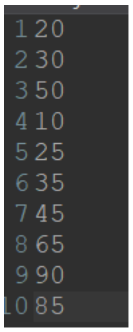
BDA
Practical 7
19BCE248

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:



```
20
30
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25
35
45
65
90
85
```
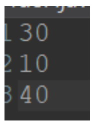
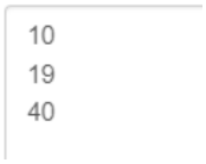



```
30
10
40
```

OUTPUT FILE:



```
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19
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```