach(ArrayOps.scala:186)
  at IPApp$.main(IPApp.scala:298)
  at IPApp.main(IPApp.scala) <5 internal calls>
17/02/22 20:27:26 INFO RemoteActorRefProvider$RemotingTerminator: Shutting down remote daemon.
17/02/22 20:27:26 INFO RemoteActorRefProvider$RemotingTerminator: Remote daemon shut down; proceeding with flushing remote transports.

Process finished with exit code 1

```

Compilation completed successfully in 5s 183ms (2 minutes ago)

Image_Classification - [F:\BigDataAnalytics\Tutorials\lab 5\image_classification_Windows] - [image_classification_windows] - ...\\DataLab4\\train\\airplane\\Airbus-A330-200F-0107a.jpg - IntelliJ IDEA 2016.3.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

image_classification_Windows DataLab4 train airplane Airbus-A330-200F-0107a.jpg IPApp IPSettings.scala ModelEvaluation.scala ResizingImage.scala

Project DataLab4
 > model
 > test
 > test2
 > train
 > airplane
 > 4227604005_7f0e80cb3b.jpg
 > 1658085909_08e0ff400d_z.jpg
 > AAAEAQAAAAAAAAMiaAAAJGVYTU5Y2
 > Airbus-A330-200F-0107a.jpg
 > airplane (1).jpg
 > Airplane (2).jpg
 > airplane (3).jpg
 > airplane.jpg

Run: IPApp IPApp IPApp

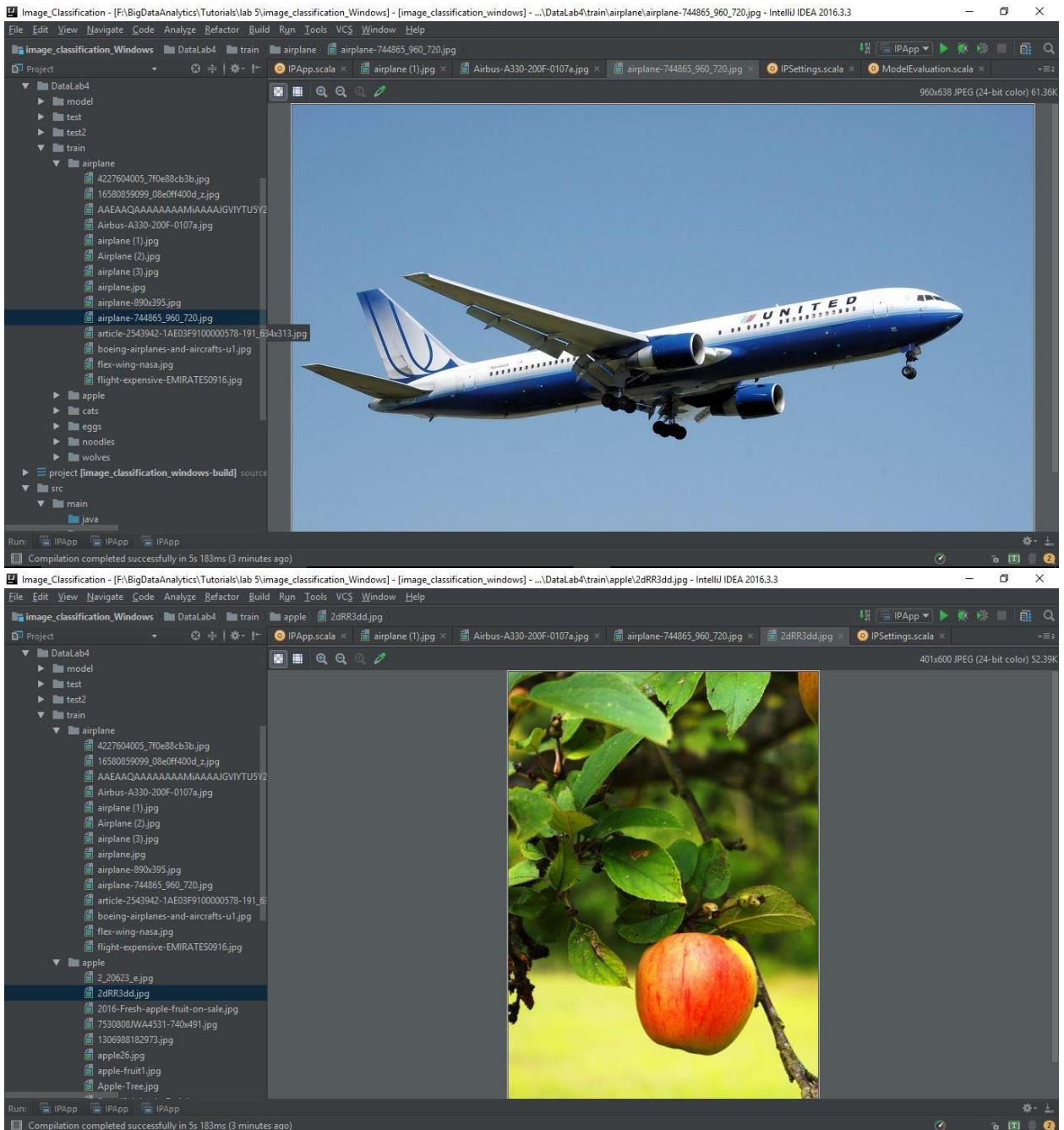
```

