Amazon Fine Food Reviews

Data Preparation

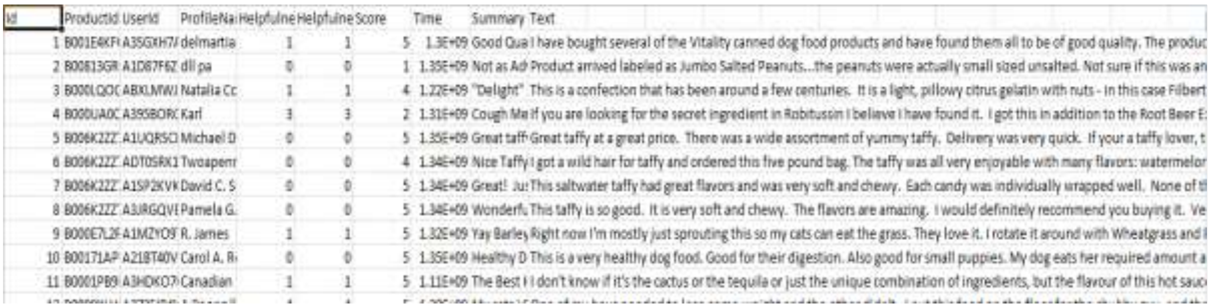
Data is downloaded from

https://www.kaggle.com/snap/amazon-fine-food-reviews

This dataset consists of reviews of fine foods from amazon. The data span a period of more than 10 years, including all ~500,000 reviews up to October 2012.

It contains the following fields:

1. Id
2. ProductId
3. UserId
4. ProfileName
5. HelpfulnessNumerator
6. HelpfulnessDenominator
7. Score : Ranging 1 to 5
8. Time
9. Summary
10. Text



Id	ProductId	UserId	ProfileNa	Helpfulne	Helpfulne	Score	Time	Summary	Text
1	B001E4KF	A3SGXH7/	delmartia	1	1	5	1.3E+09	Good Qua	I have bought several of the Vitality canned dog food products and have found them all to be of good quality. The produc
2	B00813GR	A1D87F6Z	dll pa	0	0	1	1.35E+09	Not as Ad	Product arrived labeled as Jumbo Salted Peanuts...the peanuts were actually small sized unsalted. Not sure if this was an
3	B000LQOC	ABXLMWJ	Natalia Cc	1	1	4	1.22E+09	"Delight"	This is a confection that has been around a few centuries. It is a light, pillowy citrus gelatin with nuts - In this case Filbert
4	B000UA0C	A395BORC	Karl	3	3	2	1.31E+09	Cough Me	If you are looking for the secret ingredient in Robitussin I believe I have found it. I got this in addition to the Root Beer E:
5	B006K2ZZ	A1UQRSC	Michael D	0	0	5	1.35E+09	Great taff	Great taffy at a great price. There was a wide assortment of yummy taffy. Delivery was very quick. If your a taffy lover, t
6	B006K2ZZ	ADT0SRK1	Twoapenr	0	0	4	1.34E+09	Nice Taffy	I got a wild hair for taffy and ordered this five pound bag. The taffy was all very enjoyable with many flavors: watermelor
7	B006K2ZZ	A1SP2KVK	David C. S	0	0	5	1.34E+09	Great! Ju:	This saltwater taffy had great flavors and was very soft and chewy. Each candy was individually wrapped well. None of tl
8	B006K2ZZ	A3JRGQVE	Pamela G.	0	0	5	1.34E+09	Wonderfu	This taffy is so good. It is very soft and chewy. The flavors are amazing. I would definitely recommend you buying it. Ve
9	B000E7L2F	A1MZYO9	R. James	1	1	5	1.32E+09	Yay Barley	Right now I'm mostly just sprouting this so my cats can eat the grass. They love it. I rotate it around with Wheatgrass and I
10	B00171AP	A21BT40V	Carol A. R	0	0	5	1.35E+09	Healthy D	This is a very healthy dog food. Good for their digestion. Also good for small puppies. My dog eats her required amount a
11	B0001PB9	A3HDKO7	Canadian	1	1	5	1.11E+09	The Best I	I don't know if it's the cactus or the tequila or just the unique combination of ingredients, but the flavour of this hot sauc

In this, we label those reviews as positive whose score is either 4 or 5 and as negative whose score is either 1 or 2. Records with score 3 are not considered for classification.

