**DSBA 6100-U01 – Spring 2016**

**Big Data Analytics for Competitive Advantage**

**Group Project – Part 3**

**Technical Report**

**Team 5**

**Team Members:**

Kerri Easterbrook

Xiazhi (Sherri) Fang

Madlen Ivanova

Diana Kinney

Mahalakshmi Vishnampettai Raghuraman

Aravindharaj Rajendran

Divya Ravi

**1. Solution Overview**

To gain insight into the relationships between company performance, social responsibility, patent development, and current political climate, technology solutions were used to extract and analyze semi-structured and structured data for Fortune 500 companies.

**2. Structured Data: Fortune 500 details & US Presidential Election data**

Historical fortune 500 company annual sales, net income, research & development expense, age, number of employees, corporate social responsibility (CSR), etc. was downloaded from CompuStat as an MS Excel file. The Federal Archives website provided historical election data including year, president, and party in office in another MS Excel file. Research & Development expense was used to estimate a company’s historical level of innovation, whereas a count of “analyst” jobs currently posted on indeed.com was used to reflect a snapshot of each company’s current analytics level.

**3. Semi-Structured Data: US & European Patent Counts**

US patent data in XML file was staged on DSBA server file system. The source drive contained weekly data of patents in separate folders and files. The weekly data composed of 52 files was consolidated into a yearly file for each year. Then the source data was structured into 11 files, one for each year from 2005-2015. Connection to the server was established through putty, with further folder and file manipulations performed through linux shell scripting. Commands include unzip, cat, cd, mv, mkdir, less, and more.

US patent schema (XSD) was analyzed to identify the xml elements that correspond to the key attributes identified for hypothesis and analysis. The key three elements were identified to be Org name, abstract, and invention title. Java MapReduce Program was developed using Eclipse IDE installed on Cloudera Hadoop distribution. The program was tested using one sample file from the patent corpus and verified to extract the three key elements for three sample companies. The project in Eclipse was then exported to a JAR file. This JAR file was then deployed to the DSBA Hadoop server. Command – SCP source file target was used for deployment. Eleven data files staged at DSBA server file system were also migrated to the DSBA Hadoop server.

Phase 1 of the Java MapReduce program was run to extract <orgname>, which is the company name tag. These company names were mapped against the Fortune 500 company list using SAS code to generate a list of possible “org names” for each Fortune 500 company name. With this, a lookup list of one-to-many mappings of Fortune 500 company name to Patent Assignee org names was created in a text file. The data for analysis was cleansed by performing tokenization, stemming, and removal of special characters such as leading spaces and hyphenated words in organization names. Phase 2 of the Java MapReduce program was executed to analyze the XML file and provide patent count, patent abstract, and patent title for each org name. If the org name was found in the lookup of Fortune 500 companies, then that data was written into a text file. If the org name was not found in the lookup of Fortune 500 companies, then the data was discarded. The text file data was delimited in order to be imported to MS Excel and further into a table within MS Access database. The same process was repeated for European patent data (xml) downloaded from the EPO site.

**4. Data Aggregation & Manipulation**

The data in the form of csv files and excel spreadsheets were loaded into MS Access tables. SQL queries were written to join 6 different data sets using Ticker, NAICs Title, and Year to form a flat MS Excel file. Subsequent nested queries were slow on Access so team used Tableau to perform quick joins of long data sets; filtering and exporting data back to Excel after validation. Duplicate data and junk files were deleted from the excel file, then imported into SPSS where the scale and type of data were defined, new variables were created, and necessary data type conversions were performed.

**5. Topic Modeling & Visualizations**

Using Mallet, topic modeling was performed on patent abstracts and patent titles for all Fortune 500, US Patent data using 1000 iterations to get the final topic model output. Topic modeling was also performed on the annual reports for three years (2013, 2014, & 2015) for the following eight companies: Walmart, Costco, Sears, Target, IBM, Apple, Microsoft, and HP. These reports were merged into a single PDF for each company, which was converted into a txt document. Mallet’s topic modeling was run on each txt document, with 1,000 iterations, preserving bigrams.

Word clouds were created using IBM’s Word Cloud Generator on patent abstracts and title that were provided as output from MapReduce program. Using Tableau, Excel, and SPSS, visualizations were performed on the data to better understand and illustrate relationship between variable and trends using bubble charts, scatter plots, pivot charts, and 2-D graphs.

**4. Data Analyses Techniques**

Using MS Excel descriptive statistics were calculated and pivot tables utilized to examine detailed relationships between variables. All numeric variables were also analyzed using SPSS for correlations, linear regressions, and cluster analyses, both hierarchical and k-means. In SPSS, data was split by specialty and all relationships between variables examined using scatterplots and linear regressions. Using SAS, data was divided into multiple spreadsheets based upon the variable “Specialty”. Multiple linear regressions were run on each sheet looking at the impact of year, number of employees, and which party was president on revenue. The variables “revenue” and “employees” were transformed to provide a better linear model. Different combinations of independent variables, transformed and untransformed, were used, but the four aforementioned variables produced the best-fit model, as determined by r-square.

APPENDIX:

1. Objective 4

2. Data Sets Assembled 4

3. High level design - Process flow diagram 5

4. High level design - Architecture 5

5. High level design - Technology stack 6

6. Low level design - Data Model (Schema) 6

7. Semi structured Data Model (XML, Text files, PDFs) 6

8. Implementation - Data Preparation 7

9. Implementation - Testing & Measurements 7

10. Reporting & Visualization 8

11. Procedures/Code snippets -MapReduce Java Program - US Patents: 8

12. Procedures/Code snippets -MapReduce Java Program - European Patents: 17

13. Procedures/Code snippets – SAS 25

14. Procedures/Code snippets - MS Access - SQL 27

15. Descriptive statistics for all Variables in Fortune 500 List 28

16. Descriptive statistics by company: Average Patent Count 30

17. Descriptive statistics by company: Revenue 40

17. List of stop words 49

18. Data Assembly and Cleanup 50

19. Data Output Cleaning 52

20. Variables for Analysis & Descriptions 52

22. Additional Variables Added is SPSS for Analysis 54

23. Determining Highest Revenue Company & Highest Patent Count Company 55

24. Competitor Selection 55

25. Correlations Between All Variables 55

26. Scatter Plots Between Variables of Interest 55

27. Linear Regression 56

28. Cluster Analysis of CSR Variables 73

29. Multiple Linear Regression: Types of Firms impacted by President Party 74

# 1. Objective

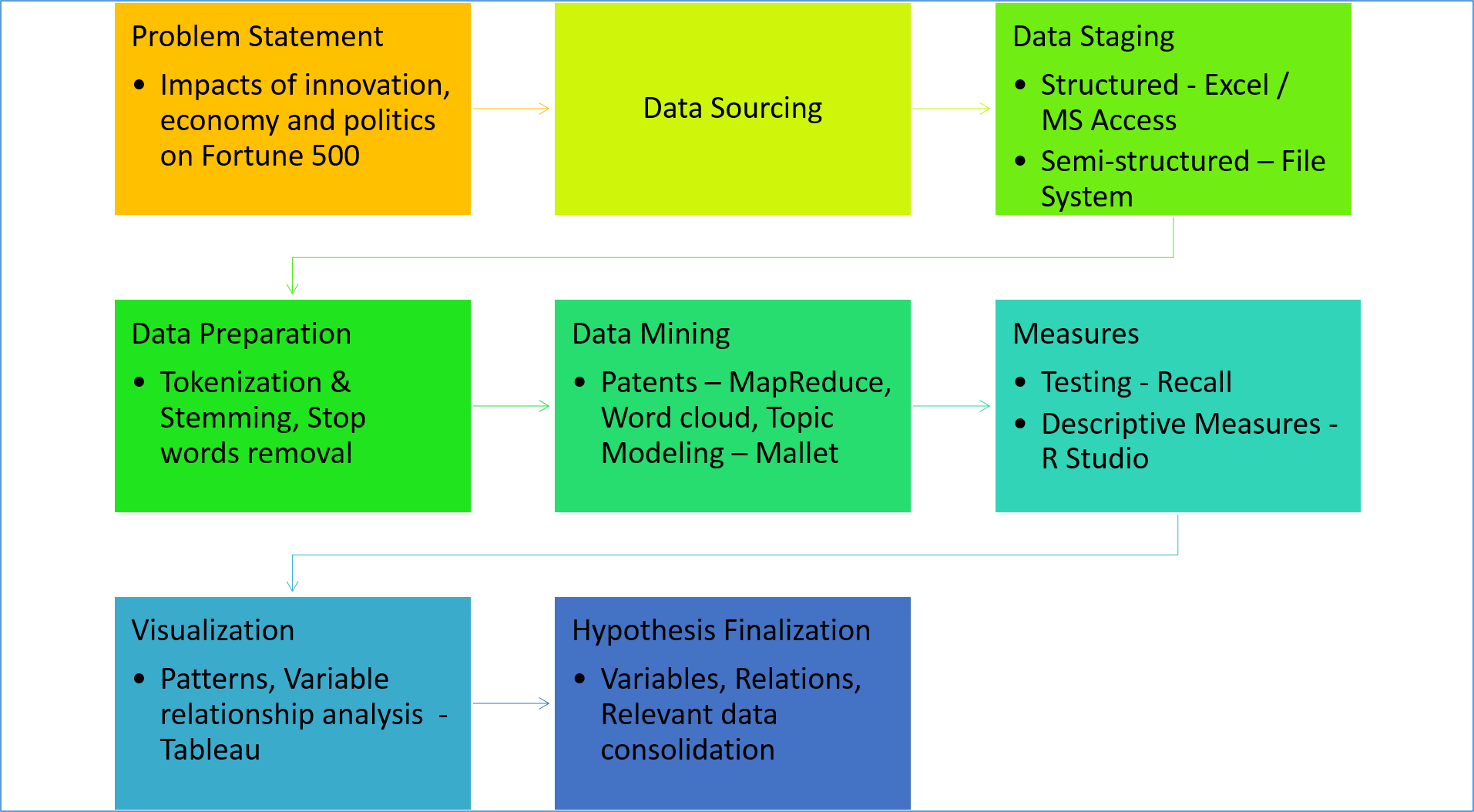
Collect, extract and analyze information pertaining to primary data on organization, innovation and secondary data related to economy and political conditions in support of investigating hypothesis to provide insights on patterns, relationships so that data based predictions can be made.

If there were huge caps, the code and data collection/preparation was revisited to make corrections where possible. If the gaps are expected and acceptable, they are recorded. The process used was tested. If the process passed the test, and the hypothesis is true, conclusions and or predictions will be made. If the process does not pass the test, analysis will be repeated.

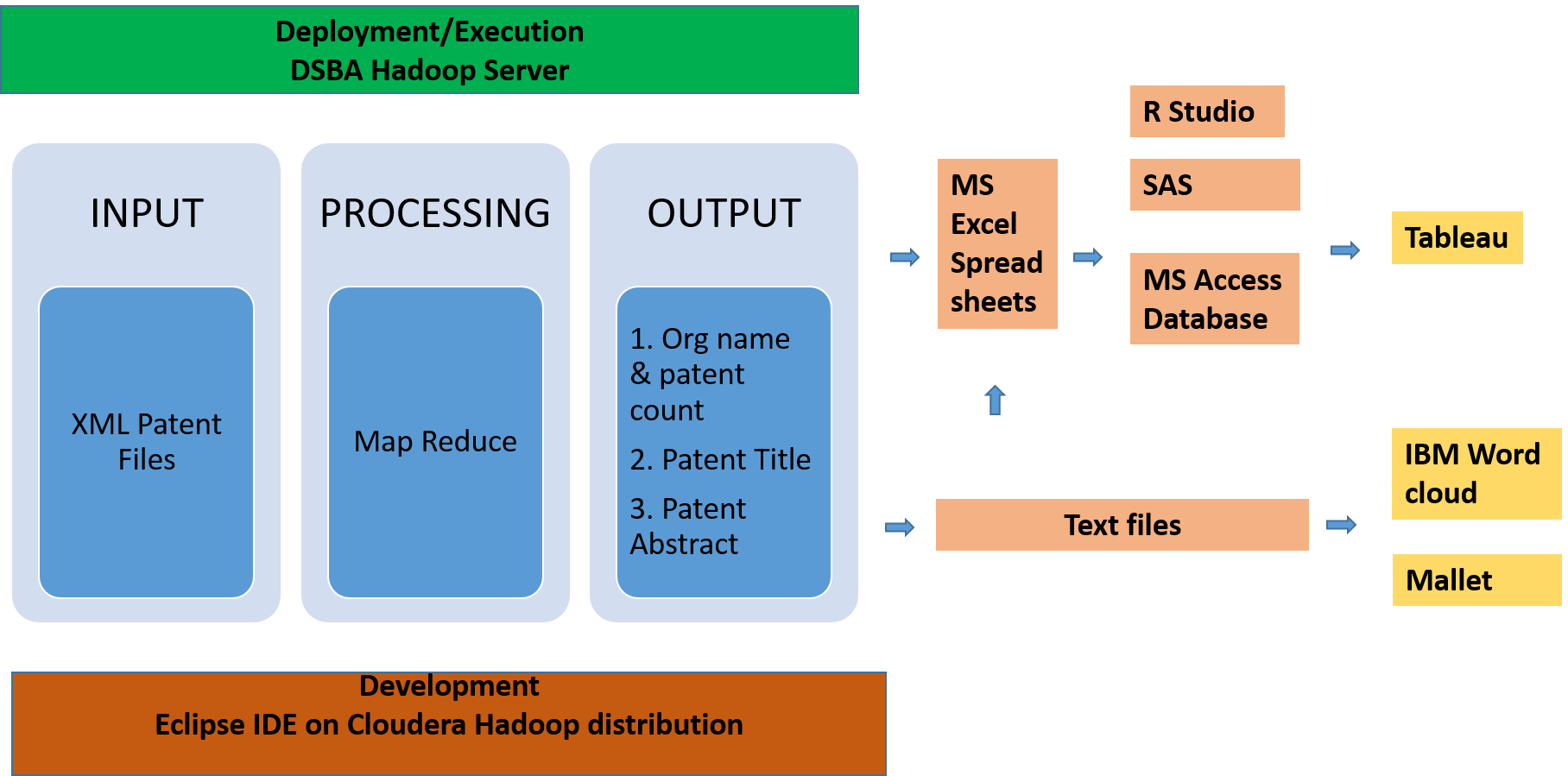
# 2. Data Sets Assembled

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Data Set Description** | **Data Source** | **File Format** | **Data collection method** | **Essential commands** | **Time Period** |
| **Company revenue and social responsibility data & enrichment data** | www.compustat.com | Excel | Direct download | VLOOKUP  EXCEL VIEW SQL | 1970 - 2015 |
| **Economy** | http://www.bea.gov/national/index.htm#gdp | HTML | Manual text copy |  | 1970 - 2015 |
| **Politics** | http://www.fec.gov/data/CandidateDisbursement.do | CSV | Direct download | VLOOKUP | 1970 - 2015 |
| **Fortune 500 Company - market performance data** | <http://www.hoovers.com/> UNCC Library access to Hoovers | HTML | Manual text copy | EXCEL VIEW SQL | 2015 |
| **US Patent Data** | /projects/class/dsba-6100/patentData2000\_2015/patGrants2005\_2015h1\_ipgs | XML / ZIP | Linux Command | WGET | 2005 - 2015 |
| UNZIP CP |
| **US Patent Statistics** | http://www.uspto.gov/ | Excel | Direct Download |  | 1969 - 2015 |
| **European Patent Data** | PATSTAT Online- https://data.epo.org/expert-services/index-2-2-5.html | XML / ZIP | Direct Download |  | 2005 - 2015 |
| **European Patent Statistics** | http://worldwide.espacenet.com  /advancedSearch?locale=en\_EP | XML / ZIP | Direct Download |  | 2005 - 2015 |
| **Bulk US Patent data** | https://bulkdata.uspto.gov/ | XML / ZIP | Direct Download |  | Need basis |

# 3. High level design - Process flow diagram



# 4. High level design - Architecture



**Hadoop server**

UNCC Research Computing has a 48-core Hadoop cluster (1 NameNode, 6 Slaves) available for use by faculty and graduate student researchers. Our Hadoop cluster also has a 10.75TB Hadoop Distributed File System (HDFS).

**Cloudera Hadoop distribution**

Open source platform distribution, including Apache Hadoop

# 5. High level design - Technology stack

* 1. Java
  2. Eclipse IDE
  3. SAS
  4. MS Access
  5. MS Excel
  6. IBM Word Cloud
  7. Mallet
  8. Tableau
  9. R-Studio
  10. SPSS Statistics 23

# 6. Low level design - Data Model (Schema)

**Access Database**

**Politics**:

* 1. USPresElectData
  2. Candidate Disbursements
  3. Campaign and Committee Summary Action

**Economy**:

* 1. USEconomyStats

**Innovation**:

* 1. CompanyPatentCountsanalyzed
  2. CompanyPatentCountsActuals
  3. LookupCompFortuneNamePatentName (Bridge table between patents and other domains)

**Fortune500Companies:**

* 1. Fortune500\_Comp
  2. KLD\_Report
  3. NAICS2012

Fortune500Companies: JOIN ON Ticker, NAICS

Innovation: JOIN ON Ticker, Year

Politics: JOIN ON Company Name, Year, Candidate Name, Political Affiliation

Economy: JOIN ON Year

# 7. Semi structured Data Model (XML, Text files, PDFs)

1. **USPTO Patent.XML**

|  |  |
| --- | --- |
| **Business Element** | **XML Element** |
| Company Name | <orgname></orgname> |
| Patent Title | <invention-title></invention-title> |
| Patent Abstract | <abstract></abstract> |

1. **European Patent XML**

|  |  |
| --- | --- |
| **Business Element** | **XML Element** |
| Company Name | <B731><snm> |
| Patent Title | <B542><p> |
| Patent Abstract | Not used |

# 8. Implementation - Data Preparation

**Tokenization**

Removal of special characters like (,),+, leading spaces in organization names

Example: (Proctor + Gamble)

Hyphenated words in organization names. Example: (Wal-mart)

**Stemming**

Some company names were URIs. Example: (Amazon.com)

**Stop words removal**

List of stop words such as should, could, must etc are provided at the end of this document.

# 9. Implementation - Testing & Measurements

1. **Handling Missing Data - Omission/Imputation**

Patent count was detected for only 330 companies. The rest of the companies are to be imputed using a count of 1 or omitted from analysis.

Compustat file (Compustat Revenue etc Report for Fortune 500 ticker list.xlsx) does not contain information for the below 14 companies (which were on our Fortune 500 2015 firms for group project analysis). They were mostly private companies or mutuals that are out of scope for this analysis.