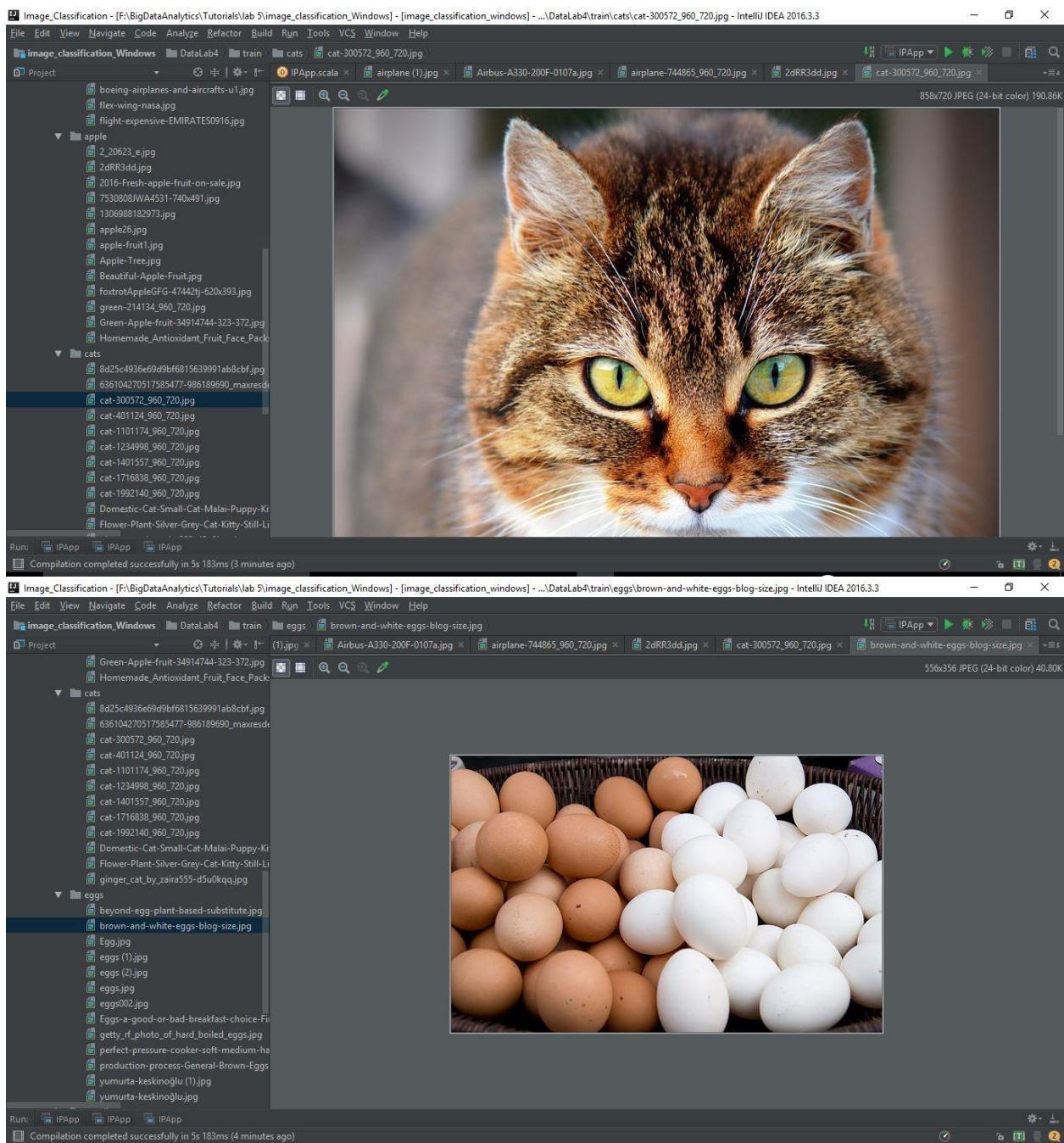
17/02/22 20:27:25 INFO InternalParquetRecordReader: at row 0, reading next block
17/02/22 20:27:25 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 20:27:25 INFO InternalParquetRecordReader: block read in memory in 0 ms, row count = 204
Exception in thread "main" java.lang.IndexOutOfBoundsException: 6
  at scala.collection.LinearSeqOptimized$class.apply(LinearSeqOptimized.scala:65)
  at scala.collection.immutable.List.apply(List.scala:84)
  at IPApp$$anonfun$main$1.apply(IPApp.scala:305)
  at IPApp$$anonfun$main$1.apply(IPApp.scala:298)
  at scala.collection.IndexedSeqOptimized$class.foreach(IndexedSeqOptimized.scala:33)
  at scala.collection.mutable.ArrayOps$ofRef.foreach(ArrayOps.scala:186)
  at IPApp$.main(IPApp.scala:298)
  at IPApp.main(IPApp.scala) <5 internal calls>
17/02/22 20:27:26 INFO RemoteActorRefProvider$RemotingTerminator: Shutting down remote daemon.
17/02/22 20:27:26 INFO RemoteActorRefProvider$RemotingTerminator: Remote daemon shut down; proceeding with flushing remote transports.

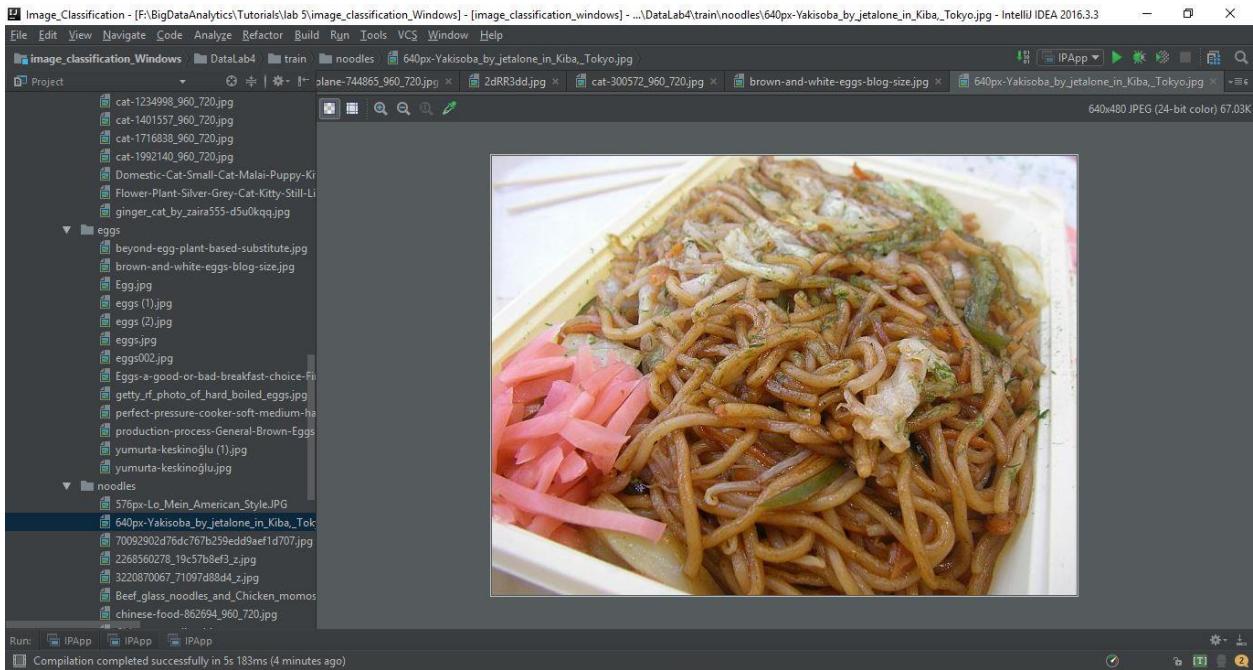
Process finished with exit code 1

```

Compilation completed successfully in 5s 183ms (2 minutes ago)







2. Client Application using Spark API

The client application program is run on data set **data**, the data set contains images from 4 categories omelet, rice, spaghetti, sushi. These are divided into train and test data sets. The input for this client app are the models generated from the previous program. The models, features and all the other models are taken as input for generating output. The output generated may not be right for every image since the accuracy for the data set is only 24%. Here are the screen shots for the output of the program:

```

C:\ Command Prompt - superstatic -p 8081
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\raghava koundinya>F:
F:\>BigDataAnalytics
'BigDataAnalytics' is not recognized as an internal or external command,
operable program or batch file.

F:>cd BigDataAnalytics
The system cannot find the path specified.

F:>cd BigDataAnalytics
F:\BigDataAnalytics>cd Tutorials
F:\BigDataAnalytics\Tutorials>cd Data Sets for Lab4
F:\BigDataAnalytics\Tutorials\Datasets for Lab4>cd ImageClassification
F:\BigDataAnalytics\Tutorials\Datasets for Lab4\ImageClassification>cd UI
F:\BigDataAnalytics\Tutorials\Datasets for Lab4\ImageClassification\UI>superstatic -p 8081
Superstatic started.
Visit http://localhost:8081 to view your app.

```

```
image_classification - [F:\BigDataAnalytics\Tutorials\Datasets\Lab4\imageClassification\image_classification] - [image_classification] - ...\\src\\main\\scala\\SimpleServer.scala - IntelliJ IDEA 2016.3.3
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
image_classification src main scala SimpleServer.scala
Run SimpleServer
G + "C:\Program Files\Java\jdk1.8.0_77\bin\java" ...
log4j:WARN No appenders could be found for logger (org.eclipse.jetty.util.log).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/tag.html#noconfig for more info.
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
17/02/22 21:24:44 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
17/02/22 21:24:47 INFO SLF4JLogger: SLF4JLogger started
17/02/22 21:24:47 INFO Remoting: Starting remoting
17/02/22 21:24:48 INFO Remoting: Remoting started; listening on addresses :[akka.tcp://sparkDriverActorSystem@192.168.1.167:49999]
17/02/22 21:24:54 INFO FileInputFormat: Total input paths to process : 1
17/02/22 21:24:55 INFO depreciation: mapred.tip.id is deprecated. Instead, use mapreduce.task.id
17/02/22 21:24:55 INFO depreciation: mapred.task.id is deprecated. Instead, use mapreduce.task.attempt.id
17/02/22 21:24:55 INFO depreciation: mapred.task.is.map is deprecated. Instead, use mapreduce.task.ismap
17/02/22 21:24:55 INFO depreciation: mapred.task.partition is deprecated. Instead, use mapreduce.task.partition
17/02/22 21:24:55 INFO depreciation: mapred.job.id is deprecated. Instead, use mapreduce.job.id
17/02/22 21:24:56 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 21:24:56 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 21:24:56 INFO ParquetFileReader: Initiating action with parallelism: 5
17/02/22 21:24:56 INFO ParquetFileReader: Initiating action with parallelism: 5
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
17/02/22 21:25:03 INFO depreciation: mapred.min.split.size is deprecated. Instead, use mapreduce.input.fileinputformat.split.minsize
17/02/22 21:25:04 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptContext$TaskAttempt
17/02/22 21:25:04 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptContext$TaskAttempt
17/02/22 21:25:04 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptContext$TaskAttempt
17/02/22 21:25:04 WARN ParquetRecordReader: Can not initialize counter due to context is not a instance of TaskInputOutputContext, but is org.apache.hadoop.mapreduce.task.TaskAttemptContext$TaskAttempt
[Stage 2+>                                         (0 + 4) / 4]17/02/22 21:25:04 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 21:25:04 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 21:25:04 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 100 records.
17/02/22 21:25:04 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 21:25:04 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 21:25:04 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 21:25:04 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 21:25:04 INFO InternalParquetRecordReader: Got brand-new decompressor [.g2]
17/02/22 21:25:04 INFO CodecPool: Got brand-new decompressor [.g2]

Platform and Plugin Updates
IntelliJ IDEA is ready to update.