Loading data into a dataframe:

```
val df = spark.read.
                    format("csv")
                    .option("header","true")
                    .option("inferSchema","true")
                    .load("/home/harsh/Desktop/amazon food/Reviews.csv")
```

Removing records with score 3:

```
val n = df.filter("Score !=3")
```

Making a udf for labelling based on score:

```
def lo(i:Int) :Int = { if(i>3){1} else{0} }
```

```
val labelling = udf(lo _)
```

Extracting the required columns along with labelling:

```
val fine = n.select(labelling($"Score").alias("label"),
$"HelpfulnessNumerator", $"HelpfulnessDenominator",
$"Summary", $"Text" )
```

Taking only consistent data:

```
val consistent = fine.filter($"HelpfulnessNumerator" <= $"HelpfulnessDenominator")
```

Making an udf for pre-processing (removing emojis, website links, special characters, unnecessary spaces)

```
def prep(d:String) :String = { d.replace("\"","").toLowerCase()
      .replaceAll("\n", "")
      .replaceAll("rt\\s+", "")
      .replaceAll("\\s+@\\w+", "")
      .replaceAll("@\\w+", "")
      .replaceAll("\\s+#\\w+", "")
      .replaceAll("#\\w+", "")
      .replaceAll("(?:https?|http?)://[\\w/%.-]+", "")
      .replaceAll("(?:https?|http?)://[\\w/%.-]+\\s+", "")
      .replaceAll("(?:https?|http?)//[\\w/%.-]+\\s+", "")
      .replaceAll("(?:https?|http?)//[\\w/%.-]+", "")
      .replaceAll("[^\u0000-\uFFFF]","")
      .replaceAll("(\u00a9|\u00ae|[\u2000-\u3300]|\ud83c[\ud000-\udfff]|\ud83d[\ud000-\udfff]|\ud83e[\ud000-\udfff])","")
      .trim()
}

val preProcess = udf(prep _)

val data = consistent.select($"label", $"HelpfulnessNumerator", $"HelpfulnessDenominator", concat(preProcess($"Summary"), lit(" "), preProcess($"Text")).alias("text"))
```

Then, we want to use nlp stemming, so we convert string into document, then token, then normalizer, then stemmer, then finisher.

```
val document = new DocumentAssembler()
                                        .setInputCol("text")
                                       .setOutputCol("document")


val d1 = document.transform(data)


val token = new com.johnsnowlabs.nlp.annotator.Tokenizer()
                                                .setInputCols("document")
                                               .setOutputCol("token")


val t1 = token.fit(d1).transform(d1)


val normalizer = new Normalizer()
                                  .setInputCols("token")
                                 .setOutputCol("normal")


val n1 = normalizer.fit(t1).transform(t1)


val stemmer = new Stemmer()
                          .setInputCols("normal")
                          .setOutputCol("stem")
```

```
val s1 = stemmer.transform(n1)

val finisher = new Finisher()
                       .setInputCols("stem")
                       .setOutputCols("final")

val f1 = finisher.transform(s1)
```

After loading, we need to convert text into feature vectors.

```
val hashingTF = new HashingTF()
.setInputCol("filtered").setOutputCol("rawFeatures").setNumFeatures(10000)

val featurizedData = hashingTF.transform(f1)

val idf = new IDF().setInputCol("rawFeatures").setOutputCol("features")

val idfModel = idf.fit(featurizedData)

val rescaledData = idfModel.transform(featurizedData)
```

Combining HelpfulnessNumerator, HelpfulnessDenominator and features to a vector column:

```
val assembler = new VectorAssembler()
.setInputCols(Array("HelpfulnessNumerator", "HelpfulnessDenominator", "features"))

  .setOutputCol("finalFeatures")

val output = assembler.transform(rescaledData)

val limited  = output.select($"label",$"finalFeatures".alias("features"))
```

Then we split the transformed data into two subsets i.e. training and test(ratio 0.8:0.2)

```
val Array(training, test) = limited.randomSplit(Array[Double](0.8,0.2))
```

Model Selection and Model Tuning

We tried Logistic Regression for classification.

```
val lr = new LogisticRegression().setMaxIter(10).setRegParam(0.01).setLabelCol("label").setElasticNetParam(0.5)


val model = lr.fit(training)

val preTr = model.transform(training)

val preTs = model.transform(test)
```

Conclusion

We evaluated accuracy for model using MultiClassClassification Evaluator and got 90 % accuracy for both training and testing.

```
val evaluator = new MulticlassClassificationEvaluator()
                    .setLabelCol("label")
                    .setPredictionCol("prediction")
                    .setMetricName("accuracy")
val train_accuracy = evaluator.evaluate(preTr)
val test_accuracy = evaluator.evaluate(preTs)
```