1. Berkshire Hathaway
2. CHS
3. Freddie Mac
4. Fannie Mae
5. Essendant
6. Auto-Owners Insurance
7. Erie Insurance Group
8. H.J. Heinz
9. Lansing Trade Group
10. Thrivent Financial for Lutherans
11. USAA
12. Western & Southern Financial Group
13. Integrys Energy Group
14. Energy Future Holdings
15. **Performance Measurement**

R – recall was calculated for a sample of 23 companies from the 2011 US Patent count. The average recall was 112.64%, which implies false positives in our MapReduce.

Independent samples t-test was run to see if there was a significant difference between these two samples (MapReduce vs USPTO statistics). No significant difference was found at a 95% confidence interval, so we can assume the two sets are statistically the same.

**Patent counts – Output of MapReduce program**

**Extract: IBM – International Business Machines**

|  |  |
| --- | --- |
| **Name** | **Patent counts 2011** |
| international business machiness corporation | 2 |
| international business machines | 5 |
| international business machines coroporation | 1 |
| international business machines incorporated | 2 |
| international business machines corporatio | 1 |
| international business machines corproation | 2 |
| international business machines corporation | 6111 |
| oy international business machines ab | 1 |
| international business machines coporation | 1 |
| **Total (we have taken the Max count from the above)** | **6111** |

**Patent counts – USPTO Statistics – 6148**

|  |  |
| --- | --- |
| **Name** | **Patent counts 2011** |
| INTERNATIONAL BUSINESS MACHINES CORPORATION | 6148 |

# 10. Reporting & Visualization

1. Tableau

Tableau was downloaded from [www.tableau.com/](http://www.tableau.com/)

Data source was selected to point to Access Database. The individual tables were selected and joined to perform visualizations of relationships between variables.

# 11. Procedures/Code snippets -MapReduce Java Program - US Patents:

package parse;

import javax.xml.stream.XMLStreamConstants;//XMLInputFactory;

import java.io.\*;

import java.net.URI;

import java.util.ArrayList;

import org.apache.hadoop.conf.Configuration;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.fs.FSDataInputStream;

import org.apache.hadoop.fs.FileSystem;

import org.apache.hadoop.io.DataOutputBuffer;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.LongWritable;

import org.apache.hadoop.io.NullWritable;

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.InputSplit;

import org.apache.hadoop.mapreduce.RecordReader;

import org.apache.hadoop.mapreduce.TaskAttemptContext;

import org.apache.hadoop.mapreduce.lib.input.FileSplit;

import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;

import org.apache.hadoop.mapreduce.lib.input.TextInputFormat;

import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

import org.apache.hadoop.mapreduce.lib.output.MultipleOutputs;

import org.apache.hadoop.mapreduce.lib.output.TextOutputFormat;

import org.apache.hadoop.util.GenericOptionsParser;

import javax.xml.stream.\*;

public class PatentXMLParser {

public static String filename = new String();

public static String output\_folder = new String();

// ====================================================================================================================================================================

/\*

\* The following class is a custom InputFormat class. This class has been

\* created particularly to read a part of an XML file between two XML tags

\* that are specified by the START\_TAG\_KEY and END\_TAG\_KEY attributes. Once

\* read, that part of the XML file will then be converted into the

\* DataStream and will be sent over to the Mapper class.

\*/

// ====================================================================================================================================================================

public static class XmlInputFormat1 extends TextInputFormat {

public static final String START\_TAG\_KEY = "xmlinput.start";

public static final String END\_TAG\_KEY = "xmlinput.end";

public RecordReader<LongWritable, Text> createRecordReader(

InputSplit split, TaskAttemptContext context) {

return new XmlRecordReader();

}

public static class XmlRecordReader extends

RecordReader<LongWritable, Text> {

private byte[] startTag;

private byte[] endTag;

private long start;

private long end;

private FSDataInputStream fsin;

private DataOutputBuffer buffer = new DataOutputBuffer();

private LongWritable key = new LongWritable();

private Text value = new Text();

@Override

public void initialize(InputSplit split, TaskAttemptContext context)

throws IOException, InterruptedException {

Configuration conf = context.getConfiguration();

startTag = conf.get(START\_TAG\_KEY).getBytes("utf-8");

endTag = conf.get(END\_TAG\_KEY).getBytes("utf-8");

FileSplit fileSplit = (FileSplit) split;

// open the file and seek to the start of the split

start = fileSplit.getStart();

end = start + fileSplit.getLength();

Path file = fileSplit.getPath();

FileSystem fs = file.getFileSystem(conf);

fsin = fs.open(fileSplit.getPath());

fsin.seek(start);

}

@Override

public boolean nextKeyValue() throws IOException,

InterruptedException {

if (fsin.getPos() < end) {

if (readUntilMatch(startTag, false)) {

try {

buffer.write(startTag);

if (readUntilMatch(endTag, true)) {

key.set(fsin.getPos());

value.set(buffer.getData(), 0,

buffer.getLength());

return true;

}

} finally {

buffer.reset();

}

}

}

return false;

}

@Override

public LongWritable getCurrentKey() throws IOException,

InterruptedException {

return key;

}

@Override

public Text getCurrentValue() throws IOException,

InterruptedException {

return value;

}

@Override

public void close() throws IOException {

fsin.close();

}

@Override

public float getProgress() throws IOException {

return (fsin.getPos() - start) / (float) (end - start);

}

private boolean readUntilMatch(byte[] match, boolean withinBlock)

throws IOException {

int i = 0;

while (true) {

int b = fsin.read();

// end of file:

if (b == -1)

return false;

// save to buffer:

if (withinBlock)

buffer.write(b);

// check if we're matching:

if (b == match[i]) {

i++;

if (i >= match.length)

return true;

} else

i = 0;

// see if we've passed the stop point:

if (!withinBlock && i == 0 && fsin.getPos() >= end)

return false;

}

}

}

}

// ====================================================================================================================================================================

/\*

\* The following class is the Mapper class. This is where the XML file is

\* parsed and the values between the corresponding XML tags are read. After

\* reading, some of the values are written into the corresponding output

\* files (such as the Patent Title and Patent Abstract) and the rest of the

\* values are sent over to the Reducer class (such as the Patent Count).

\* This is also where the filtering of the Fortune 500 companies takes

\* place.

\*/

// ====================================================================================================================================================================

public static class Map extends

Mapper<LongWritable, Text, Text, IntWritable> {

private final static IntWritable one = new IntWritable(1);

private Text org\_name = new Text();

private Text patent\_abstract = new Text();

private Text patent\_title = new Text();

public static boolean flag\_patent = false;

public static boolean flag\_abstract = false;

public static String orgname = new String();

public static String absorgname = new String();

@SuppressWarnings("rawtypes")

MultipleOutputs mos;

ArrayList<String> fortune\_list = new ArrayList<String>();

ArrayList<String> cleaned\_fortune\_list = new ArrayList<String>();

ArrayList<String> abstract\_list = new ArrayList<String>();

ArrayList<String> cleaned\_abstract\_list = new ArrayList<String>();

@Override

protected void cleanup(

Mapper<LongWritable, Text, Text, IntWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

mos.close();

super.cleanup(context);

}

@SuppressWarnings({ "rawtypes", "unchecked" })

@Override

protected void setup(

Mapper<LongWritable, Text, Text, IntWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

URI[] uri = context.getCacheFiles();

FileReader reader = new FileReader(new File(uri[0]));

BufferedReader br = new BufferedReader(reader);

String line = new String();

while ((line = br.readLine()) != null) {

fortune\_list.add(line);

cleaned\_fortune\_list.add(line.replaceAll("[^a-z0-9]+", ""));

}

br.close();

FileReader reader1 = new FileReader(new File(uri[1]));

BufferedReader br1 = new BufferedReader(reader1);

while ((line = br1.readLine()) != null) {

abstract\_list.add(line);

cleaned\_abstract\_list.add(line.replaceAll("[^a-z0-9]+", ""));

}

br1.close();

mos = new MultipleOutputs(context);

super.setup(context);

}

@SuppressWarnings({ "unchecked", "rawtypes" })

@Override

protected void map(LongWritable key, Text value, Mapper.Context context)

throws IOException, InterruptedException {

String document = value.toString();

document = document.replace("&#x26;", "%ampr%");

try {

XMLStreamReader reader = XMLInputFactory.newInstance()

.createXMLStreamReader(

new ByteArrayInputStream(document.getBytes()));

String currentElement = "";

String propertyName = "";

while (reader.hasNext()) {

int code = reader.next();

switch (code) {

case XMLStreamConstants.START\_ELEMENT: // START\_ELEMENT:

currentElement = reader.getLocalName();

break;

case XMLStreamConstants.CHARACTERS: // CHARACTERS:

if (currentElement.equalsIgnoreCase("assignees")) {

flag\_patent = true;

} else if (currentElement.equalsIgnoreCase("orgname")) {

if (flag\_patent == true) {

flag\_patent = false;

propertyName = reader.getText().trim()

.toLowerCase();

propertyName = propertyName.replace("%ampr%",

"&");

propertyName = propertyName.replaceAll(

"[^&a-z0-9 ]+", "");

orgname = propertyName;

org\_name.set(propertyName);

String company = propertyName.toString()

.replaceAll("[^a-z0-9]+", "");

for (int i = 0; i < cleaned\_fortune\_list.size(); i++) {

if (company

.equalsIgnoreCase(cleaned\_fortune\_list

.get(i))) {

context.write(

new Text(fortune\_list.get(i)),

one);

break;

}

}

for (int j = 0; j < cleaned\_abstract\_list

.size(); j++) {

if (company

.equalsIgnoreCase(cleaned\_abstract\_list

.get(j))) {

String c = abstract\_list.get(j);

if (c.equalsIgnoreCase("international business machines corporation")

|| c.equalsIgnoreCase("boozallen")) {

String oname = orgname

+ "<==========>";

Text text = new Text(oname);

mos.write("computertitle", text,

patent\_title);

break;

} else {

String oname = orgname

+ "<==========>";

Text text = new Text(oname);

mos.write("semiconductortitle",

text, patent\_title);

break;

}

}

}

}

} else if (currentElement.equalsIgnoreCase("abstract")) {

String company = orgname.replaceAll("[^a-z0-9]+",

"");

for (int i = 0; i < cleaned\_abstract\_list.size(); i++) {

if (company

.equalsIgnoreCase(cleaned\_abstract\_list

.get(i))) {

flag\_abstract = true;

absorgname = abstract\_list.get(i);

break;

}

}

} else if (currentElement.equalsIgnoreCase("p")) {

if (flag\_abstract == true) {

flag\_abstract = false;

propertyName = reader.getText().trim()

.toLowerCase();

patent\_abstract.set(propertyName);

String oname = absorgname + "<==========>";

Text text = new Text(oname);

if (absorgname

.equalsIgnoreCase("international business machines corporation")

|| absorgname

.equalsIgnoreCase("boozallen"))

mos.write("computerabstract", text,

patent\_abstract);

else

mos.write("semiconductorabstract", text,

patent\_abstract);

}

} else if (currentElement

.equalsIgnoreCase("invention-title")) {

propertyName = reader.getText().trim()

.toLowerCase();

if (propertyName.length() > 1) {

patent\_title.set(propertyName);

}

}

break;

}

}

reader.close();

} catch (Exception e) {

throw new IOException(e);

}

}

}

// ====================================================================================================================================================================

/\*

\* The following class is the Reducer class. This is where the actual Patent

\* count for the Fortune 500 companies are calculated and written to the

\* output file.

\*/

// ====================================================================================================================================================================

public static class Reduce extends

Reducer<Text, IntWritable, Text, NullWritable> {

@SuppressWarnings("rawtypes")

MultipleOutputs mos;

@Override

protected void cleanup(

Reducer<Text, IntWritable, Text, NullWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

mos.close();

super.cleanup(context);

}

@SuppressWarnings({ "unchecked", "rawtypes" })

@Override

protected void setup(

Reducer<Text, IntWritable, Text, NullWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

mos = new MultipleOutputs(context);

super.setup(context);

}

@SuppressWarnings("unchecked")

public void reduce(Text key, Iterable<IntWritable> values,

Context context) throws IOException, InterruptedException {

int sum = 0;

for (IntWritable val : values) {

sum += val.get();

}

mos.write("count", key, new IntWritable(sum));

}

}

public static void main(String[] args) throws Exception {

// The below text file contains a list of Fortune 500 companies which

// will be sent over to the MapReduce for the filtering purpose of the

// Patent Count

File file = new File("Fortune\_Patent.txt");

// The below text file contains a list of Fortune 500 companies only for

// the selected two industries which will be

// sent over to the MapReduce for filtering purpose of the Patent Title

// and Abstract

File file1 = new File("Fortune\_Abstract\_Selected.txt");

GenericOptionsParser parser = new GenericOptionsParser(args);

Configuration conf = parser.getConfiguration();

String[] arguments = parser.getRemainingArgs();

// Setting values for the START\_TAG\_KEY and END\_TAG\_KEY attributes

conf.set("xmlinput.start", "<us-patent-grant");

conf.set("xmlinput.end", "</us-patent-grant>");

Job job = Job.getInstance(conf);

job.setJarByClass(PatentXMLParser.class);

job.addCacheFile(file.toURI());

job.addCacheFile(file1.toURI());

job.setMapperClass(PatentXMLParser.Map.class);

job.setReducerClass(PatentXMLParser.Reduce.class);

job.setInputFormatClass(XmlInputFormat1.class);

job.setMapOutputKeyClass(Text.class);

job.setMapOutputValueClass(IntWritable.class);

// Creating MultipleOutputs for writing the count, title and abstract to

// separate output files

MultipleOutputs.addNamedOutput(job, "computertitle",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "semiconductortitle",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "computerabstract",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "semiconductorabstract",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "count", TextOutputFormat.class,

Text.class, IntWritable.class);

FileInputFormat.addInputPath(job, new Path(arguments[0]));

FileOutputFormat.setOutputPath(job, new Path(arguments[1]));

job.waitForCompletion(true);

}

}

# 12. Procedures/Code snippets -MapReduce Java Program - European Patents:

package parse;

import javax.xml.stream.XMLStreamConstants;//XMLInputFactory;

import java.io.\*;

import java.net.URI;

import java.util.ArrayList;

import org.apache.hadoop.conf.Configuration;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.fs.FSDataInputStream;

import org.apache.hadoop.fs.FileSystem;

import org.apache.hadoop.io.DataOutputBuffer;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.LongWritable;

import org.apache.hadoop.io.NullWritable;

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.InputSplit;

import org.apache.hadoop.mapreduce.RecordReader;

import org.apache.hadoop.mapreduce.TaskAttemptContext;

import org.apache.hadoop.mapreduce.lib.input.FileSplit;

import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;

import org.apache.hadoop.mapreduce.lib.input.TextInputFormat;

import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

import org.apache.hadoop.mapreduce.lib.output.MultipleOutputs;

import org.apache.hadoop.mapreduce.lib.output.TextOutputFormat;

import org.apache.hadoop.util.GenericOptionsParser;

import javax.xml.stream.\*;

public class PatentXMLParser {

public static String filename = new String();

public static String output\_folder = new String();

// ====================================================================================================================================================================

/\*

\* The following class is a custom InputFormat class. This class has been

\* created particularly to read a part of an XML file between two XML tags

\* that are specified by the START\_TAG\_KEY and END\_TAG\_KEY attributes. Once

\* read, that part of the XML file will then be converted into the

\* DataStream and will be sent over to the Mapper class.

\*/

// ====================================================================================================================================================================

public static class XmlInputFormat1 extends TextInputFormat {

public static final String START\_TAG\_KEY = "xmlinput.start";

public static final String END\_TAG\_KEY = "xmlinput.end";

public RecordReader<LongWritable, Text> createRecordReader(

InputSplit split, TaskAttemptContext context) {

return new XmlRecordReader();

}

public static class XmlRecordReader extends

RecordReader<LongWritable, Text> {

private byte[] startTag;

private byte[] endTag;

private long start;

private long end;

private FSDataInputStream fsin;

private DataOutputBuffer buffer = new DataOutputBuffer();

private LongWritable key = new LongWritable();

private Text value = new Text();

@Override

public void initialize(InputSplit split, TaskAttemptContext context)

throws IOException, InterruptedException {

Configuration conf = context.getConfiguration();

startTag = conf.get(START\_TAG\_KEY).getBytes("utf-8");

endTag = conf.get(END\_TAG\_KEY).getBytes("utf-8");

FileSplit fileSplit = (FileSplit) split;

// open the file and seek to the start of the split

start = fileSplit.getStart();

end = start + fileSplit.getLength();

Path file = fileSplit.getPath();

FileSystem fs = file.getFileSystem(conf);

fsin = fs.open(fileSplit.getPath());

fsin.seek(start);

}

@Override

public boolean nextKeyValue() throws IOException,

InterruptedException {

if (fsin.getPos() < end) {

if (readUntilMatch(startTag, false)) {

try {

buffer.write(startTag);

if (readUntilMatch(endTag, true)) {

key.set(fsin.getPos());

value.set(buffer.getData(), 0,

buffer.getLength());

return true;

}

} finally {

buffer.reset();

}

}

}

return false;

}

@Override

public LongWritable getCurrentKey() throws IOException,

InterruptedException {

return key;

}

@Override

public Text getCurrentValue() throws IOException,

InterruptedException {

return value;

}

@Override

public void close() throws IOException {

fsin.close();

}

@Override

public float getProgress() throws IOException {

return (fsin.getPos() - start) / (float) (end - start);

}

private boolean readUntilMatch(byte[] match, boolean withinBlock)

throws IOException {

int i = 0;

while (true) {

int b = fsin.read();

// end of file:

if (b == -1)

return false;

// save to buffer:

if (withinBlock)

buffer.write(b);

// check if we're matching:

if (b == match[i]) {

i++;

if (i >= match.length)

return true;

} else

i = 0;

// see if we've passed the stop point:

if (!withinBlock && i == 0 && fsin.getPos() >= end)

return false;

}

}

}

}

// ====================================================================================================================================================================

/\*

\* The following class is the Mapper class. This is where the XML file is

\* parsed and the values between the corresponding XML tags are read. After

\* reading, some of the values are written into the corresponding output

\* files (such as the Patent Title and Patent Abstract) and the rest of the

\* values are sent over to the Reducer class (such as the Patent Count).

\* This is also where the filtering of the Fortune 500 companies takes

\* place.