Compilation completed successfully with 5 warnings in 30s 946ms (10 minutes ago)
```

```
IPSettings
1 /**
2  * Created by pradyumnad on 19/07/15.
3 */
4 object IPSettings {
5
6     val PATH = "data/"
7     //val INPUT_DIR = PATH + "train"
8     val TEST_INPUT_DIR = PATH + "test"
9     val FEATURES_PATH = PATH + "model/features"
10
11    val KMEANS_PATH = PATH + "model/clusters"
12    val KMEANS_CENTERS_PATH = PATH + "model/clusterCenters"
13    val HISTOGRAM_PATH = PATH + "model/histograms"
14    val RANDOM_FOREST_PATH = PATH + "model/nbmodel"
15
16 }
```

UI - [F:\BigDataAnalytics\Tutorials\Data Sets for Lab4\ImageClassification\UI] - [UI] - ...\\index.html - IntelliJ IDEA 2016.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

UI

Project

index.html custom.js

html head

```
</div>
<div class="col-md-1 text-center ver_centr">
    <input class="vertical-center" id="clk" type="button" value="Predict" />
</div>
<div class="col-md-4">
    <h3 id="txt_area"> </h3>
    
</div>
<h4>Select an Image:</h4>

<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
```

UI - [F:\BigDataAnalytics\Tutorials\Data Sets for Lab4\ImageClassification\UI] - [UI] - ...\\index.html - IntelliJ IDEA 2016.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

UI

Project

index.html custom.js

html head

```
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
<div class="col-lg-3 col-md-4 col-xs-6 thumb">
    <a class="thumbnail" href="#">
        
    </a>
</div>
```

Image_Classification - [F:\BigDataAnalytics\Tutorials\]Data Sets for Lab4\imageClassification\image_classification] - [image_classification] - ...\\src\\main\\scala\\SimpleServer.scala - IntelliJ IDEA 2016.3.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Project image_classification F:\BigDataAnalytics\Tutorials\]Data Sets for Lab4\imageClassification\image_classification

SimpleServer.scala SimpleServer ImageUtils.scala IPApp.scala SimpleServer.scala IPSets.scala

```

object SimplePlan extends Plan {
  def intent = {
    case req@GET(Path("/get")) => {
      Ok >> ResponseString(IPApp.testImage("data/test/rice/12.jpg"))
    }
    case req@POST(Path("/get_custom")) => {
      val imageByte = (new BASE64Decoder()).decodeBuffer(Body.string(req))
      val bytes = new ByteArrayInputStream(imageByte)
      val image = ImageIO.read(bytes)
      ImageIO.write(image, "png", new File("image.png"))
    }
    Ok >> ResponseString(IPApp.testImage("image.png"))
  }
}

object SimpleServer extends App {
  System.setProperty("hadoop.home.dir", "F:\\winutils")
  val bindingIP = SocketPortBinding(host = "127.0.0.1", port = 8080)
  unfiltered.jetty.Server.portBinding(bindingIP).plan(SimplePlan).run()
}

```

Run: SimpleServer SimpleServer SimpleServer SimpleServer

```

17/02/22 21:48:12 INFO CodecPool: Got brand-new decompressor (.gz)
17/02/22 21:48:12 INFO InternalParquetRecordReader: block read in memory in 38 ms. row count = 100
17/02/22 21:48:12 INFO InternalParquetRecordReader: block read in memory in 39 ms. row count = 100
17/02/22 21:48:12 INFO InternalParquetRecordReader: block read in memory in 36 ms. row count = 100
17/02/22 21:48:12 INFO InternalParquetRecordReader: block read in memory in 38 ms. row count = 100
17/02/22 21:48:12 INFO FileInputFormat: Total input paths to process : 1
All files are up-to-date (a minute ago)

```

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Project image_classification F:\BigDataAnalytics\Tutorials\]Data Sets for Lab4\imageClassification\image_classification

SimpleServer.scala ImageUtils.scala IPApp.scala SimpleServer.scala IPSets.scala

```

object SimplePlan extends Plan {
  def intent = {
    case req@GET(Path("/get")) => {
      Ok >> ResponseString(IPApp.testImage("data/test/rice/12.jpg"))
    }
    case req@POST(Path("/get_custom")) => {
      val imageByte = (new BASE64Decoder()).decodeBuffer(Body.string(req))
      val bytes = new ByteArrayInputStream(imageByte)
      val image = ImageIO.read(bytes)
      ImageIO.write(image, "png", new File("image.png"))
    }
    Ok >> ResponseString(IPApp.testImage("image.png"))
  }
}

object SimpleServer extends App {
  System.setProperty("hadoop.home.dir", "F:\\winutils")
  val bindingIP = SocketPortBinding(host = "127.0.0.1", port = 8080)
  unfiltered.jetty.Server.portBinding(bindingIP).plan(SimplePlan).run()
}

```

Run: SimpleServer SimpleServer SimpleServer SimpleServer

```

17/02/22 21:50:37 INFO deprecation: mapred.task.is.map is deprecated. Instead, use mapreduce.task.ismap
17/02/22 21:50:37 INFO deprecation: mapred.task.partition is deprecated. Instead, use mapreduce.task.partition
17/02/22 21:50:37 INFO deprecation: mapred.job.id is deprecated. Instead, use mapreduce.job.id
17/02/22 21:50:37 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 21:50:37 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 21:50:37 INFO ParquetfileReader: Initiating action with parallelism: 5
17/02/22 21:50:37 INFO ParquetfileReader: Initiating action with parallelism: 5
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
[Stage 1:-----> (3 + 1) / 4]

```

Remove redundant braces

The screenshot shows the IntelliJ IDEA 2016.3.3 interface with the following details:

- Project Structure:** The project is named "image_classification". It contains a "src" directory with "main" and "test" sub-directories. "main" contains "java", "resources", "scala", and "scala-2.11".
- Code Editor:** The file "SimpleServer.scala" is open, showing Scala code for a REST API. It defines a "SimplePlan" object with methods for handling GET and POST requests. It also defines a "SimpleServer" object extending "App".
- Run Log:** The "Run" tab shows the application's log output:

```
17/02/22 21:50:48 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 204 records.
17/02/22 21:50:48 INFO InternalParquetRecordReader: block read in memory in 6 ms. row count = 287
17/02/22 21:50:48 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 21:50:48 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 21:50:48 INFO InternalParquetRecordReader: block read in memory in 1 ms. row count = 204
17/02/22 21:50:48 INFO InternalParquetRecordReader: RecordReader initialized will read a total of 259 records.
17/02/22 21:50:48 INFO InternalParquetRecordReader: at row 0. reading next block
17/02/22 21:50:48 INFO CodecPool: Got brand-new decompressor [.gz]
17/02/22 21:50:48 INFO InternalParquetRecordReader: block read in memory in 1 ms. row count = 259
Test image predicted as : spaghetti
```
- Status Bar:** Shows the current time as 7:36, LF+, and UTF-8.

Here is the output from the web:

Image classification example

localhost:8081

Apache Spark - Image Classification

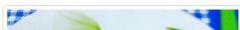
Image Class Prediction



Predict

Test image predicted as : omlete

Select an Image:



localhost:8081/#

Apache Spark - Image Classification

Image Class Prediction

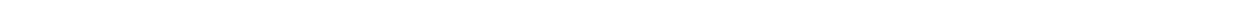
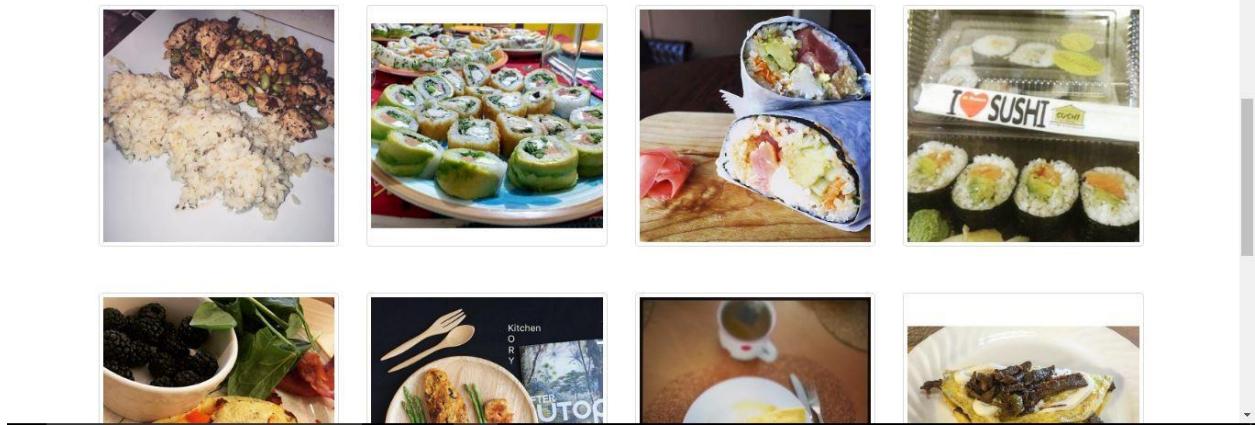
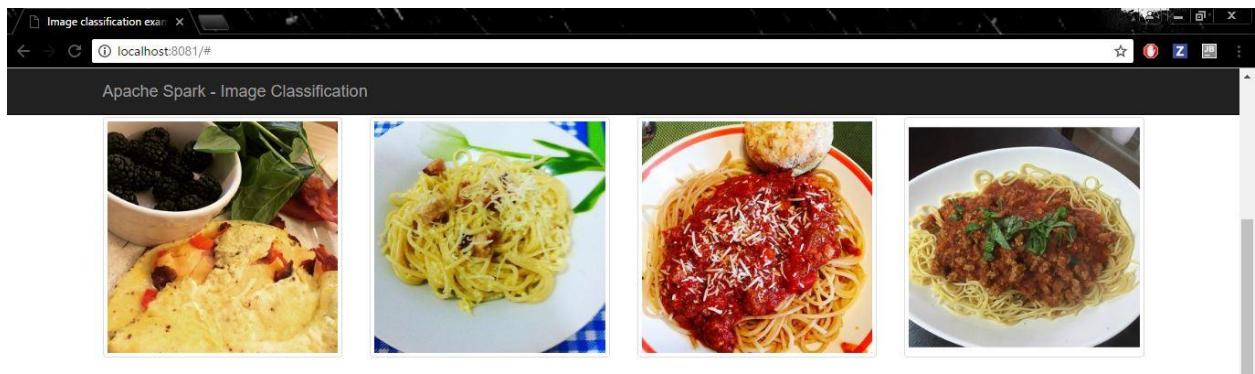


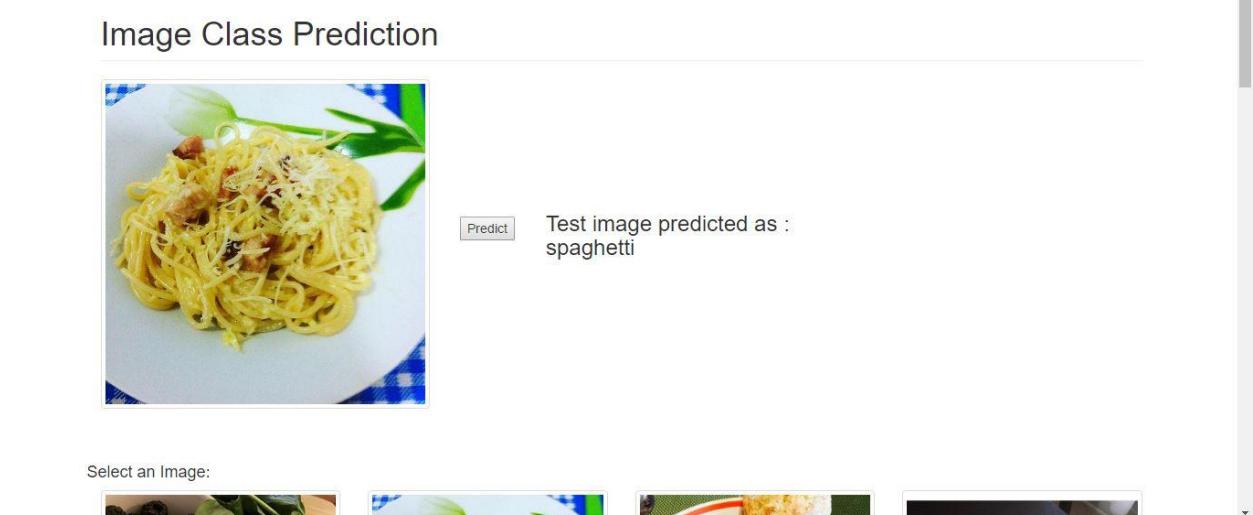
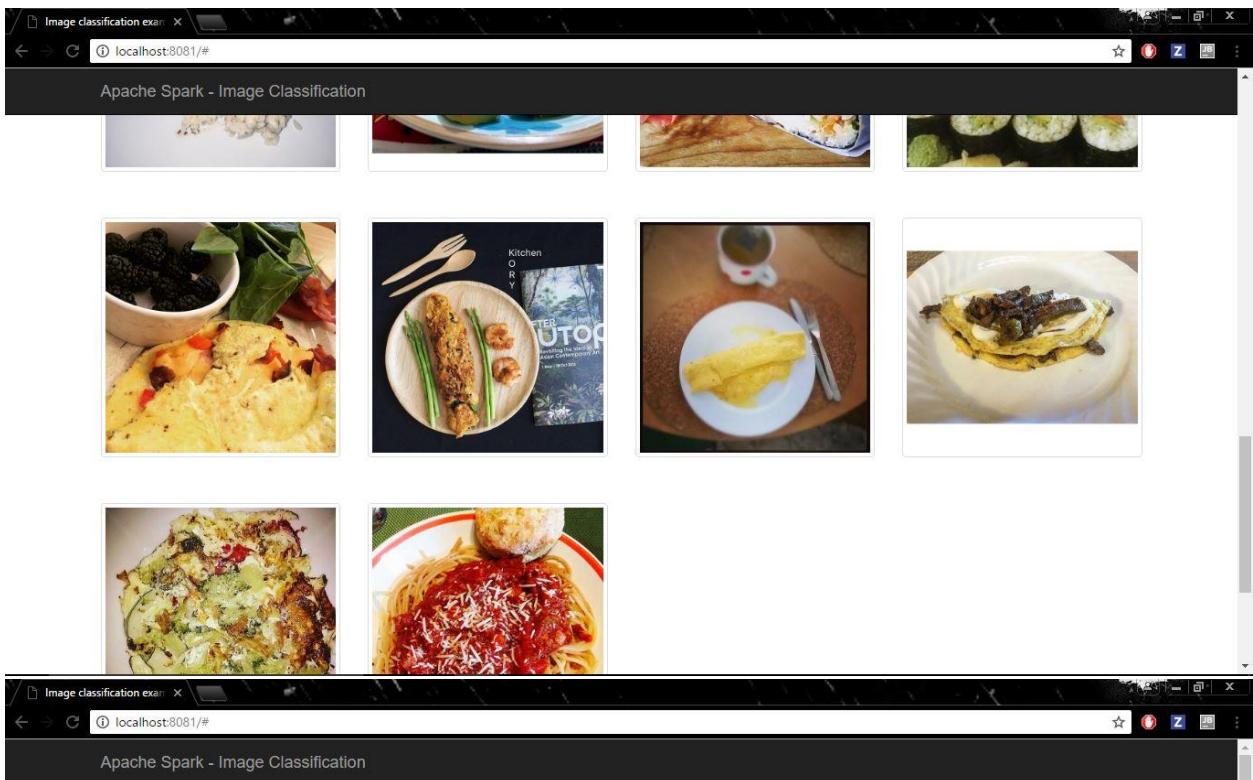
Predict



Select an Image:







3. Google Conversation API

The google conversation api is executed using the summary from the summary generated from the annotations from the video form tutorial lab 3. Here are the screen shots from the Google API conversation:

Secure | https://developers.google.com/actions/tools/web-simulator

Actions on Google

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GUIDES SAMPLES REFERENCE WEB SIMULATOR

Request

02/23/2017 @ 1:44AM

