

### MapReduce Function:

```
from mrjob.job import MRJob # import the mrjob library
from mrjob.step import MRStep # import the mrStep library

class MRtarget(MRJob):
    def steps(self):
        return [
            MRStep(mapper=self.mapper_get_target,
                   reducer=self.reducer_count_target)
        ]

    # the map step: each line in the csv file is read as a key, value pair

    def mapper_get_target(self, _, target):
        yield target, 1

    # the reduce step: combine all tuples with the same key
    # then sum all the values of the tuple, which will give the total value

    def reducer_count_target(self, key, values):
        yield key, sum(values)

if __name__ == '__main__':
    MRtarget.run()
```

### 1- Count change category for each sector:

```
[maria_dev@sandbox-hdp ~]$ python project_MapReduce.py -r hadoop --hadoop-streaming-jar /usr/hdp/current/hadoop-mapreduce-client/hadoop-streaming.jar data._Sector_change.csv
```

### The output :

```
Streaming final output from hdfs:///user/maria_dev/tmp/mrjob/project_MapReduce.m
aria_dev.20221129.173214.064348/output...
"Communication Services,Bad Change"      10023
"Communication Services,Good Change"     9068
"Communication Services,Stable" 2257
"Consumer Discretionary,Bad Change"      24937
"Consumer Discretionary,Good Change"     23996
"Consumer Discretionary,Stable" 5923
"Consumer Staples,Bad Change" 28450
"Consumer Staples,Good Change" 27502
"Consumer Staples,Stable" 8734
"Energy,Bad Change" 7202
"Energy,Good Change" 6904
"Energy,Stable" 1625
"Financials,Bad Change" 67244
"Financials,Good Change" 63151
"Financials,Stable" 14455
"Health Care,Bad Change" 8259
"Health Care,Good Change" 8018
"Health Care,Stable" 1548
"IT,Bad Change" 394
"IT,Good Change" 360
"IT,Stable" 52
"Industrials,Bad Change" 28957
"Industrials,Good Change" 27568
"Industrials,Stable" 7412
"Materials,Bad Change" 63853
"Materials,Good Change" 61414
"Materials,Stable" 16277
"Real Estate,Bad Change" 19975
"Real Estate,Good Change" 18838
"Real Estate,Stable" 5650
"Utilities,Bad Change" 3804
"Utilities,Good Change" 3816
"Utilities,Stable" 1765
```