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Big Data Analytics

Practical 7

Aim

Implement any one of the analytic algorithms using mapreduce by handling larger datasets in main memory. PCY/Multi-Hash/SON algorithm Regression K-means Clustering.

Code

```
import java.io.*;
import java.util.*;
import java.util.StringTokenizer;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.fs.FSDataOutputStream;
import org.apache.hadoop.fs.FileSystem;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
import
org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import
org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;
public class Prac7 {
    public static class TokenizerMapper extends Mapper <
Object, Text, Text, IntWritable > {
        private Text word = new Text();private Text
center = new Text();
        List < Integer > Centroids;
        Path centroids;
        FileSystem fs;
        protected void setup(Context context) throws
IOException,
```

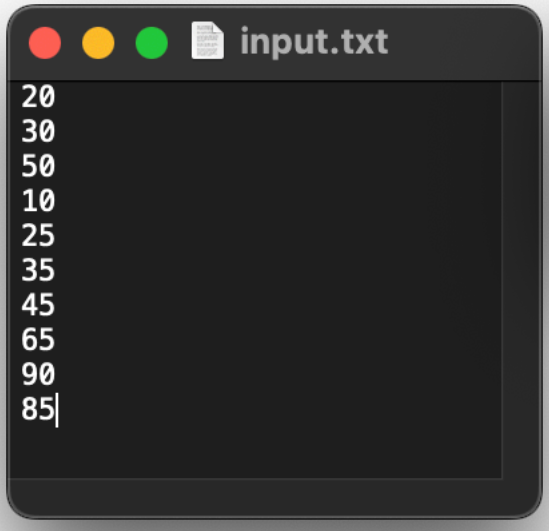
```
        InterruptedException {
            Centroids = new ArrayList < > ();
            centroids = new Path("hdfs:/prac7/
centroids.txt"); //Location of file in HDFS fs =
FileSystem.get(context.getConfiguration());
            BufferedReader br = new BufferedReader(new
InputStreamReader(fs.open(centroids)));
            String line;
            line = br.readLine();
            while (line != null) {
                Centroids.add(Integer.parseInt(line));
                line = br.readLine();
            }
        }
        public void map(Object key, Text value, Context
context) throws IOException,
        InterruptedException {
            StringTokenizer itr = new
StringTokenizer(value.toString());
            while (itr.hasMoreTokens()) {
                word.set(itr.nextToken());
                int datapoint =
Integer.parseInt(word.toString());
                int min = Integer.MAX_VALUE;
                for (int i = 0; i < Centroids.size(); i+
+) {
                    int dist = Math.abs(datapoint -
Centroids.get(i));
                    if (dist < min) {
                        min = dist;
                        center.set(Centroids.get(i) +
"");
                    }
                }
                context.write(center, new
IntWritable(datapoint));
            }
        }
    }
    public static class IntSumReducer extends Reducer <
Text, IntWritable, Text, IntWritable > {
        private IntWritable result = new IntWritable();
        List < Integer > newCentroids;
```

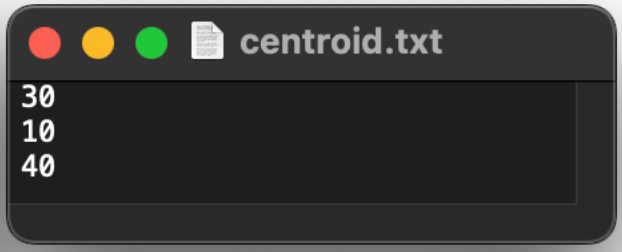
```
        Path centroids;FileSystem fs;
        protected void setup(Context context) throws
IOException,
        InterruptedException {
            newCentroids = new ArrayList < > ();
            centroids = new Path("hdfs:/prac7/
centroids.txt"); //Location of file in HDFS
            fs =
FileSystem.get(context.getConfiguration());
        }
        public void reduce(Text key, Iterable <
IntWritable > values, Context context) throws
IOException,
        InterruptedException {
            int sum = 0;
            int length = 0;
            for (IntWritable val: values) {
                sum += val.get();
                length++;
            }
            result.set(sum / length);

newCentroids.add(Integer.parseInt(result.toString()));
        }
        protected void cleanup(Context context) throws
IOException,
        InterruptedException {
            FSDataOutputStream out = fs.create(centroids,
true);
            BufferedWriter bw = new BufferedWriter(new
OutputStreamWriter(out));
            for (Integer itr: newCentroids) {
                System.out.println(itr);;
                bw.write(itr + "\n");
            }
            bw.close();
        }
    }
    public static void main(String[] args) throws
Exception {
        for (int i = 0; i < 3; i++) {}
    }
    Configuration conf = new Configuration();
```

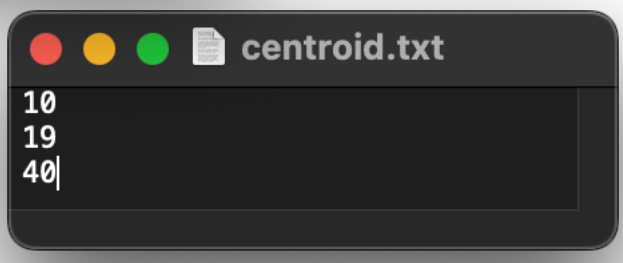
```
    Job job = Job.getInstance(conf, "KMeans");
    job.setJarByClass(Prac7.class);
    job.setMapperClass(TokenizerMapper.class);
    job.setReducerClass(IntSumReducer.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
    FileInputFormat.addInputPath(job, new Path(args[0]));
    FileSystem fs = FileSystem.get(conf);
    if (fs.exists(new Path(args[1] + "/" + i))) {
        fs.delete(new Path(args[1] + "/" + i), true);
    }
    FileOutputFormat.setOutputPath(job, new Path(args[1]
+ "/" + i));
    job.waitForCompletion(true);
     }
  }
}
```

Input File :





Output File :



Conclusion

In this practical, I have implemented k means clustering using Hadoop map reduce through which we can obtain centroids of a given set of points in 1 dimensions.