```
{
  "query": "what is in the video?",
  "accessToken": "ya29.Glv7A9_UNTuqlwyuwlkZlmoZr0-MPwQxxp8soDhPIf5kg0esW9a1RYv_Fdi1UyVrn4zmAwX7FXAZ0bPYVfEdxnM66hM40018X4JNv_u5dyQgJ2zTHUX8!YgITF8T",
  "expectUserResponse": true,
  "conversationToken": "CiZDIzU4Y...",
  "debugInfo": {
    "assistantToAgentDebug": {
      "assistantToAgentJson": {
        "user": {
          "user_id": "AbGm9kHGyson/elxUpOFbRhthh8YK/VHFFHz8mU6fHc=",
          "conversation": {
            "conversation_id": "1487835891149",
            "type": 2,
            "conversation_token": "[]"
          }
        },
        "inputs": [
          {
            "intent": "assistant.intent.action.TEXT",
            "raw_inputs": [
              {
                "input_type": 2,
                "query": "what is in the video?"
              }
            ]
          }
        ]
      }
    }
  }
}
```

talk to lab summary

Sure, here's lab summary
Hi! This is your assistant for Tutorial LAB 5

what is in the video?

The video is a sample video from window 7 media gallery. The video contains some scenic views from all over the world, such as mountains, waterfall etc. The video is a short video which is about 9 seconds long.

Type something, or click the mic and speak

Request

02/23/2017 @ 1:45AM

```
{
  "query": "how many frames are generated?",
  "accessToken": "ya29.Glv7A9_UNTuqlwyuwlkZlmoZr0-MPwQxxp8soDhPIf5kg0esW9a1RYv_Fdi1UyVrn4zmAwX7FXAZ0bPYVfEdxnM66hM40018X4JNv_u5dyQgJ2zTHUX8!YgITF8T",
  "expectUserResponse": true,
  "conversationToken": "CiZDIzU4Y...",
  "debugInfo": {
    "assistantToAgentDebug": {
      "assistantToAgentJson": {
        "user": {
          "user_id": "AbGm9kHGyson/elxUpOFbRhthh8YK/VHFFHz8mU6fHc=",
          "conversation": {
            "conversation_id": "1487835891149",
            "type": 2,
            "conversation_token": "[]"
          }
        },
        "inputs": [
          {
            "intent": "assistant.intent.action.TEXT",
            "raw_inputs": [
              {
                "input_type": 2,
                "query": "how many frames are generated?"
              }
            ]
          }
        ]
      }
    }
  }
}
```

what is in the video?

The video is a sample video from window 7 media gallery. The video contains some scenic views from all over the world, such as mountains, waterfall etc. The video is a short video which is about 9 seconds long.

how many frames are generated?

There are total of 270 frames generated from the video!

Type something, or click the mic and speak

Actions on Google Design **Develop** Distribute Support Search All Products

GUIDES SAMPLES REFERENCE **WEB SIMULATOR**

mountains, waterfall etc. The video is a short video which is about 9 seconds long.

how many frames are generated? U

There are total of 270 frames generated from the video!

what is the tutorial about? U

The tutorial is about summarizing the annotations generated from the video!

Type something, or click the mic and speak Microphone icon

Request 02/23/2017 @ 1:46AM