\*/

// ====================================================================================================================================================================

public static class Map extends

Mapper<LongWritable, Text, Text, IntWritable> {

private final static IntWritable one = new IntWritable(1);

private Text org\_name = new Text();

private Text patent\_abstract = new Text();

private Text patent\_title = new Text();

public static boolean flag\_patent = false;

public static boolean flag\_abstract = false;

public static boolean flag\_title = false;

public static String orgname = new String();

public static String absorgname = new String();

@SuppressWarnings("rawtypes")

MultipleOutputs mos;

ArrayList<String> fortune\_list = new ArrayList<String>();

ArrayList<String> cleaned\_fortune\_list = new ArrayList<String>();

ArrayList<String> abstract\_list = new ArrayList<String>();

ArrayList<String> cleaned\_abstract\_list = new ArrayList<String>();

@Override

protected void cleanup(

Mapper<LongWritable, Text, Text, IntWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

mos.close();

super.cleanup(context);

}

@SuppressWarnings({ "rawtypes", "unchecked" })

@Override

protected void setup(

Mapper<LongWritable, Text, Text, IntWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

URI[] uri = context.getCacheFiles();

FileReader reader = new FileReader(new File(uri[0]));

BufferedReader br = new BufferedReader(reader);

String line = new String();

while ((line = br.readLine()) != null) {

fortune\_list.add(line);

cleaned\_fortune\_list.add(line.replaceAll("[^a-z0-9]+", ""));

}

br.close();

FileReader reader1 = new FileReader(new File(uri[1]));

BufferedReader br1 = new BufferedReader(reader1);

while ((line = br1.readLine()) != null) {

abstract\_list.add(line);

cleaned\_abstract\_list.add(line.replaceAll("[^a-z0-9]+", ""));

}

br1.close();

mos = new MultipleOutputs(context);

super.setup(context);

}

@SuppressWarnings({ "unchecked", "rawtypes" })

@Override

protected void map(LongWritable key, Text value, Mapper.Context context)

throws IOException, InterruptedException {

String document = value.toString();

document = document.replace("&#x26;", "%ampr%");

try {

XMLStreamReader reader = XMLInputFactory.newInstance()

.createXMLStreamReader(

new ByteArrayInputStream(document.getBytes()));

String currentElement = "";

String attribute = "";

String propertyName = "";

while (reader.hasNext()) {

int code = reader.next();

switch (code) {

case XMLStreamConstants.START\_ELEMENT: // START\_ELEMENT:

currentElement = reader.getLocalName();

attribute = reader.getAttributeValue(0);

break;

case XMLStreamConstants.CHARACTERS: // CHARACTERS:

if (currentElement.equalsIgnoreCase("snm")) {

propertyName = reader.getText().trim()

.toLowerCase();

propertyName = propertyName.replace("%ampr%", "&");

propertyName = propertyName.replaceAll(

"[^&a-z0-9 ]+", "");

orgname = propertyName;

org\_name.set(propertyName);

String company = propertyName.toString()

.replaceAll("[^a-z0-9]+", "");

for (int i = 0; i < cleaned\_fortune\_list.size(); i++) {

if (company

.equalsIgnoreCase(cleaned\_fortune\_list

.get(i))) {

context.write(

new Text(fortune\_list.get(i)), one);

break;

}

}

for (int j = 0; j < cleaned\_abstract\_list.size(); j++) {

if (company

.equalsIgnoreCase(cleaned\_abstract\_list

.get(j))) {

String c = abstract\_list.get(j);

if (c.equalsIgnoreCase("international business machines corporation")

|| c.equalsIgnoreCase("boozallen")) {

String oname = orgname + "<==========>";

Text text = new Text(oname);

mos.write("computertitle", text,

patent\_title);

break;

} else {

String oname = orgname + "<==========>";

Text text = new Text(oname);

mos.write("semiconductortitle", text,

patent\_title);

break;

}

}

}

} else if (currentElement.equalsIgnoreCase("b541")) {

if (reader.getText().trim().toLowerCase()

.equalsIgnoreCase("en"))

flag\_title = true;

} else if (currentElement.equalsIgnoreCase("b542")) {

if (flag\_title == true) {

flag\_title = false;

patent\_title.set(reader.getText().trim()

.toLowerCase());

}

} else if (currentElement.equalsIgnoreCase("heading")) {

if (attribute.equalsIgnoreCase("h0004")) {

String company = orgname.replaceAll(

"[^a-z0-9]+", "");

for (int i = 0; i < cleaned\_abstract\_list

.size(); i++) {

if (company

.equalsIgnoreCase(cleaned\_abstract\_list

.get(i))) {

flag\_abstract = true;

absorgname = abstract\_list.get(i);

break;

}

}

}

} else if (currentElement.equalsIgnoreCase("p")) {

if (flag\_abstract == true) {

flag\_abstract = false;

propertyName = reader.getText().trim()

.toLowerCase();

patent\_abstract.set(propertyName);

String oname = absorgname + "<==========>";

Text text = new Text(oname);

if (absorgname

.equalsIgnoreCase("international business machines corporation")

|| absorgname

.equalsIgnoreCase("boozallen"))

mos.write("computerabstract", text,

patent\_abstract);

else

mos.write("semiconductorabstract", text,

patent\_abstract);

}

}

break;

}

}

reader.close();

} catch (Exception e) {

throw new IOException(e);

}

}

}

// ====================================================================================================================================================================

/\*

\* The following class is the Reducer class. This is where the actual Patent

\* count for the Fortune 500 companies are calculated and written to the

\* output file.

\*/

// ====================================================================================================================================================================

public static class Reduce extends

Reducer<Text, IntWritable, Text, NullWritable> {

@SuppressWarnings("rawtypes")

MultipleOutputs mos;

@Override

protected void cleanup(

Reducer<Text, IntWritable, Text, NullWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

mos.close();

super.cleanup(context);

}

@SuppressWarnings({ "unchecked", "rawtypes" })

@Override

protected void setup(

Reducer<Text, IntWritable, Text, NullWritable>.Context context)

throws IOException, InterruptedException {

// TODO Auto-generated method stub

mos = new MultipleOutputs(context);

super.setup(context);

}

@SuppressWarnings("unchecked")

public void reduce(Text key, Iterable<IntWritable> values,

Context context) throws IOException, InterruptedException {

int sum = 0;

for (IntWritable val : values) {

sum += val.get();

}

mos.write("count", key, new IntWritable(sum));

}

}

public static void main(String[] args) throws Exception {

// The below text file contains a list of Fortune 500 companies which

// will be sent over to the MapReduce for the filtering purpose of the

// Patent Count

File file = new File("Fortune\_Patent.txt");

// The below text file contains a list of Fortune 500 companies only for

// the selected two industries which will be

// sent over to the MapReduce for filtering purpose of the Patent Title

// and Abstract

File file1 = new File("Fortune\_Abstract\_Selected.txt");

GenericOptionsParser parser = new GenericOptionsParser(args);

Configuration conf = parser.getConfiguration();

String[] arguments = parser.getRemainingArgs();

// Setting values for the START\_TAG\_KEY and END\_TAG\_KEY attributes

conf.set("xmlinput.start", "<ep-patent-document>");

conf.set("xmlinput.end", "</ep-patent-document>");

Job job = Job.getInstance(conf);

job.setJarByClass(PatentXMLParser.class);

job.addCacheFile(file.toURI());

job.addCacheFile(file1.toURI());

job.setMapperClass(PatentXMLParser.Map.class);

job.setReducerClass(PatentXMLParser.Reduce.class);

job.setInputFormatClass(XmlInputFormat1.class);

job.setMapOutputKeyClass(Text.class);

job.setMapOutputValueClass(IntWritable.class);

// Creating MultipleOutputs for writing the count, title and abstract to

// separate output files

MultipleOutputs.addNamedOutput(job, "computertitle",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "semiconductortitle",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "computerabstract",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "semiconductorabstract",

TextOutputFormat.class, Text.class, Text.class);

MultipleOutputs.addNamedOutput(job, "count", TextOutputFormat.class,

Text.class, IntWritable.class);

FileInputFormat.addInputPath(job, new Path(arguments[0]));

FileOutputFormat.setOutputPath(job, new Path(arguments[1]));

job.waitForCompletion(true);

}

}

# 13. Procedures/Code snippets – SAS

\*presidential election;

proc import out=president

datafile="C:\Users\XIAZHI\Desktop\DSBA\00database\07U.S. Presidential Election Data v2.xlsx"

DBMS=XLSX REPLACE;

GETNAMES=YES;

RUN;

data president0;

set president;

keep year Winning\_Party;

run;

data president1 (rename=(year1=year));

set president0;

year1=year+1;

keep year1 Winning\_Party;

run;

data president2 (rename=(year1=year));

set president0;

year1=year+2;

keep year1 Winning\_Party;

run;

data president3 (rename=(year1=year));

set president0;

year1=year+3;

keep year1 Winning\_Party;

run;

data president4;

set president0 president1 president2 president3;

run;

proc sort data=president4;

by year;

run;

\*/presidential election;

\*merged data from Lakshmi;

proc import out=revenue\_age\_KLD

datafile="C:\Users\XIAZHI\Desktop\DSBA\00database\09\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent.xlsx"

dbms=xlsx replace;

getnames=yes;run;

data revenue\_age\_KLD0;

set revenue\_age\_KLD;

age1=Data\_Year\_Fiscal-2016+age;

research\_exp=input(Research\_and\_Development\_Expense,8.);

keep company\_name ticker year age1 PatentCount NAICS\_TITLE Net\_Income\_\_Loss\_ Revenue\_\_\_Total employees research\_exp env\_s env\_c com\_s com\_c div\_s div\_c pro\_s pro\_c corp\_s corp\_c mil\_c nuc\_c specialty;

run;

+

data revenue\_age\_KLD1 (rename=(Net\_Income\_\_Loss\_=net\_incom Revenue\_\_\_Total=revenue age1=age));

set revenue\_age\_KLD0;

social\_resp=sum(env\_s, env\_c, com\_s, com\_c, div\_s, div\_c, pro\_s, pro\_c, corp\_s, corp\_c, mil\_c, nuc\_c);

patent\_no=input(patentcount,4.);

label Net\_Income\_\_Loss\_=" " Revenue\_\_\_Total=" ";

drop patentcount;

if ticker ^=" " and year^=.;

run;

\*/merged data from Lakshmi;

\*merge with presidential selection;

proc sql;

create table overall as

select a.\*,

sum(env\_s, env\_c, com\_s, com\_c, div\_s, div\_c, pro\_s, pro\_c, corp\_s, corp\_c, mil\_c, nuc\_c)as social\_resp,

b.Winning\_Party

from revenue\_age\_KLD1 as a, president4 as b

where a.year = b.year;

quit;

data overall0;

set overall;

if winning\_party="Democratic" then D\_election=1;

else D\_election=0;

\*if winning\_party="Republican" then R\_election=1;

\*else R\_election=0;

drop winning\_party;

if age>=0;

run;

\*/merge with presidential selection;

\*check data;

proc sort data=overall0 nodupkey out=check;by NAICS\_TITLE;run;

proc sort data=overall0 nodupkey out=check;by specialty;run;

proc freq data=overall0 noprint;table ticker /out=l\_ticker;run;

proc freq data=overall0 noprint;table specialty /out=l\_specialty;run;

proc export data=l\_ticker

OUTFILE= "C:\Users\XIAZHI\Desktop\DSBA\l\_ticker.xlsx"

DBMS=xlsx REPLACE;

PUTNAMES=YES;

RUN;

proc export data=l\_specialty

OUTFILE= "C:\Users\XIAZHI\Desktop\DSBA\l\_specialty.xlsx"

DBMS=xlsx REPLACE;

PUTNAMES=YES;

RUN;

\*/check data;

\*regression;

proc sort data=overall0;

by specialty;

run;

proc sgscatter data=overall0;

matrix revenue net\_incom age patent\_no research\_exp social\_resp D\_election;

run;

proc glm data=overall0;

model revenue = age patent\_no research\_exp social\_resp D\_election ;

by specialty;

run;

proc means data=overall0 max min mean median MAXDEC=0;

var revenue net\_incom age patent\_no research\_exp social\_resp ;

class specialty;

output out=decriptive n=cnt max=max min=min mean=avg median=mode;

run;

data decriptive0;

set decriptive;

keep specialty \_FREQ\_ cnt max min avg mode;

rename \_FREQ\_=frequency cnt=n;

if specialty^=" ";

run;

proc export data=decriptive0

OUTFILE= "C:\Users\XIAZHI\Desktop\DSBA\00database\11\_output\_decriptive0.xlsx"

DBMS=xlsx REPLACE;

PUTNAMES=YES;

RUN;

# 14. Procedures/Code snippets - MS Access - SQL

**9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015 Query**

SELECT Fortune500\_Comp.Company, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Global Company Key], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Data\_Date, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Data\_Year-Fiscal], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Industry Format], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Age, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Level of Consolidation - Company Annual Descriptor], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Population Source], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Data Format], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Ticker Symbol], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].CUSIP, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Company Name], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[ISO Currency Code], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Employees, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Net Income (Loss)], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Revenue - Total], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Research and Development Expense], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Active/Inactive Status Marker], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Price Close - Annual - Calendar], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Market Value - Total - Fiscal], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[North American Industry Classification Code], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].NAICS\_TITLE, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Standard Industry Classification Code], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Web URL], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Company Initial Public Offering Date], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Company\_Name, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Ticker, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Year, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].env\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].env\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].com\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].com\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].div\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].div\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].pro\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].pro\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].corp\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].corp\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].mil\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].nuc\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].PatentCount, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Specialty

FROM Fortune500\_Comp LEFT JOIN [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015] ON Fortune500\_Comp.Symbol=[9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Ticker symbol];

**9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent1969\_2015 Query**

SELECT Fortune500\_Comp.Company, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Global Company Key], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Data\_Date, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Data\_Year-Fiscal], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Industry Format], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Age, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Level of Consolidation - Company Annual Descriptor], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Population Source], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Data Format], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Ticker Symbol], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].CUSIP, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Company Name], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[ISO Currency Code], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Employees, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Net Income (Loss)], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Revenue - Total], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Research and Development Expense], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Active/Inactive Status Marker], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Price Close - Annual - Calendar], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Market Value - Total - Fiscal], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[North American Industry Classification Code], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].NAICS\_TITLE, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Standard Industry Classification Code], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Web URL], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Company Initial Public Offering Date], [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Company\_Name, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Ticker, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Year, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].env\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].env\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].com\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].com\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].div\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].div\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].pro\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].pro\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].corp\_s, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].corp\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].mil\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].nuc\_c, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].PatentCount, [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].Specialty

FROM Fortune500\_Comp LEFT JOIN [9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015] ON Fortune500\_Comp.Symbol=[9\_CompRev\_Age\_NAICS\_KLD\_Join\_1-4\_Patent2005\_2015].[Ticker symbol];