```
{
  "query": "what is the tutorial about?",
  "accessToken": "ya29.Glv7A9_UWTuqNwyuWkZlmoZr0-MPvQxxp8soODhpIf5kgOesw0a1RYv_Fdi1UyVrn4zmAwX7FXA2bPYVfEdxnM66hM40018X4JNv_u5dyQgJ2zTHUX8MygITF8T",
  "expectUserResponse": true,
  "conversationToken": "CiZDIZu4Y..." Copy,
  "debugInfo": {
    "assistantToAgentDebug": {
      "assistantToAgentJson": {
        "user": {
          "user_id": "AbGm9kHGson/elxUpOFbRHthh8YK/VHFFHz8mU6fHc=",
          "conversation": {
            "conversation_id": "1487835891149",
            "type": 2,
            "conversation_token": "[]"
          },
          "inputs": [
            {
              "intent": "assistant.intent.action.TEXT",
              "raw_inputs": [
                {
                  "input_type": 2,
                  "query": "what is the tutorial about?"
                }
              ]
            }
          ]
        }
      }
    }
  }
}
```

<https://developers.google.com/actions/>

Actions on Google Design **Develop** Distribute Support Search All Products

GUIDES SAMPLES REFERENCE **WEB SIMULATOR**

The tutorial is about summarizing the annotations generated from the video!

what is the summary of the video? U

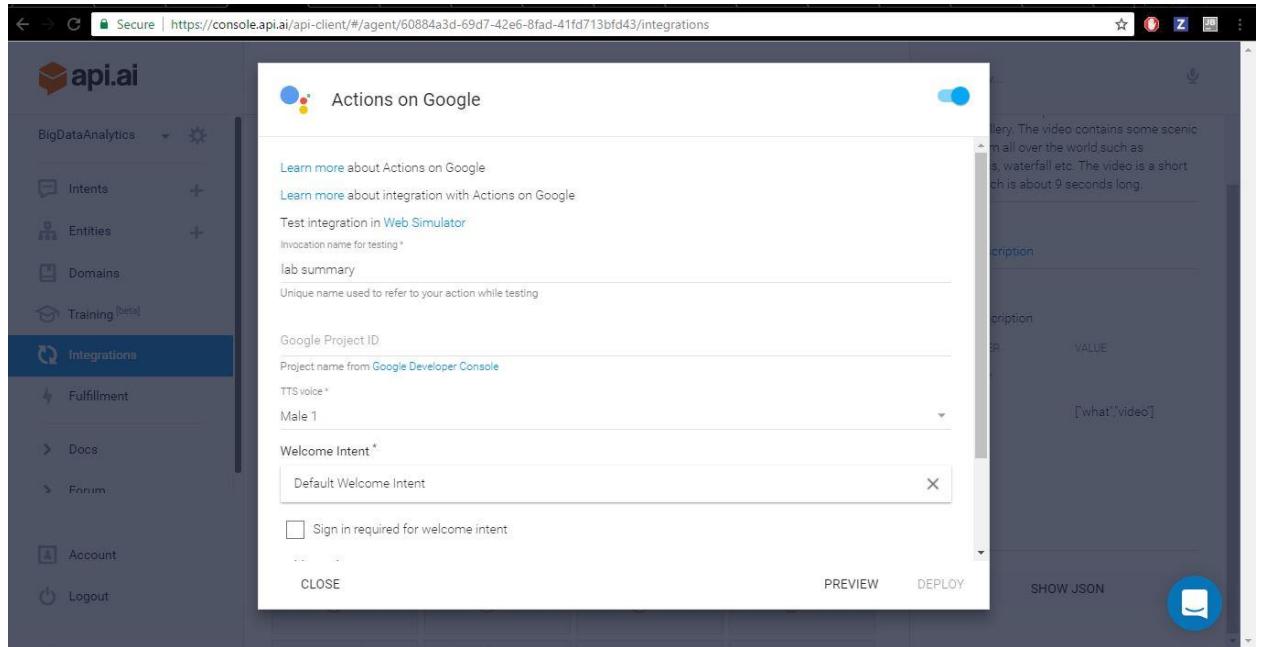
The video contains a total number of 270 frames out of which 35 frames are the main/key frames. The video annotation is based on these key/main frames. The video is a mixture of several outdoor sceneries and the total length of the video is 10 seconds. The video starts with main frame image 0 as seen above contains mountain, sky.

Type something, or click the mic and speak Microphone icon

Request 02/23/2017 @ 1:47AM

```
{
  "query": "what is the summary of the video?",
  "accessToken": "ya29.Glv7A9_UWTuqNwyuWkZlmoZr0-MPvQxxp8soODhpIf5kgOesw0a1RYv_Fdi1UyVrn4zmAwX7FXA2bPYVfEdxnM66hM40018X4JNv_u5dyQgJ2zTHUX8MygITF8T",
  "expectUserResponse": true,
  "conversationToken": "CiZDIZu4Y..." Copy,
  "debugInfo": {
    "assistantToAgentDebug": {
      "assistantToAgentJson": {
        "user": {
          "user_id": "AbGm9kHGson/elxUpOFbRHthh8YK/VHFFHz8mU6fHc=",
          "conversation": {
            "conversation_id": "1487835891149",
            "type": 2,
            "conversation_token": "[]"
          },
          "inputs": [
            {
              "intent": "assistant.intent.action.TEXT",
              "raw_inputs": [
                {
                  "input_type": 2,
                  "query": "what is the summary of the video?"
                }
              ]
            }
          ]
        }
      }
    }
  }
}
```

<https://developers.google.com/actions/>



Created an app in heroku:

```
Created an app in heroku:
C:\Users\raghava koundinya>heroku login
See other CLI commands with heroku help

C:\Users\raghava koundinya>heroku login
Enter your Heroku credentials.
Email: raghava.6464@gmail.com
Password (typing will be hidden):
Logged in as raghava.6464@gmail.com

C:\Users\raghava koundinya>cd ~/myapp
The system cannot find the path specified.

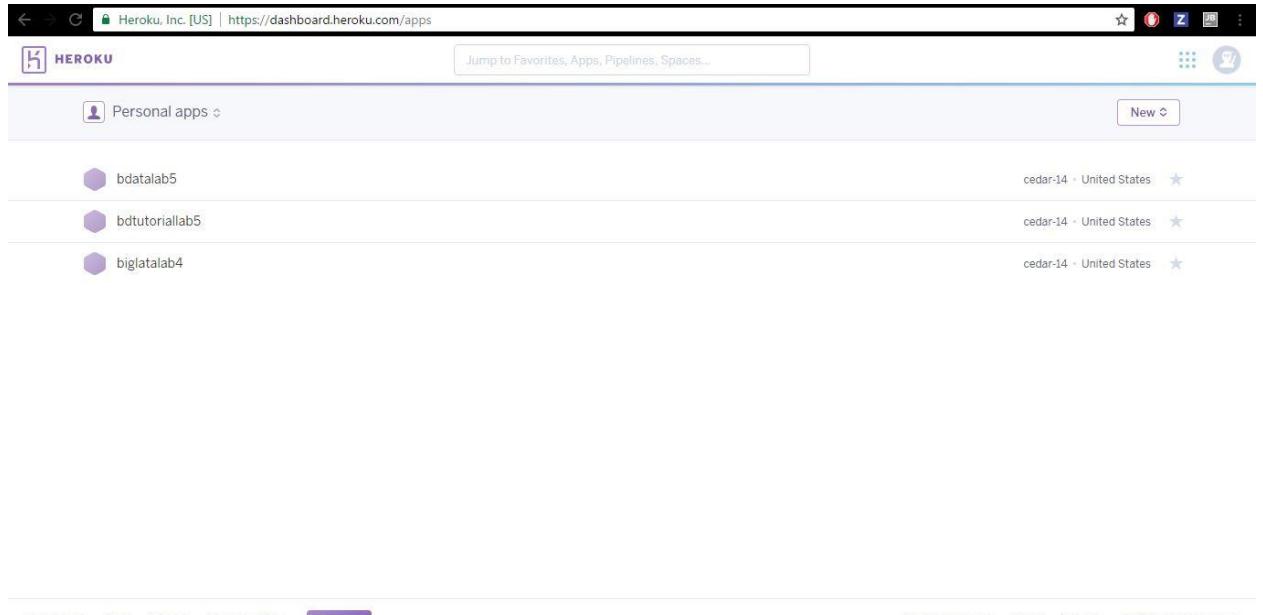
C:\Users\raghava koundinya>heroku create BigDataLab5
Creating BigDataLab5...
Name must start with a letter and can only contain lowercase letters, numbers, and dashes.

C:\Users\raghava koundinya>heroku create bigdatalab5
Creating bigdatalab5...
Name is already taken

C:\Users\raghava koundinya>heroku create tutorials5
Creating tutorials5...
Name is already taken

C:\Users\raghava koundinya>heroku create bdtutorialallabs
Creating bdtutorialallabs... done
https://bdtutorialallabs.herokuapp.com/ | https://git.heroku.com/bdtutorialallabs.git

C:\Users\raghava koundinya>
```



The screenshot shows the Heroku Dashboard interface. At the top, there's a navigation bar with links for 'Dashboard', 'Logs', 'Settings', 'Scaling', 'Processes', 'Buildpacks', 'Deployments', 'Metrics', and 'Analytics'. Below the dashboard, there's a section for 'Personal apps' with three listed:

- bdatalab5 (cedar-14 - United States)
- bdtutoriallab5 (cedar-14 - United States)
- biglatalab4 (cedar-14 - United States)

On the right side of the dashboard, there are buttons for 'New' and 'Import'. Below the dashboard, there's a command prompt window titled 'Command Prompt'.

```
heroku.com Blogs Careers Documentation Support https://dashboard.heroku.com
https://dashboard.heroku.com

Command Prompt
! Run heroku help for a list of available commands.
C:\Users\raghava koundinya>F:
F:>cd BigDataAnalytics
F:\BigDataAnalytics>cd Tutorials
F:\BigDataAnalytics\Tutorials>cd Lab 5
F:\BigDataAnalytics\Tutorials\lab 5>cd ClientApp
The system cannot find the path specified.
F:\BigDataAnalytics\Tutorials\lab 5>cd Source Code
F:\BigDataAnalytics\Tutorials\lab 5\Source Code>cd ClientApp
F:\BigDataAnalytics\Tutorials\lab 5\Source Code\ClientApp>cd target
F:\BigDataAnalytics\Tutorials\lab 5\Source Code\ClientApp\target>heroku create bdatalab5
Creating bdatalab5... done
https://bdatalab5.herokuapp.com/ | https://git.heroku.com/bdatalab5.git
F:\BigDataAnalytics\Tutorials\lab 5\Source Code\ClientApp\target>heroku deploy:jar service.war --app bdatalab5
! deploy:jar is not a heroku command.
! Perhaps you meant destroy?
! Run heroku _ to run heroku destroy service.war --app bdatalab5.
! Run heroku help for a list of available commands.
F:\BigDataAnalytics\Tutorials\lab 5\Source Code\ClientApp\target>
```

But there was some error in deploying the service.war. So the Webhook was not been deployed.