# 15. Descriptive statistics for all Variables in Fortune 500 List

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Ticker Year** | | | | | | **Global Company Key** | | | | | | | **Company Initial Public Offering Date** | | | | | | | | | | **Data Date** | | | | | **Year** | | | | | **President Party (D = Democrat, R = Republican)** | | | | | | **Binary President Party (0=D 1=R)** | | | **Election Year (1=election, 0 = non-election)** | |
| **count** | | 14,897 | | | | | | 14,897 | | | | | | | 3,412 | | | | | | | | | | 14,897 | | | | | 14,897 | | | | | 14,897 | | | | | | 14,897 | | | 14,897 | |
| **min** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
| **max** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
| **range** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
| **average** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
| **median** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
| **mode** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
| **st dev** | |  | | | | | |  | | | | | | |  | | | | | | | | | |  | | | | |  | | | | |  | | | | | |  | | |  | |
|  | **Fortune 500 Position** | | | | | **Company Name** | | | | | | | **Ticker Symbol** | | | | | | | | **# Analyst Jobs in 2016 (Analytics Level)** | | | | | | | | **Research and Development Expense (Innovation Level)** | | | | | | | | | | **Revenue - Total** | | | | **Price Close - Annual - Calendar** | |
| **count** | 14,897 | | | | | 14,897 | | | | | | | 14,897 | | | | | | | | 12,650 | | | | | | | | 7,179 | | | | | | | | | | 14,803 | | | | 14,187 | |
| **min** | 1 | | | | |  | | | | | | |  | | | | | | | | 0 | | | | | | | | 0 | | | | | | | | | | -12,519 | | | | 0 | |
| **max** | 500 | | | | |  | | | | | | |  | | | | | | | | 860 | | | | | | | | 12,183 | | | | | | | | | | 483,521 | | | | 4,198 | |
| **range** | 499 | | | | |  | | | | | | |  | | | | | | | | 860 | | | | | | | | 12,183 | | | | | | | | | | 496,040 | | | | 4,198 | |
| **average** | 235 | | | | |  | | | | | | |  | | | | | | | | 40 | | | | | | | | 436 | | | | | | | | | | 11,574 | | | | 44 | |
| **median** | 225 | | | | |  | | | | | | |  | | | | | | | | 13 | | | | | | | | 49 | | | | | | | | | | 4,959 | | | | 35 | |
| **mode** | 341 | | | | |  | | | | | | |  | | | | | | | | 2 | | | | | | | | 0 | | | | | | | | | | 0 | | | | 29 | |
| **st dev** | 143 | | | | |  | | | | | | |  | | | | | | | | 89 | | | | | | | | 1,165 | | | | | | | | | | 25,296 | | | | 72 | |
|  | **Net Income (Loss)** | | | | | | | | **Employees** | | | | | | | | | **Market Value - Total - Fiscal** | | | | | | | | **USPT Count** | | | | | **EUPT Count** | | | | | **Total Patent** | | | |
| **count** | 13,270 | | | | | | | | 14,387 | | | | | | | | | 6,718 | | | | | | | | 1,883 | | | | | 1,132 | | | | | 1,883 | | | |
| **min** | -98,696 | | | | | | | | 0 | | | | | | | | | 3 | | | | | | | | 1 | | | | | 1 | | | | | 1 | | | |
| **max** | 104,821 | | | | | | | | 2,200 | | | | | | | | | 626,550 | | | | | | | | 7,450 | | | | | 385 | | | | | 7,534 | | | |
| **range** | 203,517 | | | | | | | | 2,200 | | | | | | | | | 626,547 | | | | | | | | 7,449 | | | | | 384 | | | | | 7,533 | | | |
| **average** | 658 | | | | | | | | 47 | | | | | | | | | 23,872 | | | | | | | | 155 | | | | | 28 | | | | | 170 | | | |
| **median** | 168 | | | | | | | | 20 | | | | | | | | | 8,779 | | | | | | | | 21 | | | | | 9 | | | | | 23 | | | |
| **mode** | 0 | | | | | | | | 25 | | | | | | | | | 14,053 | | | | | | | | 1 | | | | | 1 | | | | | 1 | | | |
| **st dev** | 2,603 | | | | | | | | 98 | | | | | | | | | 46,980 | | | | | | | | 480 | | | | | 47 | | | | | 501 | | | |
|  | **City** | | | | **State** | | | | | | | **Age** | | | | | | | | **NAICS Industry Code** | | | | | | | | **NAICS Industry Concentration** | | | | | | | | |
| **count** | 14,897 | | | | 14,897 | | | | | | | 14,542 | | | | | | | | 14,897 | | | | | | | | 14,897 | | | | | | | | |
| **min** |  | | | |  | | | | | | | 5 | | | | | | | |  | | | | | | | |  | | | | | | | | |
| **max** |  | | | |  | | | | | | | 66 | | | | | | | |  | | | | | | | |  | | | | | | | | |
| **range** |  | | | |  | | | | | | | 61 | | | | | | | |  | | | | | | | |  | | | | | | | | |
| **average** |  | | | |  | | | | | | | 47 | | | | | | | |  | | | | | | | |  | | | | | | | | |
| **median** |  | | | |  | | | | | | | 53 | | | | | | | |  | | | | | | | |  | | | | | | | | |
| **mode** |  | | | |  | | | | | | | 66 | | | | | | | |  | | | | | | | |  | | | | | | | | |
| **st dev** |  | | | |  | | | | | | | 18 | | | | | | | |  | | | | | | | |  | | | | | | | | |
|  | **Specialty** | | | | | | **Standard Industry Classification Code** | | | | | | | | | **Com C** | | | | | | **Com S** | | | | | **Corp C** | | | | | | **Corp S** | | | | |
| **count** | 14,897 | | | | | | 14,897 | | | | | | | | | 6,812 | | | | | | 6,812 | | | | | 6,812 | | | | | | 6,812 | | | | |
| **min** |  | | | | | |  | | | | | | | | | 0 | | | | | | 0 | | | | | 0 | | | | | | 0 | | | | |
| **max** |  | | | | | |  | | | | | | | | | 3 | | | | | | 3 | | | | | 2 | | | | | | 1 | | | | |
| **range** |  | | | | | |  | | | | | | | | | 3 | | | | | | 3 | | | | | 2 | | | | | | 1 | | | | |
| **average** |  | | | | | |  | | | | | | | | | 0 | | | | | | 0 | | | | | 0 | | | | | | 0 | | | | |
| **median** |  | | | | | |  | | | | | | | | | 0 | | | | | | 0 | | | | | 0 | | | | | | 0 | | | | |
| **mode** |  | | | | | |  | | | | | | | | | 0 | | | | | | 0 | | | | | 0 | | | | | | 0 | | | | |
| **st dev** |  | | | | | |  | | | | | | | | | 0 | | | | | | 1 | | | | | 0 | | | | | | 0 | | | | |
|  | **Div C** | | | **Div S** | | | | | | | **Env C** | | | | | | **Env S** | | | | | | | **Mil C** | | | **Nuc C** | | | | | | | **Pro C** | | | | | **Pro S** | | |
| **count** | 6,812 | | | 6,812 | | | | | | | 6,812 | | | | | | 6,812 | | | | | | | 6,812 | | | 6,812 | | | | | | | 6,812 | | | | | 6,812 | | |
| **min** | 0 | | | 0 | | | | | | | 0 | | | | | | 0 | | | | | | | 0 | | | 0 | | | | | | | 0 | | | | | 0 | | |
| **max** | 2 | | | 7 | | | | | | | 6 | | | | | | 4 | | | | | | | 4 | | | 2 | | | | | | | 4 | | | | | 3 | | |
| **range** | 2 | | | 7 | | | | | | | 6 | | | | | | 4 | | | | | | | 4 | | | 2 | | | | | | | 4 | | | | | 3 | | |
| **average** | 0 | | | 1 | | | | | | | 0 | | | | | | 0 | | | | | | | 0 | | | 0 | | | | | | | 1 | | | | | 0 | | |
| **median** | 0 | | | 1 | | | | | | | 0 | | | | | | 0 | | | | | | | 0 | | | 0 | | | | | | | 0 | | | | | 0 | | |
| **mode** | 0 | | | 0 | | | | | | | 0 | | | | | | 0 | | | | | | | 0 | | | 0 | | | | | | | 0 | | | | | 0 | | |
| **st dev** | 0 | | | 1 | | | | | | | 1 | | | | | | 1 | | | | | | | 1 | | | 0 | | | | | | | 1 | | | | | 0 | | |
|  | **COM (S - C)** | | **CORP (S - C)** | | | | | | | **DIV (S - C)** | | | | **ENV (S - C)** | | | | | **PRO (S - C)** | | | | **Total CSR (sum of COM, CORP, DIV, ENV, PRO)** | | | | | | | | |
| **count** | 6,812 | | 6,812 | | | | | | | 6,812 | | | | 6,812 | | | | | 6,812 | | | | 6,812 | | | | | | | | |
| **min** | -3 | | -2 | | | | | | | -2 | | | | -5 | | | | | -4 | | | | -9 | | | | | | | | |
| **max** | 3 | | 1 | | | | | | | 7 | | | | 4 | | | | | 2 | | | | 12 | | | | | | | | |
| **range** | 6 | | 3 | | | | | | | 9 | | | | 9 | | | | | 6 | | | | 21 | | | | | | | | |
| **average** | 0 | | 0 | | | | | | | 1 | | | | 0 | | | | | 0 | | | | 0 | | | | | | | | |
| **median** | 0 | | 0 | | | | | | | 1 | | | | 0 | | | | | 0 | | | | 0 | | | | | | | | |
| **mode** | 0 | | 0 | | | | | | | 0 | | | | 0 | | | | | 0 | | | | 0 | | | | | | | | |
| **st dev** | 1 | | 1 | | | | | | | 1 | | | | 1 | | | | | 1 | | | | 2 | | | | | | | | |

# 16. Descriptive statistics by company: Average Patent Count

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Company Name** | **Average of US Patent Count** | **Average of EU Patent Count** |
| 3M | 520.11 | 186.40 |
| A-Mark Precious Metals |  |  |
| Abbott Laboratories | 78.00 | 35.40 |
| AbbVie | 106.00 | 18.50 |
| Advance Auto Parts |  |  |
| Advanced Micro Devices | 265.22 | 21.60 |
| AECOM |  |  |
| AES | 1.00 |  |
| Aetna | 2.75 |  |
| Aflac |  |  |
| AGCO | 20.00 | 6.60 |
| Agilent Technologies | 238.78 | 25.20 |
| AGL Resources | 1.00 |  |
| AIG | 1.57 |  |
| Air Products & Chemicals | 1.67 |  |
| AK Steel Holding | 1.00 | 1.00 |
| Alaska Air Group | 1.00 |  |
| Alcoa | 28.89 | 7.20 |
| Alleghany |  |  |
| Allergan | 98.78 | 27.70 |
| Alliance Data Systems | 1.00 |  |
| Allstate | 11.17 |  |
| Ally Financial |  |  |
| Alphabet | 614.11 | 10.43 |
| Altria Group |  |  |
| Amazon.com | 198.44 | 2.33 |
| Ameren | 1.00 |  |
| American Airlines Group | 4.57 |  |
| American Electric Power | 1.00 |  |
| American Express | 66.89 | 1.50 |
| American Financial Group |  |  |
| Ameriprise Financial | 4.00 |  |
| AmerisourceBergen | 1.00 |  |
| Amgen | 70.44 | 24.20 |
| Amphenol | 14.22 | 3.25 |
| Anadarko Petroleum | 1.40 | 1.40 |
| Anixter International |  |  |
| Anthem |  |  |
| Apache | 1.60 |  |
| Apple | 919.00 | 29.50 |
| Applied Materials | 336.44 | 19.70 |
| Aramark |  |  |
| Archer Daniels Midland | 14.67 | 4.10 |
| ARRIS Group | 11.17 |  |
| Arrow Electronics | 1.00 |  |
| Asbury Automotive Group |  |  |
| Ashland | 10.00 | 4.78 |
| Assurant | 1.33 |  |
| AT&T | 847.11 |  |
| Autoliv | 42.67 | 8.10 |
| Automatic Data Processing |  |  |
| AutoNation |  |  |
| AutoZone | 1.00 |  |
| Avery Dennison | 48.00 | 17.40 |
| Avis Budget Group |  |  |
| Avnet | 1.00 |  |
| Avon Products | 13.00 | 3.10 |
| Baker Hughes | 261.33 | 20.50 |
| Ball | 8.22 | 2.29 |
| Bank of America Corp. | 70.44 | 1.33 |
| Bank of New York Mellon Corp. | 1.25 |  |
| Barnes & Noble | 1.50 |  |
| Baxter International | 63.67 | 25.20 |
| BB&T Corp. | 2.20 |  |
| Becton Dickinson | 82.44 | 38.90 |
| Bed Bath & Beyond | 1.60 |  |
| Best Buy | 1.00 |  |
| Biogen | 18.78 | 8.80 |
| BlackRock | 1.25 |  |
| Blackstone Group | 1.00 |  |
| Boeing | 593.67 | 89.40 |
| Booz Allen Hamilton Holding |  |  |
| BorgWarner | 52.78 | 31.80 |
| Boston Scientific | 4.00 | 6.43 |
| Bristol-Myers Squibb | 128.67 | 45.70 |
| Broadcom | 806.33 | 75.60 |
| Buckeye Partners |  |  |
| C.H. Robinson Worldwide |  |  |
| Cablevision Systems | 1.00 |  |
| Caesars Entertainment | 1.50 |  |
| Calpine | 1.00 |  |
| Calumet Specialty Products Partners |  |  |
| Cameron International | 31.25 | 3.67 |
| Campbell Soup | 2.00 | 1.00 |
| Capital One Financial | 11.33 |  |
| Cardinal Health | 1.00 |  |
| CarMax |  |  |
| Casey's General Stores |  |  |
| Caterpillar | 224.56 | 14.60 |
| CBRE Group |  |  |
| CBS | 9.80 |  |
| CDW | 1.00 |  |
| Celanese | 24.00 | 6.20 |
| Celgene | 15.44 | 5.60 |
| Centene |  |  |
| CenterPoint Energy | 1.00 |  |
| CenturyLink | 118.00 |  |
| CH2M Hill | 3.38 | 1.00 |
| Charles Schwab | 5.67 |  |
| Charter Communications |  |  |
| Chesapeake Energy |  |  |
| Chevron | 88.44 | 5.50 |
| Chubb | 1.00 | 1.00 |
| Cigna |  |  |
| Cisco Systems | 830.67 | 40.40 |
| Citigroup | 2.43 |  |
| Clorox | 24.67 | 1.40 |
| CMS Energy |  |  |
| Coca-Cola | 28.10 | 9.60 |
| Coca-Cola Enterprises | 1.67 |  |
| Cognizant Technology Solutions | 2.00 |  |
| Colgate-Palmolive | 81.00 | 25.10 |
| Comcast | 23.44 | 3.50 |
| Commercial Metals |  |  |
| Community Health Systems |  |  |
| Computer Sciences | 9.38 | 2.00 |
| Con-way | 1.00 |  |
| ConAgra Foods | 8.56 | 1.40 |
| ConocoPhillips | 41.78 | 5.56 |
| Consolidated Edison | 3.29 | 1.00 |
| Core-Mark Holding |  |  |
| Corning | 172.00 | 25.80 |
| Costco | 1.00 |  |
| Crown Holdings | 20.89 | 6.30 |
| CST Brands |  |  |
| CSX | 1.00 |  |
| Cummins | 31.00 | 1.88 |
| CVS Health | 1.00 |  |
| D.R. Horton |  |  |
| Dana Holding | 37.75 | 6.17 |
| Danaher | 1.38 | 1.33 |
| Darden Restaurants |  |  |
| DaVita HealthCare Partners |  |  |
| Dean Foods |  |  |
| Deere | 178.56 |  |
| Delek US Holdings |  |  |
| Delta Air Lines | 1.25 |  |
| Devon Energy |  |  |
| Dick's Sporting Goods | 1.67 |  |
| Dillard's |  |  |
| DirecTV | 58.90 | 5.30 |
| Discover Financial Services | 2.60 | 1.00 |
| Discovery Communications | 1.75 | 1.00 |
| DISH Network | 8.33 | 1.00 |
| Dollar General |  |  |
| Dollar Tree |  |  |
| Dominion Resources | 1.50 |  |
| Domtar |  |  |
| Dover |  |  |
| Dow Chemical | 5.40 | 4.30 |
| Dr Pepper Snapple Group | 4.14 |  |
| DTE Energy | 1.50 |  |
| Duke Energy | 1.00 |  |
| DuPont | 384.00 | 150.50 |
| Eastman Chemical | 56.44 | 22.80 |
| eBay | 77.44 | 1.00 |
| Ecolab | 60.67 | 13.70 |
| Edison International |  |  |
| Eli Lilly | 59.44 | 33.70 |
| EMC | 275.11 | 4.10 |
| EMCOR Group |  |  |
| Emerson Electric | 53.22 | 5.40 |
| Energy Future Holdings |  |  |
| Energy Transfer Equity |  |  |
| Entergy | 1.00 |  |
| Enterprise Products Partners |  |  |
| EOG Resources | 1.00 |  |
| Estee Lauder | 1.00 |  |
| Eversource Energy |  |  |
| Exelon | 1.00 |  |
| Expedia | 2.00 |  |
| Expeditors International of Washington |  |  |
| Express Scripts Holding | 5.50 |  |
| Exxon Mobil | 263.56 | 58.80 |
| Facebook | 109.75 | 1.33 |
| Family Dollar Stores |  |  |
| FedEx | 1.50 |  |
| Fidelity National Financial |  |  |
| Fidelity National Information Services | 1.00 |  |
| Fifth Third Bancorp | 1.00 |  |
| First Data | 40.44 | 1.00 |
| FirstEnergy | 1.33 | 1.00 |
| Fluor | 1.50 | 2.33 |
| FMC Technologies | 13.11 | 3.13 |
| Foot Locker |  |  |
| Ford Motor | 86.00 | 6.22 |
| Franklin Resources |  |  |
| Freeport-McMoRan | 5.50 | 1.33 |
| GameStop | 1.00 |  |
| Gap |  |  |
| General Cable | 3.38 | 1.40 |
| General Dynamics | 1.67 |  |
| General Electric | 1,208.22 | 231.40 |
| General Mills | 16.78 | 2.60 |
| General Motors | 196.00 | 15.14 |
| Genuine Parts |  |  |
| Genworth Financial | 4.25 |  |
| Gilead Sciences | 21.00 | 8.70 |
| Global Partners |  |  |
| Goldman Sachs Group | 21.22 |  |
| Goodyear Tire & Rubber | 161.00 |  |
| Graybar Electric |  |  |
| Group 1 Automotive |  |  |
| Guardian Life Ins. Co. of America |  |  |
| Halliburton | 272.33 | 37.30 |
| Hanesbrands | 1.00 |  |
| Harley-Davidson | 10.89 | 1.00 |
| Harman International Industries | 33.56 | 5.11 |
| Hartford Financial Services Group | 24.71 |  |
| HCA Holdings |  |  |
| HD Supply Holdings |  |  |
| Health Net |  |  |
| Henry Schein | 1.50 |  |
| Hershey | 1.67 | 1.00 |
| Hess |  |  |
| Hilton Worldwide Holdings |  |  |
| HollyFrontier |  |  |
| Home Depot | 1.33 |  |
| Honeywell International | 658.44 | 123.20 |
| Hormel Foods | 2.13 | 1.50 |
| Host Hotels & Resorts |  |  |
| HP | 1,558.44 | 86.00 |
| HRG Group |  |  |
| Humana | 3.50 |  |
| Huntington Ingalls Industries | 1.00 |  |
| Huntsman | 11.00 | 6.80 |
| IBM | 4,956.33 | 130.90 |
| Icahn Enterprises |  |  |
| iHeartMedia | 2.00 |  |
| Illinois Tool Works | 207.67 | 61.80 |
| Ingram Micro |  |  |
| Ingredion |  |  |
| Insight Enterprises |  |  |
| Intel | 1,625.78 | 105.10 |
| International Paper | 24.22 | 5.00 |
| Interpublic Group |  |  |
| INTL FCStone |  |  |
| J.B. Hunt Transport Services |  |  |
| J.C. Penney | 1.00 |  |
| J.M. Smucker | 3.57 |  |
| Jabil Circuit | 2.88 |  |
| Jacobs Engineering Group |  |  |
| Jarden | 1.00 |  |
| JetBlue Airways |  |  |
| Johnson & Johnson | 15.11 |  |
| Johnson Controls | 48.89 | 9.10 |
| Jones Financial |  |  |
| Jones Lang LaSalle | 1.00 |  |
| JP Morgan Chase | 46.67 |  |
| KBR | 1.00 |  |
| Kellogg | 7.78 | 2.43 |
| Kelly Services |  |  |
| Kimberly-Clark | 202.00 | 94.70 |
| Kinder Morgan | 1.25 |  |
| Kindred Healthcare |  |  |
| KKR |  |  |
| Kohl's |  |  |
| Kraft Foods Group | 48.50 | 11.25 |
| Kroger | 3.00 |  |
| L Brands |  |  |
| L-3 Communications | 20.44 | 2.33 |
| Laboratory Corp. of America | 3.67 | 1.00 |
| Land O'Lakes | 2.43 |  |
| Las Vegas Sands | 2.00 |  |
| Lear | 96.78 | 4.75 |
| Lennar |  |  |
| Leucadia National |  |  |
| Level 3 Communications | 16.13 | 2.00 |
| Liberty Interactive |  |  |
| Liberty Mutual Insurance Group |  |  |
| LifePoint Health |  |  |
| Lincoln National | 1.25 |  |
| Lithia Motors |  |  |
| Live Nation Entertainment | 1.00 |  |
| LKQ |  |  |
| Lockheed Martin | 247.11 | 13.90 |
| Loews |  |  |
| Lowe's | 4.50 |  |
| Macy's |  |  |
| ManpowerGroup |  |  |
| Marathon Oil | 2.75 | 1.86 |
| Marathon Petroleum | 2.67 |  |
| Marriott International |  |  |
| Marsh & McLennan |  |  |
| Masco | 74.44 | 2.67 |
| Massachusetts Mutual Life Insurance |  |  |
| MasterCard | 20.11 |  |
| Mattel | 56.11 | 10.70 |
| McDonald's | 1.00 | 1.00 |
| McGraw Hill Financial |  |  |
| McKesson | 14.40 |  |
| MeadWestvaco | 35.56 | 17.20 |
| Merck | 70.29 |  |
| MetLife |  |  |
| MGM Resorts International | 2.00 |  |
| Micron Technology | 1,194.11 | 27.50 |
| Microsoft | 2,404.67 | 94.10 |
| Mohawk Industries | 1.00 |  |
| Molina Healthcare |  |  |
| Mondelez International |  |  |
| Monsanto | 237.00 | 14.70 |
| Morgan Stanley | 17.43 | 1.00 |
| Mosaic | 2.00 |  |
| Motorola Solutions | 477.00 | 89.40 |
| MRC Global |  |  |
| Murphy Oil | 1.00 |  |
| Murphy USA |  |  |
| Mutual of Omaha Insurance |  |  |
| National Oilwell Varco | 20.14 | 5.00 |
| Nationwide |  |  |
| Navient |  |  |
| Navistar International | 11.00 |  |
| NCR | 74.33 | 8.50 |
| NetApp | 131.17 | 2.67 |
| Netflix | 4.25 |  |
| New York Life Insurance | 2.33 |  |
| Newell Rubbermaid |  |  |
| Newmont Mining | 2.33 |  |
| News Corp. |  |  |
| NextEra Energy |  |  |
| NGL Energy Partners | 1.00 |  |
| Nike | 303.11 | 1.33 |
| NiSource | 1.00 |  |
| Nordstrom |  |  |
| Norfolk Southern | 3.00 |  |
| Northrop Grumman | 82.13 | 30.88 |
| Northwestern Mutual | 1.00 |  |
| NRG Energy |  |  |
| Nucor | 10.78 | 2.29 |
| O'Reilly Automotive |  |  |
| Occidental Petroleum | 1.50 | 1.20 |
| Office Depot | 4.00 |  |
| Old Republic International |  |  |
| Omnicare | 2.14 |  |
| Omnicom Group | 1.00 |  |
| Oneok |  |  |
| Oracle | 449.11 | 9.90 |
| Oshkosh | 7.33 | 2.00 |
| Owens & Minor | 1.00 |  |
| Owens Corning | 19.14 | 2.67 |
| Owens-Illinois | 9.80 | 4.50 |
| Paccar | 33.11 | 1.50 |
| Pacific Life |  |  |
| Packaging Corp. of America | 1.71 |  |
| Pantry |  |  |
| Parker-Hannifin | 36.22 | 8.90 |
| PBF Energy |  |  |
| Peabody Energy | 1.00 |  |
| Penske Automotive Group |  |  |
| PepsiCo | 32.78 | 1.78 |
| Peter Kiewit Sons' |  |  |
| PetSmart |  |  |
| Pfizer | 83.67 | 18.70 |
| PG&E Corp. |  |  |
| Philip Morris International | 43.22 | 2.67 |
| Phillips 66 | 30.50 | 2.67 |
| Pioneer Natural Resources | 1.50 |  |
| Plains GP Holdings |  |  |
| PNC Financial Services Group | 12.00 |  |
| PPG Industries | 66.22 | 20.70 |
| PPL | 1.00 |  |
| Praxair | 37.67 | 9.40 |
| Precision Castparts | 1.00 |  |
| Priceline Group | 3.00 |  |
| Principal Financial | 1.00 |  |
| Procter & Gamble | 444.10 |  |
| Progressive | 2.00 |  |
| Prudential Financial | 4.63 |  |
| Public Service Enterprise Group |  |  |
| Publix Super Markets |  |  |
| PulteGroup |  |  |
| PVH | 1.00 |  |
| Qualcomm | 844.33 | 222.80 |
| Quanta Services |  |  |
| Quest Diagnostics | 1.00 |  |
| Quintiles Transnational Holdings | 1.00 |  |
| R.R. Donnelley & Sons | 5.20 |  |
| Ralph Lauren | 3.00 |  |
| Raytheon | 1.00 |  |
| Realogy Holdings |  |  |
| Regions Financial | 1.00 |  |
| Reinsurance Group of America |  |  |
| Reliance Steel & Aluminum |  |  |
| Republic Services |  |  |
| Reynolds American |  |  |
| Rite Aid |  |  |
| Rockwell Automation | 111.56 | 12.60 |
| Ross Stores |  |  |
| Ryder System |  |  |
| Safeway | 3.00 |  |
| salesforce.com | 55.67 |  |
| SanDisk | 263.22 | 29.20 |
| Sanmina | 4.00 | 1.00 |
| Seaboard | 1.00 |  |
| Sealed Air | 9.00 | 5.60 |
| Sears Holdings | 14.57 |  |
| Sempra Energy |  |  |
| Sherwin-Williams | 9.70 | 3.13 |
| Sonic Automotive |  |  |
| Southern | 2.63 |  |
| Southwest Airlines | 2.29 |  |
| SpartanNash |  |  |
| Spectra Energy | 1.00 |  |
| Spirit AeroSystems Holdings | 10.00 | 2.00 |
| St. Jude Medical | 56.22 | 24.10 |
| Stanley Black & Decker | 17.25 |  |
| Staples | 12.43 | 3.00 |
| Starbucks | 2.83 | 1.00 |
| Starwood Hotels & Resorts | 1.50 |  |
| State Farm Insurance Cos. |  |  |
| State Street Corp. | 1.33 |  |
| Steel Dynamics |  |  |
| Stryker | 33.44 | 7.90 |
| SunTrust Banks |  |  |
| Supervalu | 1.00 |  |
| Symantec | 212.78 | 3.22 |
| Synnex |  |  |
| Sysco |  |  |
| Targa Resources | 1.00 |  |
| Target | 77.00 |  |
| Tech Data |  |  |
| TEGNA |  |  |
| Tenet Healthcare |  |  |
| Tenneco | 13.30 | 1.63 |
| Terex | 1.00 |  |
| Tesoro | 1.00 |  |
| Texas Instruments | 765.33 | 48.90 |
| Textron | 12.00 | 3.20 |
| Thermo Fisher Scientific | 1.50 |  |
| TIAA-CREF |  |  |
| Time Warner | 2.88 |  |
| Time Warner Cable | 26.67 | 1.00 |
| TJX |  |  |
| Toys "R" Us |  |  |
| Tractor Supply |  |  |
| TravelCenters of America |  |  |
| Travelers Cos. | 2.00 |  |
| Trinity Industries | 3.63 | 1.33 |
| TRW Automotive Holdings | 16.40 | 8.80 |
| Twenty-First Century Fox |  |  |
| Tyson Foods | 2.67 |  |
| U.S. Bancorp | 1.00 |  |
| UGI |  |  |
| Union Pacific | 2.60 |  |
| United Continental Holdings |  |  |
| United Natural Foods |  |  |
| United Rentals |  |  |
| United States Steel | 2.29 |  |
| United Technologies | 200.30 | 85.00 |
| UnitedHealth Group | 4.00 |  |
| Universal Health Services |  |  |
| Unum Group |  |  |
| UPS | 23.10 | 3.89 |
| US Foods |  |  |
| Valero Energy |  |  |
| Verizon | 245.10 | 5.11 |
| VF |  |  |
| Viacom | 1.67 |  |
| Visa | 35.56 | 3.00 |
| Visteon | 62.90 | 7.38 |
| Voya Financial |  |  |
| W.R. Berkley |  |  |
| W.W. Grainger | 4.38 |  |
| Walgreens |  |  |
| Walmart | 9.70 |  |
| Walt Disney | 1.00 | 1.00 |
| Waste Management | 1.00 |  |
| WellCare Health Plans |  |  |
| Wells Fargo | 9.78 |  |
| WESCO International | 2.00 |  |
| Western Digital | 147.60 | 1.00 |
| Western Refining |  |  |
| Western Union | 18.13 |  |
| WestRock |  |  |
| Weyerhaeuser | 24.70 | 3.70 |
| Whirlpool | 131.10 | 23.60 |
| Whole Foods Market |  |  |
| Williams | 1.00 |  |
| Windstream Holdings | 1.00 |  |
| World Fuel Services |  |  |
| Wyndham Worldwide |  |  |
| Wynn Resorts | 1.00 |  |
| Xcel Energy |  |  |
| Xerox | 761.20 | 105.60 |
| Yum Brands |  |  |
| **Grand Total** | **155.16** | **27.83** |

# 17. Descriptive statistics by company: Revenue

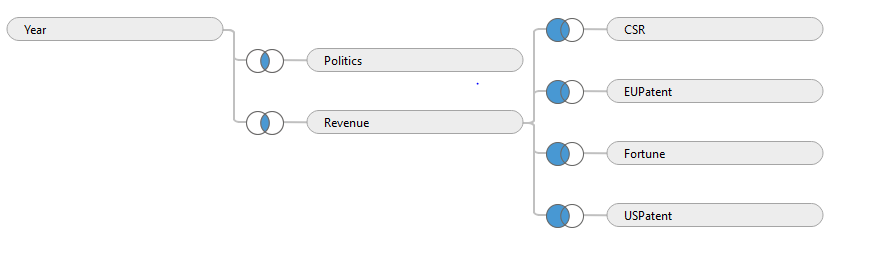
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company\_Name | frequency | n | max | min | avg | median | range | std\_dev |
| 3M CO | 23 | 23 | 31821 | 13340 | 19656 | 16724 | 18481 | 5906.696046 |
| ABBOTT LABORATORIES | 23 | 23 | 39874 | 6876.59 | 19262.73 | 17684.7 | 32997 | 10001.5834 |
| ABBVIE INC | 2 | 2 | 19960 | 18380 | 19170 | 19170 | 1580 | 1117.228714 |
| ADVANCE AUTO PARTS INC | 12 | 12 | 9843.9 | 3287.88 | 5248.097 | 4993.33 | 6556 | 1758.534702 |
| ADVANCED MICRO DEVICES | 23 | 23 | 6568 | 1226.65 | 3962.047 | 3891.75 | 5341.4 | 1803.021212 |
| AECOM INC | 7 | 7 | 8356.8 | 4237.27 | 6672.764 | 6545.79 | 4119.5 | 1608.601964 |
| AES CORP | 15 | 15 | 18046 | 3253 | 12090.2 | 11564 | 14793 | 4469.414426 |
| AETNA INC | 46 | 46 | 58043 | 12978 | 25217.91 | 22511 | 45065 | 9724.796556 |
| AFLAC INC+ | 30 | 30 | 25411 | 8640 | 15553.6 | 14626 | 16771 | 5232.991052 |
| AGCO CORP | 5 | 5 | 9962.2 | 6630.4 | 8397.22 | 8773.2 | 3331.8 | 1559.133241 |
| AGILENT TECHNOLOGIES INC | 14 | 14 | 10773 | 4481 | 6437.929 | 6033 | 6292 | 1619.711725 |
| AGL RESOURCES INC | 24 | 24 | 5385 | 607.4 | 1949.374 | 1313.1 | 4777.6 | 1217.135733 |
| AIR PRODUCTS & CHEMICALS INC | 23 | 23 | 10439 | 2931.1 | 6546.374 | 5717.2 | 7507.9 | 2621.969724 |
| AK STEEL HOLDING CORP | 13 | 13 | 7644.3 | 3994.1 | 5604.485 | 5933.7 | 3650.2 | 1203.563012 |
| ALASKA AIR GROUP INC | 22 | 22 | 5368 | 1115.38 | 2682.806 | 2334.45 | 4252.6 | 1193.005526 |
| ALCOA INC | 23 | 23 | 30748 | 9055.9 | 19396.28 | 21013 | 21692 | 6766.537564 |
| ALLEGHANY CORP | 26 | 26 | 5260.6 | 402.533 | 1594.001 | 1095.96 | 4858.1 | 1411.92171 |
| ALLERGAN PLC | 23 | 23 | 13062 | 34.684 | 2420.129 | 1457.72 | 13028 | 3135.22816 |
| ALLIANCE DATA SYSTEMS CORP | 13 | 13 | 5302.9 | 871.451 | 2479.855 | 2025.27 | 4431.5 | 1323.107272 |
| ALLSTATE CORP | 40 | 40 | 37202 | 22793 | 30811.65 | 31868.5 | 14409 | 4119.396829 |
| ALLY FINANCIAL INC | 2 | 2 | 9869 | 9869 | 9869 | 9869 | 0 | 0 |
| ALPHABET INC | 2 | 2 | 66001 | 29321 | 47661 | 47661 | 36680 | 25936.67673 |
| ALTRIA GROUP INC | 23 | 23 | 72944 | 15957 | 47327.13 | 53776 | 56987 | 19904.83786 |
| AMAZON.COM INC | 20 | 20 | 88988 | 3122.43 | 28490.16 | 19166 | 85866 | 26235.25859 |
| AMEREN CORP | 16 | 16 | 7839 | 3318.21 | 5811.41 | 6416.5 | 4520.8 | 1653.078599 |
| AMERICAN AIRLINES GROUP INC | 8 | 8 | 42650 | 12887 | 20393.25 | 16523.5 | 29763 | 9905.533399 |
| AMERICAN ELECTRIC POWER CO | 23 | 23 | 61257 | 5044.79 | 12932.47 | 13380 | 56212 | 11362.28832 |
| AMERICAN EXPRESS CO | 46 | 46 | 35280 | 14173 | 25400.41 | 25763 | 21107 | 5934.822763 |
| AMERICAN FINANCIAL GROUP INC | 28 | 28 | 5713 | 3339.82 | 4371.181 | 4289.85 | 2373.2 | 582.3872035 |
| AMERICAN INTERNATIONAL GROUP | 46 | 46 | 114255 | 8062 | 56191.3 | 58855 | 106193 | 33337.63253 |
| AMERIPRISE FINANCIAL INC | 20 | 20 | 12296 | 7149 | 9361.9 | 9465 | 5147 | 1667.2831 |
| AMERISOURCEBERGEN CORP | 15 | 15 | 119569 | 16191.4 | 68081.03 | 70189.7 | 103378 | 23670.18634 |
| AMGEN INC | 23 | 23 | 20063 | 682.043 | 8199.432 | 5523 | 19381 | 6465.682515 |
| AMPHENOL CORP | 13 | 13 | 5345.5 | 1062 | 2711.871 | 2820.07 | 4283.5 | 1344.824421 |
| ANADARKO PETROLEUM CORP | 23 | 23 | 16375 | 336.616 | 6064.66 | 5686 | 16038 | 5453.973592 |
| ANIXTER INTL INC | 11 | 11 | 6445.5 | 2625.2 | 5088.718 | 5472.1 | 3820.3 | 1306.823719 |
| ANTHEM INC | 2 | 2 | 73919 | 73874.1 | 73896.35 | 73896.4 | 44.5 | 31.46625176 |
| APACHE CORP | 24 | 24 | 16947 | 342.032 | 6103.418 | 3494.81 | 16605 | 5895.140366 |
| APPLE INC | 23 | 23 | 182795 | 5363 | 32591.26 | 9188.75 | 177432 | 49681.90505 |
| APPLIED MATERIALS INC | 23 | 23 | 10517 | 638.606 | 5898.485 | 5062.31 | 9878.4 | 3177.145091 |
| ARCHER-DANIELS-MIDLAND CO | 24 | 24 | 89804 | 8468.2 | 37097.11 | 27080.8 | 81336 | 28624.88987 |
| ARRIS GROUP INC | 11 | 11 | 5322.9 | 433.986 | 1326.667 | 1087.51 | 4888.9 | 1355.777604 |
| ARROW ELECTRONICS INC | 15 | 15 | 22769 | 7390.15 | 14306.35 | 13577.1 | 15379 | 4893.041229 |
| ASBURY AUTOMOTIVE GROUP INC | 12 | 12 | 5867.7 | 3650.6 | 4922.616 | 4874.22 | 2217.1 | 735.9891519 |
| ASHLAND INC | 23 | 23 | 13327 | 6121 | 8626.242 | 8206 | 7206 | 1782.683946 |
| ASSURANT INC | 20 | 20 | 10407 | 7355.06 | 8413.467 | 8467.88 | 3052.4 | 803.1296154 |
| AT&T INC | 41 | 41 | 132447 | 9331.9 | 88817.02 | 123018 | 123115 | 47978.03262 |
| AUTOLIV INC | 12 | 12 | 9240.5 | 3991 | 6729.55 | 6486.95 | 5249.5 | 1681.508463 |
| AUTOMATIC DATA PROCESSING | 14 | 14 | 12207 | 6853.65 | 8898.077 | 8821.8 | 5352.8 | 1626.001583 |
| AUTONATION INC | 21 | 21 | 19989 | 48.766 | 11882.4 | 14131.9 | 19941 | 7923.256541 |
| AUTOZONE INC | 17 | 17 | 9475.3 | 2691.44 | 5909.096 | 5710.88 | 6783.9 | 1813.201743 |
| AVERY DENNISON CORP | 23 | 23 | 6710.4 | 2545.1 | 4542.435 | 4206.9 | 4165.3 | 1450.041378 |
| AVIS BUDGET GROUP INC | 8 | 8 | 8485 | 5131 | 6214.625 | 5942 | 3354 | 1144.846956 |
| AVNET INC | 23 | 23 | 27500 | 1740.77 | 11336.34 | 9172.21 | 25759 | 7914.874098 |
| AVON PRODUCTS | 23 | 23 | 11292 | 3593.3 | 7074.104 | 6228.3 | 7698.3 | 2625.633682 |
| BAKER HUGHES INC | 23 | 23 | 24551 | 2504.76 | 8093.114 | 5382.2 | 22046 | 6377.163234 |
| BALL CORP | 23 | 23 | 8735.7 | 2018.4 | 4905.448 | 3858.9 | 6717.3 | 2422.897474 |
| BANK OF AMERICA CORP | 46 | 46 | 150450 | 9917 | 65984.11 | 53151 | 140533 | 45140.73924 |
| BANK OF NEW YORK MELLON CORP | 38 | 38 | 16828 | 5285 | 9216.079 | 7234 | 11543 | 4000.277135 |
| BARNES & NOBLE INC | 13 | 13 | 7129.2 | 4870.39 | 5746.773 | 5410.83 | 2258.8 | 802.7575916 |
| BAXTER INTERNATIONAL INC | 23 | 23 | 16671 | 5048 | 9587.043 | 8921 | 11623 | 3065.120352 |
| BB&T CORP | 34 | 34 | 11072 | 3877.14 | 8596.142 | 9926 | 7194.9 | 2321.609138 |
| BECTON DICKINSON & CO | 23 | 23 | 8446 | 2172.17 | 4719.383 | 4033.07 | 6273.8 | 2089.61805 |
| BED BATH & BEYOND INC | 14 | 14 | 11881 | 2396.66 | 6727.333 | 6833.19 | 9484.5 | 2888.066466 |
| BERKLEY (W R) CORP | 12 | 12 | 7138.6 | 4434.77 | 5316.937 | 4939.39 | 2703.8 | 930.6086348 |
| BEST BUY CO INC | 16 | 16 | 50705 | 12494 | 34416.79 | 37978.5 | 38211 | 12945.96582 |
| BIOGEN INC | 11 | 11 | 9703.3 | 679.183 | 4057.055 | 4097.51 | 9024.1 | 2359.914515 |
| BLACKROCK INC | 26 | 26 | 11234 | 533.144 | 4528.664 | 4628 | 10701 | 3845.653871 |
| BOEING CO | 24 | 24 | 90762 | 19515 | 53317.04 | 55499.5 | 71247 | 20082.73681 |
| BOOZ ALLEN HAMILTON HLDG CP | 2 | 2 | 5758.1 | 5274.77 | 5516.415 | 5516.41 | 483.29 | 341.7369292 |
| BORGWARNER INC | 12 | 12 | 8305.1 | 2731.1 | 5084.575 | 4924.65 | 5574 | 1744.577181 |
| BOSTON SCIENTIFIC CORP | 19 | 19 | 8357 | 1106.68 | 5030.899 | 5624 | 7250.3 | 2725.758288 |
| BRISTOL-MYERS SQUIBB CO | 23 | 23 | 21244 | 11156 | 17159.78 | 18213 | 10088 | 3223.871289 |
| BROADCOM CORP | 14 | 14 | 8428 | 961.821 | 4075.457 | 3722.11 | 7466.2 | 2660.915814 |
| C H ROBINSON WORLDWIDE INC | 13 | 13 | 13470 | 3090.07 | 7268.979 | 7316.22 | 10380 | 3273.899688 |
| CABLEVISION SYS CORP -CL A | 13 | 13 | 7773.3 | 4003.41 | 5938.063 | 6460.95 | 3769.9 | 1265.557358 |
| CAESARS ENTERTAINMENT CORP | 3 | 3 | 8586.7 | 4548.33 | 7217.009 | 8516 | 4038.4 | 2311.417315 |
| CALPINE CORP | 11 | 11 | 9937 | 5478 | 7525.113 | 7457.9 | 4459 | 1372.828066 |
| CAMERON INTERNATIONAL CORP | 13 | 13 | 10381 | 1538.1 | 4677.316 | 4666.37 | 8842.9 | 2845.860163 |
| CAMPBELL SOUP CO | 23 | 23 | 8268 | 6133 | 7145.5 | 7278 | 2135 | 672.6910928 |
| CAPITAL ONE FINANCIAL CORP | 32 | 32 | 23869 | 2599.82 | 13349.01 | 13597.4 | 21269 | 6543.485461 |
| CARDINAL HEALTH INC | 17 | 17 | 107552 | 10968 | 66833.96 | 74910.7 | 96584 | 32015.53555 |
| CARMAX INC | 12 | 12 | 14874 | 4066.94 | 8113.766 | 7657.3 | 10807 | 3078.322271 |
| CASEYS GENERAL STORES INC | 11 | 11 | 7052.2 | 2024.14 | 4487.45 | 4248.9 | 5028.1 | 1691.001101 |
| CATERPILLAR INC | 23 | 23 | 65875 | 10182 | 29679.43 | 20977 | 55693 | 16833.72035 |
| CBRE GROUP INC | 22 | 22 | 9227.8 | 2365.1 | 5346.136 | 5175.4 | 6862.7 | 1906.303422 |
| CBS CORP | 16 | 16 | 14536 | 1711.56 | 10980.14 | 13410.3 | 12825 | 4844.480877 |
| CDW CORP | 1 | 1 | 12075 | 12074.5 | 12074.5 | 12074.5 | 0 |  |
| CELANESE CORP | 10 | 10 | 6823 | 4603 | 6157.9 | 6431 | 2220 | 764.6009053 |
| CELGENE CORP | 13 | 13 | 7670.4 | 114.243 | 2333.092 | 1405.82 | 7556.2 | 2426.026965 |
| CENTENE CORP | 27 | 27 | 16588 | 201.429 | 3829.53 | 2919.29 | 16387 | 4355.6976 |
| CENTERPOINT ENERGY INC | 13 | 13 | 11322 | 7452 | 8959.927 | 8785 | 3870 | 1019.508204 |
| CENTURYLINK INC | 15 | 15 | 18376 | 1676.67 | 5748.851 | 2445.77 | 16699 | 6143.460109 |
| CHARTER COMMUNICATIONS INC | 10 | 10 | 9108 | 3953.13 | 5816.613 | 5379 | 5154.9 | 1538.56587 |
| CHESAPEAKE ENERGY CORP | 11 | 11 | 20951 | 1717.43 | 8892.417 | 7800 | 19234 | 5338.6423 |
| CHEVRON CORP | 13 | 13 | 255112 | 91685 | 175753.9 | 189607 | 163427 | 51893.64327 |
| CHUBB CORP | 46 | 46 | 14107 | 4568.48 | 9729.122 | 9127.95 | 9538.5 | 3700.42176 |
| CIGNA CORP | 46 | 46 | 34954 | 16362 | 20188.72 | 18954.5 | 18592 | 4014.046419 |
| CISCO SYSTEMS INC | 22 | 22 | 47142 | 339.623 | 21670.16 | 20486.5 | 46802 | 15941.2659 |
| CITIGROUP INC | 46 | 46 | 157333 | 5099.5 | 79343.85 | 94713 | 152234 | 46070.71787 |
| CLOROX CO/DE | 23 | 23 | 5591 | 1641.53 | 3796.447 | 4089 | 3949.5 | 1423.451464 |
| CMS ENERGY CORP | 15 | 15 | 9597 | 5472 | 6892.267 | 6464 | 4125 | 1234.280326 |
| COCA-COLA CO | 23 | 23 | 48017 | 11571.6 | 24635.93 | 20458 | 36445 | 10560.10883 |
| COCA-COLA ENTERPRISES INC | 15 | 15 | 21807 | 6714 | 15430.33 | 16889 | 15093 | 5257.035648 |
| COGNIZANT TECH SOLUTIONS | 11 | 11 | 10263 | 368.231 | 3619.84 | 2816.3 | 9894.5 | 3166.245079 |
| COLGATE-PALMOLIVE CO | 23 | 23 | 17277 | 6060.3 | 11102.67 | 9427.8 | 11217 | 3546.158252 |
| COMCAST CORP | 25 | 25 | 68775 | 721 | 31878.69 | 34256 | 68054 | 23373.61495 |
| COMMERCIAL METALS | 11 | 11 | 10427 | 2875.89 | 6946.723 | 7039.96 | 7551.5 | 1949.99217 |
| COMMUNITY HEALTH SYSTEMS INC | 13 | 13 | 18639 | 1693.63 | 8187.712 | 7127.49 | 16945 | 5572.817041 |
| COMPUTER SCIENCES CORP | 23 | 23 | 16740 | 2113.35 | 10620.21 | 11426 | 14627 | 5200.156134 |
| CON-WAY INC | 8 | 8 | 5806.1 | 4221.48 | 4943.571 | 4994.41 | 1584.6 | 604.3013846 |
| CONAGRA FOODS INC | 25 | 25 | 27630 | 11579.4 | 18393.22 | 15832.4 | 16050 | 5789.680629 |
| CONOCOPHILLIPS | 12 | 12 | 230859 | 50512 | 136645.6 | 149211 | 180347 | 63432.16709 |
| CONSOLIDATED EDISON INC | 23 | 23 | 13583 | 5873.06 | 9644.996 | 9633.96 | 7709.9 | 2836.71461 |
| CORE MARK HOLDING CO INC | 8 | 8 | 8169.8 | 4001.1 | 5568.45 | 5262.95 | 4168.7 | 1439.804089 |
| CORNING INC | 23 | 23 | 9715 | 3090 | 5196.139 | 4799.2 | 6625 | 1779.752332 |
| COSTCO WHOLESALE CORP | 17 | 17 | 112640 | 21874.4 | 57090.71 | 52935.2 | 90766 | 27127.38551 |
| CROWN HOLDINGS INC | 23 | 23 | 9097 | 3780.7 | 7009.748 | 7289 | 5316.3 | 1633.77418 |
| CST BRANDS INC | 1 | 1 | 10777 | 10777 | 10777 | 10777 | 0 |  |
| CSX CORP | 23 | 23 | 12669 | 7793 | 9733.391 | 9608 | 4876 | 1381.619792 |
| CUMMINS INC | 16 | 16 | 19255 | 6296 | 13921.31 | 13236 | 12959 | 4190.7444 |
| CVS HEALTH CORP | 17 | 17 | 139367 | 12738.2 | 57598.01 | 37006.2 | 126629 | 42804.61009 |
| D R HORTON INC | 13 | 13 | 15108 | 3646.4 | 7834.734 | 6738.83 | 11462 | 3916.419999 |
| DANA HOLDING CORP | 6 | 6 | 8095 | 5228 | 6810.833 | 6920.5 | 2867 | 1045.515646 |
| DANAHER CORP | 17 | 17 | 19914 | 3197.24 | 10109.54 | 11025.9 | 16717 | 5148.816548 |
| DARDEN RESTAURANTS INC | 19 | 19 | 8551.9 | 3171.81 | 5431.363 | 5278.11 | 5380.1 | 1755.43442 |
| DAVITA HEALTHCARE PARTNERS | 13 | 13 | 12795 | 1650.75 | 5162.369 | 5264.15 | 11144 | 3159.730917 |
| DEAN FOODS CO | 12 | 12 | 13055 | 8991.46 | 10931.77 | 10990.3 | 4064 | 1318.373218 |
| DEERE & CO | 23 | 23 | 35736 | 6846.7 | 17861.19 | 13780 | 28889 | 8939.906579 |
| DELEK US HOLDINGS INC | 8 | 8 | 8726.7 | 2666.7 | 5323.938 | 4356.15 | 6060 | 2393.453022 |
| DELTA AIR LINES INC | 21 | 21 | 40362 | 9170.61 | 18919.48 | 14138 | 31191 | 9528.075819 |
| DEVON ENERGY CORP | 14 | 14 | 19566 | 2784.1 | 9503.936 | 9721 | 16782 | 4512.210721 |
| DICKS SPORTING GOODS INC | 11 | 11 | 6814.5 | 1470.85 | 4044.061 | 4130.13 | 5343.6 | 1623.127074 |
| DILLARDS INC -CL A | 23 | 23 | 8921.2 | 4184.47 | 6925.446 | 6816.91 | 4736.8 | 1233.529818 |
| DIRECTV | 10 | 10 | 33260 | 11360 | 21211.2 | 20629 | 21900 | 7333.886768 |
| DISCOVER FINANCIAL SVCS INC | 14 | 14 | 9789 | 6093.39 | 7738.564 | 8226.72 | 3695.6 | 1453.77332 |
| DISCOVERY COMMUNICATIONS INC | 9 | 9 | 6265 | 688.087 | 3089.868 | 3516 | 5576.9 | 1978.0377 |
| DISH NETWORK CORP | 14 | 14 | 14643 | 4001.14 | 10326.47 | 11353.8 | 10642 | 3735.081821 |
| DISNEY (WALT) CO | 23 | 23 | 48813 | 6182.4 | 26589.73 | 25402 | 42631 | 12014.5427 |
| DOLLAR GENERAL CORP | 17 | 17 | 18910 | 1764.19 | 8363.046 | 6871.99 | 17145 | 5650.354324 |
| DOLLAR TREE INC | 13 | 13 | 8602.2 | 1987.27 | 4633.382 | 4242.6 | 6614.9 | 2028.059802 |
| DOMINION RESOURCES INC | 23 | 23 | 18041 | 3785.7 | 10351.68 | 10558 | 14255 | 4857.454282 |
| DOMTAR CORP | 7 | 7 | 6394 | 5465 | 5759 | 5612 | 929 | 334.1756025 |
| DONNELLEY (R R) & SONS CO | 11 | 11 | 11603 | 7156.4 | 10180.72 | 10221.9 | 4447 | 1458.200931 |
| DOVER CORP | 23 | 23 | 8104.3 | 2195.79 | 5168.543 | 4547.66 | 5908.6 | 1863.589176 |
| DOW CHEMICAL | 24 | 24 | 59985 | 18086 | 35916.63 | 30218.5 | 41899 | 16458.52531 |
| DR PEPPER SNAPPLE GROUP INC | 6 | 6 | 6121 | 5531 | 5816 | 5806.5 | 590 | 226.9343517 |
| DTE ENERGY CO | 24 | 24 | 12301 | 3519.34 | 6694.507 | 7077.5 | 8781.7 | 2597.754514 |
| DU PONT (E I) DE NEMOURS | 23 | 23 | 39911 | 24134 | 31638.96 | 31659 | 15777 | 4998.176099 |
| DUKE ENERGY CORP | 23 | 23 | 59503 | 3825.83 | 17102.05 | 15184 | 55677 | 13471.25817 |
| EASTMAN CHEMICAL CO | 20 | 20 | 9527 | 4329 | 6002.15 | 5595 | 5198 | 1387.377848 |
| EBAY INC | 13 | 13 | 17902 | 748.821 | 7357.258 | 7672.33 | 17153 | 5133.15805 |
| ECOLAB INC | 28 | 28 | 14281 | 917.955 | 5295.044 | 4359.88 | 13363 | 4309.954344 |
| EDISON INTERNATIONAL | 18 | 18 | 14112 | 8390.38 | 11589.06 | 11857 | 5721.6 | 1552.91745 |
| EMC CORP/MA | 18 | 18 | 24440 | 2273.65 | 10994.27 | 9268.39 | 22166 | 6569.439567 |
| EMCOR GROUP INC | 11 | 11 | 6785.2 | 4534.65 | 5525.894 | 5547.94 | 2250.6 | 768.2374743 |
| EMERSON ELECTRIC CO | 23 | 23 | 24807 | 7427 | 15976.33 | 15479.6 | 17380 | 5841.153636 |
| ENERGY TRANSFER EQUITY LP | 1 | 1 | 46115 | 46115 | 46115 | 46115 | 0 |  |
| ENTERGY CORP | 23 | 23 | 13094 | 4051.43 | 9170.987 | 10016.1 | 9042.3 | 2643.712955 |
| EOG RESOURCES INC | 13 | 13 | 17474 | 1093.93 | 5691.065 | 4131.6 | 16380 | 4706.762123 |
| EVERSOURCE ENERGY | 6 | 6 | 6273.8 | 4465.66 | 5449.894 | 5619.76 | 1808.1 | 665.3279168 |
| EXELON CORP | 13 | 13 | 27429 | 14515 | 18062.54 | 17318 | 12914 | 3750.968311 |
| EXPEDIA INC | 11 | 11 | 5763.5 | 222.22 | 2756.235 | 2937.01 | 5541.3 | 1528.51192 |
| EXPEDITORS INTL WASH INC | 13 | 13 | 6564.7 | 1652.63 | 4464.984 | 4625.97 | 4912.1 | 1621.718528 |
| EXPRESS SCRIPTS HOLDING CO | 13 | 13 | 100887 | 9328.78 | 33444.3 | 18273.6 | 91558 | 30613.22248 |
| EXXON MOBIL CORP | 30 | 30 | 433526 | 178909 | 335253.6 | 341578 | 254617 | 73955.97442 |
| FACEBOOK INC | 2 | 2 | 12466 | 5089 | 8777.5 | 8777.5 | 7377 | 5216.326725 |
| FAMILY DOLLAR STORES | 13 | 13 | 10489 | 3665.36 | 6733.333 | 6834.31 | 6824 | 2019.727174 |
| FEDEX CORP | 23 | 23 | 47453 | 7550.06 | 24875.58 | 22487 | 39903 | 12983.23465 |
| FIDELITY NATIONAL INFO SVCS | 8 | 8 | 6422.8 | 3446 | 4908.552 | 4972.11 | 2976.8 | 1065.055116 |
| FIDELITY NATL FINL FNF GROUP | 22 | 22 | 9436.1 | 4315.72 | 6284.742 | 5889.41 | 5120.4 | 1434.559174 |
| FIFTH THIRD BANCORP | 42 | 42 | 8539 | 952.823 | 5274.643 | 6422 | 7586.2 | 2593.705489 |
| FIRST DATA CORP | 13 | 13 | 10809 | 4081.2 | 7042.038 | 6450.8 | 6727.7 | 2278.223029 |
| FIRSTENERGY CORP | 16 | 16 | 16346 | 5861.29 | 11671.73 | 12380 | 10485 | 3203.56177 |
| FLUOR CORP | 23 | 23 | 27577 | 6600.7 | 13863.4 | 12417.4 | 20976 | 6151.08744 |
| FMC TECHNOLOGIES INC | 13 | 13 | 7942.6 | 1927.9 | 4075.531 | 4125.6 | 6014.7 | 1712.881838 |
| FOOT LOCKER INC | 11 | 11 | 7151 | 4779 | 5551.818 | 5437 | 2372 | 670.6077569 |
| FORD MOTOR CO | 24 | 24 | 176896 | 88286.3 | 144394.5 | 146597 | 88610 | 23560.41627 |
| FRANKLIN RESOURCES INC | 34 | 34 | 8696.5 | 2320.36 | 4817.244 | 4382.58 | 6376.1 | 2145.192146 |
| FREEPORT-MCMORAN INC | 21 | 21 | 21438 | 1757.13 | 9452.539 | 4179.12 | 19681 | 8425.207202 |
| GAMESTOP CORP | 11 | 11 | 9550.5 | 1352.79 | 6684.279 | 8805.9 | 8197.7 | 3276.086164 |
| GAP INC | 23 | 23 | 16435 | 2518.89 | 11357.53 | 14197 | 13916 | 5210.504609 |
| GENERAL CABLE CORP/DE | 11 | 11 | 6230.1 | 1538.4 | 4323.273 | 4614.8 | 4691.7 | 1722.074771 |
| GENERAL DYNAMICS CORP | 23 | 23 | 32677 | 3058 | 16380.65 | 13829 | 29619 | 11484.65752 |
| GENERAL MILLS INC | 23 | 23 | 17774 | 5026.7 | 10498.77 | 10506 | 12747 | 4156.816966 |
| GENERAL MOTORS CO | 21 | 21 | 207349 | 122081 | 165106 | 165370 | 85268 | 21570.25941 |
| GENUINE PARTS CO | 23 | 23 | 15342 | 3434.64 | 8456.716 | 8369.86 | 11907 | 3146.698292 |
| GENWORTH FINANCIAL INC | 20 | 20 | 11220 | 9159 | 10306.9 | 10211 | 2061 | 644.6422019 |
| GILEAD SCIENCES INC | 13 | 13 | 24890 | 233.769 | 5804.006 | 4230.05 | 24656 | 6587.929608 |
| GOLDMAN SACHS GROUP INC | 28 | 28 | 87968 | 22854 | 44129.07 | 40916.5 | 65114 | 17315.58468 |
| GOODYEAR TIRE & RUBBER CO | 23 | 23 | 22767 | 10906.8 | 15805.26 | 14417.1 | 11860 | 3564.166438 |
| GRAINGER (W W) INC | 23 | 23 | 9965 | 2077.24 | 5177.681 | 4754.32 | 7887.7 | 2062.407307 |
| GROUP 1 AUTOMOTIVE INC | 11 | 11 | 9937.9 | 4518.56 | 6143.853 | 5969.59 | 5419.3 | 1505.817963 |
| HALLIBURTON CO | 23 | 23 | 32870 | 5610.3 | 15166.88 | 14765 | 27260 | 7548.822433 |
| HANESBRANDS INC | 8 | 8 | 5324.7 | 3891.28 | 4487.092 | 4473.68 | 1433.5 | 407.4439293 |
| HARLEY-DAVIDSON INC | 11 | 11 | 6228.5 | 4781.91 | 5539.238 | 5580.51 | 1446.6 | 635.946406 |
| HARMAN INTERNATIONAL INDS | 24 | 24 | 5348.5 | 586.941 | 2411.623 | 2027.35 | 4761.5 | 1366.585985 |
| HARTFORD FINANCIAL SERVICES | 36 | 36 | 27146 | 9316 | 19147.11 | 18734.5 | 17830 | 5578.169238 |
| HCA HOLDINGS INC | 9 | 9 | 36918 | 16670 | 24858.89 | 23502 | 20248 | 6960.165667 |
| HD SUPPLY HOLDINGS INC | 1 | 1 | 8882 | 8882 | 8882 | 8882 | 0 |  |
| HEALTH NET INC | 26 | 26 | 15703 | 9988.39 | 12593.08 | 11940.5 | 5714.9 | 1812.551339 |
| HERSHEY CO | 23 | 23 | 7421.8 | 2899.17 | 4612.119 | 4429.25 | 4522.6 | 1084.269678 |
| HESS CORP | 8 | 8 | 41165 | 10737 | 31414.13 | 32786.5 | 30428 | 9503.947187 |
| HEWLETT-PACKARD CO | 12 | 12 | 127245 | 56588 | 100849.9 | 107870 | 70657 | 22932.73414 |
| HILTON WORLDWIDE HOLDINGS | 17 | 17 | 10502 | 1082.4 | 3601.559 | 3451 | 9419.6 | 2545.487072 |
| HOLLYFRONTIER CORP | 2 | 2 | 20091 | 19764.3 | 19927.53 | 19927.5 | 326.4 | 230.7975321 |
| HOME DEPOT INC | 23 | 23 | 90837 | 5136.67 | 49588.06 | 58247 | 85700 | 28323.71226 |
| HONEYWELL INTERNATIONAL INC | 23 | 23 | 40306 | 11827 | 24294.13 | 23735 | 28479 | 9571.972915 |
| HORMEL FOODS CORP | 13 | 13 | 9316.3 | 3910.31 | 6178.342 | 6193.03 | 5405.9 | 1696.930435 |
| HOST HOTELS & RESORTS INC | 16 | 16 | 5627 | 4133 | 5018.125 | 5167 | 1494 | 482.0850375 |
| HRG GROUP INC | 1 | 1 | 5963 | 5963 | 5963 | 5963 | 0 |  |
| HUMANA INC | 37 | 37 | 48500 | 2811 | 19797.25 | 13104.3 | 45689 | 13193.31011 |
| HUNT (JB) TRANSPRT SVCS INC | 11 | 11 | 6165.4 | 2433.47 | 3785.584 | 3489.9 | 3732 | 1082.726579 |
| HUNTINGTON INGALLS IND INC | 3 | 3 | 6957 | 6575 | 6746.667 | 6708 | 382 | 193.9132108 |
| HUNTSMAN CORP | 9 | 9 | 12962 | 7763 | 10494.44 | 10623.6 | 5198.6 | 1503.512653 |
| ILLINOIS TOOL WORKS | 23 | 23 | 17924 | 2639.65 | 10038.79 | 9983.58 | 15284 | 5183.595896 |
| INGRAM MICRO INC | 14 | 14 | 46487 | 22459.3 | 32328.44 | 32859.8 | 24028 | 7227.613339 |
| INGREDION INC | 7 | 7 | 6868 | 1387 | 3295.143 | 2461 | 5481 | 2203.760833 |
| INSIGHT ENTERPRISES INC | 11 | 11 | 5316.2 | 2914.35 | 4322.997 | 4800.43 | 2401.9 | 923.6774694 |
| INTEL CORP | 23 | 23 | 55870 | 4778.62 | 30094.5 | 30141 | 51091 | 14481.41957 |
| INTERPUBLIC GROUP OF COS | 21 | 21 | 7537.1 | 1739.78 | 5252.637 | 6190.8 | 5797.3 | 1924.138026 |
| INTL BUSINESS MACHINES CORP | 23 | 23 | 106916 | 62716 | 85973.22 | 88396 | 44200 | 13650.58488 |
| INTL FCSTONE INC | 13 | 13 | 75498 | 10.905 | 17504.72 | 423.2 | 75487 | 28686.74661 |
| INTL PAPER CO | 23 | 23 | 28180 | 12703 | 22095.13 | 23617 | 15477 | 4602.892019 |
| JABIL CIRCUIT INC | 13 | 13 | 17152 | 3545.47 | 10480.42 | 11684.5 | 13606 | 4770.598146 |
| JACOBS ENGINEERING GROUP INC | 13 | 13 | 12695 | 3956.99 | 8144.944 | 8473.97 | 8738.2 | 3157.023053 |
| JARDEN CORP | 11 | 11 | 8287.1 | 587.381 | 4667.56 | 5152.6 | 7699.7 | 2408.707188 |
| JETBLUE AIRWAYS CORP | 9 | 9 | 3779 | 635.191 | 2251.866 | 2363 | 3143.8 | 1146.819211 |
| JOHNSON & JOHNSON | 23 | 23 | 74331 | 12447 | 39844.39 | 36298 | 61884 | 20489.08525 |
| JOHNSON CONTROLS INC | 25 | 25 | 42828 | 4559 | 22888.94 | 22646 | 38269 | 12747.74131 |
| JONES LANG LASALLE INC | 22 | 22 | 5477.9 | 941.894 | 2658.811 | 2658.18 | 4536 | 1293.931896 |
| JPMORGAN CHASE & CO | 46 | 46 | 116353 | 11698 | 60926.3 | 50429 | 104655 | 38746.3642 |
| KBR INC | 8 | 8 | 12060 | 6366 | 9381.25 | 9364.5 | 5694 | 1861.439132 |
| KELLOGG CO | 24 | 24 | 14797 | 5786.6 | 9544.071 | 8832.4 | 9010.4 | 3048.167929 |
| KELLY SERVICES INC -CL A | 23 | 23 | 5667.6 | 1424.31 | 4171.615 | 4323.47 | 4243.3 | 1333.494131 |
| KIMBERLY-CLARK CORP | 23 | 23 | 21063 | 6776.9 | 14579.23 | 14348 | 14286 | 4479.803392 |
| KINDER MORGAN INC | 9 | 9 | 16226 | 1015.26 | 5803.231 | 1585.77 | 15211 | 5868.484901 |
| KINDRED HEALTHCARE INC | 10 | 10 | 6181.3 | 3531.22 | 4545.39 | 4268.33 | 2650.1 | 797.6080731 |
| KOHL'S CORP | 16 | 16 | 19279 | 3681.76 | 12966.67 | 14473.2 | 15597 | 5450.29627 |
| KRAFT FOODS GROUP INC | 3 | 3 | 18380 | 18205 | 18263.33 | 18205 | 175 | 101.0362971 |
| KROGER CO | 23 | 23 | 108465 | 21350.5 | 53328.87 | 51760 | 87114 | 26695.34363 |
| L BRANDS INC | 6 | 6 | 11454 | 8632 | 9864 | 9641 | 2822 | 1062.757922 |
| L-3 COMMUNICATIONS HLDGS INC | 14 | 14 | 15680 | 2347.42 | 10998.6 | 12811.5 | 13333 | 4603.067914 |
| LABORATORY CP OF AMER HLDGS | 13 | 13 | 6011.6 | 2199.8 | 4088.838 | 4068.2 | 3811.8 | 1255.781537 |
| LAS VEGAS SANDS CORP | 9 | 9 | 14584 | 1740.91 | 6428.922 | 4563.11 | 12843 | 4429.635395 |
| LAUDER (ESTEE) COS INC -CL A | 13 | 13 | 10969 | 4608.1 | 7127.446 | 7037.5 | 6360.6 | 1921.925791 |
| LEAR CORP | 12 | 12 | 17839 | 11954.6 | 15304.58 | 15156.9 | 5884.3 | 1872.714531 |
| LENNAR CORP | 13 | 13 | 16267 | 3074.02 | 7595.397 | 7277.15 | 13193 | 4243.866358 |
| LEUCADIA NATIONAL CORP | 17 | 17 | 12335 | 241.805 | 2134.749 | 1065.41 | 12093 | 3348.985927 |
| LEVEL 3 COMMUNICATIONS INC | 13 | 13 | 6777 | 1533 | 4067.615 | 3762 | 5244 | 1328.60306 |
| LIBERTY INTERACTV CP QVC GRP | 1 | 1 | 10028 | 10028 | 10028 | 10028 | 0 |  |
| LIFEPOINT HEALTH INC | 12 | 12 | 4483.1 | 743.6 | 2444.492 | 2661.9 | 3739.5 | 1129.194 |
| LILLY (ELI) & CO | 23 | 23 | 24287 | 5711.6 | 13327.07 | 11542.5 | 18575 | 6245.599387 |
| LINCOLN NATIONAL CORP | 46 | 46 | 13671 | 4644.37 | 7950.262 | 7036.06 | 9026.6 | 2348.275627 |
| LITHIA MOTORS INC -CL A | 12 | 12 | 5390.3 | 1749.32 | 3001.437 | 2840.6 | 3641 | 970.5087266 |
| LIVE NATION ENTERTAINMENT | 9 | 9 | 6867 | 2936.85 | 4699.445 | 4184.98 | 3930.1 | 1198.576059 |
| LKQ CORP | 2 | 2 | 6740.1 | 4122.93 | 5431.497 | 5431.5 | 2617.1 | 1850.593199 |
| LOCKHEED MARTIN CORP | 18 | 18 | 47182 | 23990 | 35649.22 | 36369.5 | 23192 | 8795.316725 |
| LOEWS CORP | 24 | 24 | 18799 | 13247 | 15222.85 | 14872.5 | 5552.1 | 1420.521253 |
| LOWE'S COMPANIES INC | 23 | 23 | 56223 | 3056.25 | 28081.17 | 26491 | 53167 | 19039.84507 |
| MACY'S INC | 7 | 7 | 28105 | 23489 | 25984.71 | 26313 | 4616 | 1636.091553 |
| MANPOWERGROUP | 14 | 14 | 22006 | 10483.8 | 17321.98 | 18214.5 | 11522 | 4030.329544 |
| MARATHON OIL CORP | 23 | 23 | 72128 | 10035 | 30286.61 | 20239 | 62093 | 20997.34008 |
| MARATHON PETROLEUM CORP | 4 | 4 | 93897 | 73524 | 83771.75 | 83833 | 20373 | 10232.22642 |
| MARRIOTT INTL INC | 20 | 20 | 13796 | 7968 | 10712.65 | 10552 | 5828 | 1749.291624 |
| MARSH & MCLENNAN COS | 26 | 26 | 12951 | 2779.2 | 8065.085 | 10050 | 10172 | 3866.736623 |
| MASCO CORP | 31 | 31 | 12778 | 2927 | 7990.174 | 7792 | 9851 | 3201.492482 |
| MASTERCARD INC | 16 | 16 | 9494 | 3326.07 | 5890.097 | 5355.25 | 6167.9 | 1863.177245 |
| MATTEL INC | 24 | 24 | 6484.9 | 1621.73 | 4816.933 | 5031.44 | 4863.2 | 1367.39193 |
| MCDONALD'S CORP | 23 | 23 | 27567 | 6695 | 16740.9 | 15405.7 | 20872 | 6938.633825 |
| MCGRAW HILL FINANCIAL | 1 | 1 | 5051 | 5051 | 5051 | 5051 | 0 |  |
| MCKESSON CORP | 21 | 21 | 179045 | 10312.6 | 84567.75 | 88050 | 168732 | 54449.49535 |
| MEADWESTVACO CORP | 20 | 20 | 8227 | 5459 | 6391.65 | 6170 | 2768 | 713.9372134 |
| MERCK & CO | 24 | 24 | 51790 | 8602.7 | 29040.53 | 24024 | 43188 | 13532.30126 |
| METLIFE INC | 28 | 28 | 75127 | 31928 | 51524.29 | 51010 | 43199 | 14172.45284 |
| MGM RESORTS INTERNATIONAL | 13 | 13 | 10082 | 3908.82 | 6445.224 | 6481.97 | 6173.2 | 2019.550137 |
| MICRON TECHNOLOGY INC | 23 | 23 | 16358 | 425.362 | 4786.862 | 3935.9 | 15933 | 3481.306138 |
| MICROSOFT CORP | 21 | 21 | 86451 | 1843.43 | 36051.82 | 32187 | 84608 | 25345.67131 |
| MOHAWK INDUSTRIES INC | 13 | 13 | 7905.8 | 3445.95 | 5976.061 | 5787.98 | 4459.9 | 1330.345995 |
| MOLINA HEALTHCARE INC | 20 | 20 | 9666.6 | 1175.27 | 3865.531 | 3390.86 | 8491.3 | 2455.681172 |
| MONDELEZ INTERNATIONAL INC | 2 | 2 | 35015 | 34244 | 34629.5 | 34629.5 | 771 | 545.1793283 |
| MONSANTO CO | 18 | 18 | 15855 | 4673 | 8980.611 | 7953.5 | 11182 | 3319.955034 |
| MORGAN STANLEY | 30 | 30 | 85328 | 13144 | 42455.37 | 37661 | 72184 | 17701.97154 |
| MOSAIC CO | 10 | 10 | 11113 | 4396.7 | 8242.64 | 9434.2 | 6716.1 | 2430.653484 |
| MOTOROLA SOLUTIONS INC | 11 | 11 | 19282 | 5881 | 9974.636 | 8696 | 13401 | 4719.325932 |
| MRC GLOBAL INC | 1 | 1 | 5933.2 | 5933.21 | 5933.212 | 5933.21 | 0 |  |
| MURPHY OIL CORP | 14 | 14 | 28616 | 3966.52 | 14499.42 | 12963.9 | 24650 | 9474.548369 |
| MURPHY USA INC | 2 | 2 | 17442 | 15279.3 | 16360.61 | 16360.6 | 2162.6 | 1529.184882 |
| NATIONAL OILWELL VARCO INC | 9 | 9 | 21440 | 4644.5 | 12877.52 | 12712 | 16796 | 5479.742131 |
| NATIONWIDE FINL SVCS -CL A | 14 | 14 | 4597.6 | 3179 | 4011.15 | 4209.35 | 1418.6 | 528.4172415 |
| NAVIENT CORP | 4 | 4 | 6190.1 | 5498 | 5733.405 | 5622.76 | 692.1 | 310.3094018 |
| NAVISTAR INTERNATIONAL CORP | 21 | 21 | 14200 | 3460 | 8714.857 | 8407 | 10740 | 3418.091211 |
| NCR CORP | 15 | 14 | 6591 | 4612 | 5620.929 | 5664 | 1979 | 550.2258927 |
| NETAPP INC | 15 | 15 | 6332.4 | 579.3 | 3033.045 | 2804.28 | 5753.1 | 2111.076001 |
| NETFLIX INC | 11 | 11 | 5504.7 | 272.243 | 1925.932 | 1371.16 | 5232.4 | 1593.264156 |
| NEWELL RUBBERMAID INC | 23 | 23 | 7750 | 1118.89 | 5003.391 | 5864.6 | 6631.1 | 2125.811553 |
| NEWMONT MINING CORP | 23 | 23 | 10358 | 597.37 | 3820.079 | 2657.87 | 9760.6 | 3292.861196 |
| NEWS CORP | 6 | 3 | 9095 | 8574 | 8774.333 | 8654 | 521 | 280.5714407 |
| NEXTERA ENERGY INC | 3 | 3 | 17021 | 14256 | 15539.33 | 15341 | 2765 | 1393.128972 |
| NIKE INC | 22 | 22 | 30601 | 3789.67 | 13660.78 | 11475.1 | 26811 | 7317.895409 |
| NISOURCE INC | 13 | 13 | 9458.7 | 5061.2 | 7055.592 | 6649.4 | 4397.5 | 1221.63213 |
| NORDSTROM INC | 14 | 14 | 13506 | 5659.14 | 8622.511 | 8600 | 7846.9 | 2358.618872 |
| NORFOLK SOUTHERN CORP | 23 | 23 | 11624 | 4221 | 7099.057 | 6270 | 7403 | 2550.426156 |
| NORTHROP GRUMMAN CORP | 23 | 23 | 34757 | 5063 | 18705.14 | 17206 | 29694 | 11354.96684 |
| NRG ENERGY INC | 11 | 11 | 15868 | 2361.42 | 7048.639 | 6885 | 13507 | 3907.808228 |
| NUCOR CORP | 23 | 23 | 23663 | 1465.46 | 9314.76 | 4801.78 | 22198 | 7209.43422 |
| O'REILLY AUTOMOTIVE INC | 12 | 12 | 7216.1 | 1312.49 | 3700.386 | 3049.44 | 5903.6 | 2080.991905 |
| OCCIDENTAL PETROLEUM CORP | 23 | 23 | 24217 | 6596 | 13585.91 | 11368 | 17621 | 5754.065945 |
| OFFICE DEPOT INC | 15 | 15 | 16096 | 10263.3 | 12775.9 | 12144.5 | 5832.7 | 1884.175446 |
| OLD REPUBLIC INTL CORP | 28 | 28 | 5534.4 | 2373.4 | 3954.286 | 3806.2 | 3161 | 920.1795323 |
| OMNICARE INC | 13 | 13 | 6503.3 | 2159.13 | 5216.234 | 6160.39 | 4344.2 | 1556.566165 |
| OMNICOM GROUP | 22 | 22 | 15318 | 1385.16 | 8019.899 | 8078.85 | 13933 | 4738.597198 |
| ONEOK INC | 21 | 21 | 16157 | 677.138 | 6836.892 | 5988.08 | 15480 | 5855.535801 |
| ORACLE CORP | 26 | 26 | 38226 | 1178.5 | 17677.57 | 11329.3 | 37048 | 13578.2385 |
| OSHKOSH CORP | 12 | 12 | 9842.4 | 1926.01 | 5783.884 | 6562.2 | 7916.4 | 2580.108764 |
| OWENS & MINOR INC | 11 | 11 | 9440.2 | 4244.07 | 6936.954 | 7243.24 | 5196.1 | 1877.554258 |
| OWENS CORNING | 7 | 7 | 5847 | 4803 | 5201.143 | 5172 | 1044 | 339.4816777 |
| OWENS-ILLINOIS INC | 22 | 22 | 7884.7 | 4658.5 | 6791.286 | 7072.75 | 3226.2 | 959.4334456 |
| PACCAR INC | 23 | 23 | 18997 | 2338.88 | 9499.734 | 8086.5 | 16658 | 5077.812188 |
| PACKAGING CORP OF AMERICA | 13 | 13 | 5852.6 | 1735.53 | 2454.494 | 2187.05 | 4117.1 | 1077.270577 |
| PANTRY INC | 11 | 11 | 8088.6 | 2750.36 | 5750.743 | 6015.06 | 5338.3 | 1678.479684 |
| PARKER-HANNIFIN CORP | 23 | 23 | 13216 | 2375.81 | 6993.139 | 6149.12 | 10840 | 3714.188784 |
| PBF ENERGY INC | 1 | 1 | 19828 | 19828.2 | 19828.16 | 19828.2 | 0 |  |
| PEABODY ENERGY CORP | 13 | 13 | 8077.5 | 2026.77 | 5228.862 | 5256.32 | 6050.7 | 2019.699276 |
| PENNEY (J C) CO | 23 | 23 | 32510 | 12257 | 22038.7 | 19860 | 20253 | 6486.662816 |
| PENSKE AUTOMOTIVE GROUP INC | 8 | 8 | 17177 | 9523.11 | 12680.39 | 12302 | 7654.1 | 2414.304117 |
| PEPSICO INC | 23 | 23 | 66683 | 19607.9 | 34767.78 | 29261 | 47075 | 15424.5227 |
| PETSMART INC | 12 | 12 | 7112 | 2695.18 | 4816.725 | 4868.97 | 4416.8 | 1453.013835 |
| PFIZER INC | 23 | 23 | 67791 | 6950 | 33697.55 | 32373 | 60841 | 21193.3313 |
| PG&E CORP | 23 | 23 | 26220 | 9609.97 | 14179.4 | 13237 | 16610 | 4526.08366 |
| PHILIP MORRIS INTERNATIONAL | 7 | 7 | 31377 | 25035 | 28565.14 | 29767 | 6342 | 2571.961795 |
| PHILLIPS 66 | 2 | 2 | 166089 | 146514 | 156301.5 | 156302 | 19575 | 13841.61524 |
| PIONEER NATURAL RESOURCES CO | 13 | 13 | 4325 | 701.78 | 1949.231 | 1803.26 | 3623.2 | 922.3211153 |
| PNC FINANCIAL SVCS GROUP INC | 48 | 48 | 18155 | 4105.75 | 9252.381 | 7448.5 | 14049 | 4642.851694 |
| PPG INDUSTRIES INC | 23 | 23 | 15901 | 5672.6 | 9726.526 | 8656 | 10228 | 3348.12899 |
| PPL CORP | 19 | 19 | 12737 | 2910 | 7089.632 | 6219 | 9827 | 3044.781623 |
| PRAXAIR INC | 21 | 21 | 12273 | 2438 | 6880.286 | 5613 | 9835 | 3066.819935 |
| PRECISION CASTPARTS CORP | 13 | 13 | 10005 | 2117.2 | 5358.462 | 5486.6 | 7887.8 | 2533.502627 |
| PRICELINE GROUP INC | 12 | 12 | 8442 | 863.661 | 3255.254 | 2111.51 | 7578.3 | 2800.380314 |
| PRINCIPAL FINANCIAL GRP INC | 26 | 26 | 11053 | 8242.7 | 9392.542 | 9202.1 | 2810.6 | 726.7725731 |
| PROCTER & GAMBLE CO | 24 | 24 | 84167 | 27026 | 53641.63 | 41771 | 57141 | 21969.73908 |
| PROGRESSIVE CORP-OHIO | 34 | 34 | 19398 | 4598.3 | 11958.27 | 13775.2 | 14799 | 4413.627268 |
| PRUDENTIAL FINANCIAL INC | 28 | 28 | 85288 | 26652 | 39868.11 | 34176 | 58636 | 15043.40802 |
| PUBLIC SERVICE ENTRP GRP INC | 23 | 23 | 13807 | 5091.66 | 9030.488 | 9781 | 8715.3 | 2948.073246 |
| PULTEGROUP INC | 23 | 23 | 14690 | 1213.84 | 5442.558 | 4158.42 | 13476 | 3949.649329 |
| PVH CORP | 23 | 23 | 8241.2 | 904.1 | 2380.247 | 1464.13 | 7337.1 | 1924.29747 |
| QUALCOMM INC | 15 | 15 | 26487 | 2679.79 | 9099.137 | 7526 | 23807 | 6760.263233 |
| QUANTA SERVICES INC | 12 | 12 | 7851.3 | 1626.51 | 3446.237 | 2987.08 | 6224.7 | 1925.001113 |
| QUEST DIAGNOSTICS INC | 13 | 13 | 7510.5 | 3627.77 | 6190.717 | 6704.91 | 3882.7 | 1405.647234 |
| QUINTILES TRANSNATIONAL HLDG | 3 | 1 | 5460 | 5460 | 5459.998 | 5460 | 0 |  |
| RALPH LAUREN CORP | 13 | 13 | 7620 | 2363.71 | 4673.409 | 4880.1 | 5256.3 | 1759.528507 |
| RAYTHEON CO | 24 | 24 | 25499 | 9058.22 | 18202.73 | 19940.5 | 16441 | 5552.10467 |
| REALOGY HOLDINGS CORP | 2 | 2 | 5330 | 5328 | 5329 | 5329 | 2 | 1.414213562 |
| REGIONS FINANCIAL CORP | 26 | 26 | 10930 | 3617.89 | 6703.844 | 6123.81 | 7312.6 | 2214.930738 |
| REINSURANCE GROUP AMER INC | 26 | 26 | 10967 | 1968.28 | 5973.637 | 5688.72 | 8998.2 | 2788.243889 |
| RELIANCE STEEL & ALUMINUM CO | 11 | 11 | 10452 | 1882.93 | 6233.607 | 6312.8 | 8568.7 | 2693.766914 |
| REPUBLIC SERVICES INC | 14 | 14 | 8788.3 | 2257.5 | 5176.193 | 3430.65 | 6530.8 | 2836.795459 |
| REYNOLDS AMERICAN INC | 10 | 10 | 9023 | 6437 | 8335.7 | 8490.5 | 2586 | 706.1880533 |
| RITE AID CORP | 22 | 22 | 26528 | 3748.38 | 15681.72 | 16200.7 | 22780 | 8328.768886 |
| ROCKWELL AUTOMATION | 23 | 23 | 12981 | 3909 | 7082.809 | 6259.4 | 9072 | 2829.65229 |
| ROSS STORES INC | 13 | 13 | 11042 | 2986.6 | 6313.508 | 5975.21 | 8055.1 | 2480.051134 |
| RYDER SYSTEM INC | 24 | 24 | 6638.8 | 4217.03 | 5423.131 | 5178.07 | 2421.7 | 678.8701013 |
| SAFEWAY INC | 14 | 14 | 44207 | 28859.9 | 38117.21 | 39300.5 | 15347 | 4989.466552 |
| SALESFORCE.COM INC | 10 | 10 | 5373.6 | 176.375 | 1646.184 | 1191.18 | 5197.2 | 1590.316527 |
| SANDISK CORP | 28 | 28 | 6627.7 | 366.301 | 4278.852 | 3896.37 | 6261.4 | 1711.167141 |
| SANMINA CORP | 14 | 14 | 12205 | 3911.56 | 7855.504 | 6902.41 | 8293 | 2833.858083 |
| SCHEIN (HENRY) INC | 13 | 13 | 10371 | 2558.24 | 5908.318 | 5920.19 | 7813.1 | 2451.150349 |
| SCHWAB (CHARLES) CORP | 18 | 18 | 6083 | 4383 | 5104.722 | 4994.5 | 1700 | 520.6995075 |
| SEALED AIR CORP | 29 | 29 | 7750.5 | 435.128 | 3587.996 | 4085.1 | 7315.4 | 2150.719463 |
| SEARS HOLDINGS CORP | 9 | 9 | 53012 | 31198 | 44399.67 | 44043 | 21814 | 6577.358531 |
| SEMPRA ENERGY | 16 | 16 | 11761 | 5360 | 8921.563 | 9206.5 | 6401 | 2178.67045 |
| SHERWIN-WILLIAMS CO | 23 | 23 | 11130 | 2541.45 | 5906.274 | 5211.62 | 8588.1 | 2338.559298 |
| SMUCKER (JM) CO | 20 | 20 | 5897.7 | 483.472 | 2321.472 | 1730.44 | 5414.2 | 1982.778114 |
| SONIC AUTOMOTIVE INC -CL A | 12 | 12 | 9197.1 | 6034.78 | 7514.599 | 7633.11 | 3162.3 | 936.645787 |
| SOUTHERN CO | 23 | 23 | 18467 | 8049.85 | 12525 | 11585 | 10417 | 3411.290514 |
| SOUTHWEST AIRLINES | 23 | 23 | 18605 | 1313.61 | 7278.226 | 5649.56 | 17291 | 4949.300487 |
| SPARTANNASH CO | 9 | 9 | 7916.1 | 2039.93 | 3078.598 | 2551.96 | 5876.1 | 1823.085899 |
| SPECTRA ENERGY CORP | 8 | 8 | 5903 | 4532 | 5021.75 | 5009.5 | 1371 | 452.8076697 |
| SPIRIT AEROSYSTEMS HOLDINGS | 8 | 8 | 6799.2 | 3207.7 | 4518.988 | 4125.45 | 3591.5 | 1141.147752 |
| ST JUDE MEDICAL INC | 40 | 40 | 5622 | 994.396 | 4101.078 | 4681.27 | 4627.6 | 1583.163529 |
| STANLEY BLACK & DECKER INC | 23 | 23 | 11339 | 1962.2 | 4189.739 | 2748.9 | 9376.4 | 2873.686708 |
| STAPLES INC | 16 | 16 | 25022 | 7123.19 | 17132.22 | 17119.8 | 17899 | 6300.426525 |
| STARBUCKS CORP | 18 | 18 | 16448 | 696.481 | 6556.088 | 5831.77 | 15751 | 4799.12771 |
| STARWOOD HOTELS&RESORTS WRLD | 14 | 14 | 6321 | 3967 | 5462.429 | 5765.5 | 2354 | 731.3571909 |
| STATE STREET CORP | 34 | 34 | 12572 | 3183 | 7635.471 | 7246 | 9389 | 2950.910514 |
| STEEL DYNAMICS INC | 11 | 11 | 8756 | 987.248 | 5029.478 | 4384.55 | 7768.7 | 2761.396879 |
| STRYKER CORP | 16 | 16 | 9675 | 1103.21 | 5167.232 | 5138.55 | 8571.8 | 2598.222002 |
| SUNTRUST BANKS INC | 46 | 46 | 13313 | 3088.82 | 7804.857 | 7822.83 | 10225 | 3306.775376 |
| SUPERVALU INC | 23 | 23 | 44564 | 10632.3 | 23555.22 | 19528.9 | 33932 | 10491.36984 |
| SYMANTEC CORP | 21 | 21 | 6906 | 745.725 | 4745.426 | 5985 | 6160.3 | 2256.099897 |
| SYNNEX CORP | 10 | 10 | 13840 | 5313.99 | 8293.89 | 7743.71 | 8525.6 | 2609.683775 |
| SYSCO CORP | 23 | 23 | 46517 | 8149.7 | 24714.4 | 23350.5 | 38367 | 12053.36852 |
| TARGA RESOURCES CORP | 3 | 3 | 8616.5 | 5885.7 | 7165.567 | 6994.5 | 2730.8 | 1373.413635 |
| TARGET CORP | 18 | 18 | 73301 | 16115 | 48847.33 | 50391.5 | 57186 | 19901.51865 |
| TECH DATA CORP | 13 | 13 | 27671 | 15738.9 | 21965.61 | 22099.9 | 11932 | 3724.188993 |
| TENET HEALTHCARE CORP | 19 | 19 | 16615 | 5559 | 10350.21 | 9614 | 11056 | 2475.317254 |
| TENNECO INC | 18 | 18 | 8899 | 3279 | 6237.611 | 6378 | 5620 | 1719.079136 |
| TEREX CORP | 11 | 11 | 9889.6 | 3897.1 | 6508.673 | 6504.6 | 5992.5 | 2012.157156 |
| TESORO CORP | 11 | 11 | 40062 | 8717.7 | 22213.9 | 20253 | 31344 | 9420.617085 |
| TEXAS INSTRUMENTS INC | 23 | 23 | 14195 | 6784 | 10974.52 | 10427 | 7411 | 2354.755032 |
| TEXTRON INC | 23 | 23 | 14246 | 7822.5 | 10850.62 | 10525 | 6423.5 | 1699.049215 |
| THERMO FISHER SCIENTIFIC INC | 23 | 23 | 16890 | 805.484 | 5184.15 | 2633.03 | 16084 | 4685.229446 |
| TIME WARNER CABLE INC | 8 | 8 | 22812 | 15955 | 19572 | 19271.5 | 6857 | 2574.731886 |
| TIME WARNER INC | 21 | 21 | 46984 | 21.388 | 19921.89 | 25785 | 46963 | 18860.11907 |
| TJX COMPANIES INC | 23 | 23 | 29078 | 2757.72 | 13076.42 | 11981.2 | 26321 | 7800.587321 |
| TRACTOR SUPPLY CO | 12 | 12 | 5711.7 | 1472.89 | 3331.593 | 3107.44 | 4238.8 | 1372.995524 |
| TRAVELCENTERS OF AMERICA LLC | 2 | 2 | 7995.7 | 7944.73 | 7970.228 | 7970.23 | 50.993 | 36.05749609 |
| TRAVELERS COS INC | 22 | 22 | 27201 | 4569 | 19274.09 | 24696.5 | 22632 | 8632.581057 |
| TRINITY INDUSTRIES | 12 | 12 | 6170 | 1432.8 | 3304.5 | 3147 | 4737.2 | 1240.700275 |
| TRW AUTOMOTIVE HOLDINGS CORP | 13 | 11 | 17539 | 10091 | 13982.73 | 14383 | 7448 | 2294.842308 |
| TWENTY-FIRST CENTURY FOX INC | 1 | 1 | 31867 | 31867 | 31867 | 31867 | 0 |  |
| TYSON FOODS INC -CL A | 13 | 13 | 37580 | 10751 | 26823.15 | 26704 | 26829 | 6241.211686 |
| U S BANCORP | 34 | 34 | 22202 | 1009.13 | 15221.92 | 16596 | 21193 | 6567.708974 |
| UGI CORP | 11 | 11 | 8277.3 | 3026.1 | 5569.327 | 5591.4 | 5251.2 | 1412.327663 |
| UNION PACIFIC CORP | 23 | 23 | 23988 | 7029 | 12954.57 | 11973 | 16959 | 4656.164602 |
| UNITED CONTINENTAL HLDGS INC | 15 | 15 | 38901 | 11662.6 | 20603.95 | 17378 | 27238 | 9270.368272 |
| UNITED NATURAL FOODS INC | 12 | 12 | 6794.4 | 1175.39 | 3217.588 | 3060.07 | 5619.1 | 1680.720744 |
| UNITED PARCEL SERVICE INC | 13 | 13 | 58232 | 30646 | 44892.08 | 47547 | 27586 | 9215.240433 |
| UNITED RENTALS INC | 13 | 13 | 5685 | 2237 | 3298.295 | 3094 | 3448 | 905.9717083 |
| UNITED STATES STEEL CORP | 24 | 24 | 23754 | 4864 | 11189.08 | 8138.5 | 18890 | 5949.591947 |
| UNITED TECHNOLOGIES CORP | 23 | 23 | 64270 | 20953 | 36841.96 | 28215 | 43317 | 15379.99159 |
| UNITEDHEALTH GROUP INC | 35 | 35 | 130474 | 3768.88 | 55845.79 | 45365 | 126705 | 38720.61975 |
| UNIVERSAL HEALTH SVCS INC | 13 | 13 | 8062.1 | 2839.19 | 4986.028 | 4749.51 | 5222.9 | 1638.093774 |
| UNUM GROUP | 46 | 46 | 10575 | 2420.6 | 7849.954 | 9630.45 | 8153.9 | 3173.852726 |
| VALERO ENERGY CORP | 13 | 13 | 138286 | 14988.3 | 81686.67 | 81362 | 123298 | 40238.26217 |
| VERIZON COMMUNICATIONS INC | 43 | 43 | 127079 | 64826 | 100352.2 | 106800 | 62253 | 18022.63911 |
| VF CORP | 23 | 23 | 12282 | 2952.43 | 6315.548 | 5551.62 | 9329.7 | 2176.246824 |
| VIACOM INC | 4 | 4 | 14914 | 9337 | 12980.25 | 13835 | 5577 | 2481.885221 |
| VISA INC | 12 | 12 | 12729 | 6263 | 8977.917 | 8647.5 | 6466 | 2249.351683 |
| VISTEON CORP | 12 | 12 | 19467 | 6857 | 13636.58 | 14197 | 12610 | 4944.408071 |
| VOYA FINANCIAL INC | 1 | 1 | 11067 | 11066.9 | 11066.9 | 11066.9 | 0 |  |
| WAL-MART STORES INC | 23 | 23 | 483521 | 43886.9 | 248992.7 | 245308 | 439634 | 146981.8561 |
| WASTE MANAGEMENT INC | 14 | 14 | 13996 | 11142 | 12660.78 | 12795 | 2854 | 906.657673 |
| WELLCARE HEALTH PLANS INC | 20 | 20 | 12960 | 1395.2 | 5774.456 | 5773.55 | 11565 | 3159.666753 |
| WELLS FARGO & CO | 46 | 46 | 98636 | 4420.3 | 38797.53 | 29226 | 94216 | 31881.33211 |
| WESCO INTL INC | 11 | 11 | 7889.6 | 3286.77 | 5378.771 | 5320.6 | 4602.9 | 1337.053638 |
| WESTERN DIGITAL CORP | 19 | 19 | 15351 | 2718.5 | 8838.279 | 8074 | 12633 | 4257.141125 |
| WESTERN REFINING INC | 8 | 8 | 15154 | 4199.47 | 8841.282 | 8518.05 | 10954 | 3222.631241 |
| WESTERN UNION CO | 16 | 16 | 5683.2 | 4470.2 | 5228.844 | 5244.85 | 1213 | 375.1851329 |
| WEYERHAEUSER CO | 24 | 24 | 22665 | 5528 | 12236.54 | 10940 | 17137 | 5542.896807 |
| WHIRLPOOL CORP | 23 | 23 | 19872 | 6770 | 12876.57 | 11016 | 13102 | 4627.521787 |
| WHOLE FOODS MARKET INC | 4 | 4 | 14194 | 9005.79 | 11251.6 | 10903.3 | 5188.2 | 2251.642616 |
| WILLIAMS COS INC | 23 | 23 | 16834 | 1751.1 | 7819.583 | 7930 | 15083 | 4136.191137 |
| WINDSTREAM HOLDINGS INC | 11 | 11 | 6156.3 | 2933.5 | 4303.827 | 3712 | 3222.8 | 1392.204788 |
| WORLD FUEL SERVICES CORP | 11 | 11 | 43386 | 2661.79 | 18859.56 | 13729.6 | 40725 | 13934.4449 |
| WYNDHAM WORLDWIDE CORP | 16 | 16 | 5304 | 3750 | 4277.813 | 4288 | 1554 | 482.8994676 |
| WYNN RESORTS LTD | 11 | 11 | 5433.7 | 0.195 | 2810.758 | 2987.32 | 5433.5 | 2060.703048 |
| XCEL ENERGY INC | 14 | 14 | 14811 | 7937.52 | 10363.09 | 10081.2 | 6873.6 | 1657.249634 |
| XEROX CORP | 23 | 23 | 22626 | 15179 | 17931.2 | 17608 | 7447 | 2109.077398 |
| YUM BRANDS INC | 16 | 16 | 13633 | 6953 | 9865.313 | 9455 | 6680 | 2145.005632 |

# 17. List of stop words

Depending on the scope of the word cloud, list of fortune 500 companies were in stop words since the company names were in the title output file as well if they were not excluded. When we wanted to run the overall topic model for a year, the company names were added)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| corporation | about | can't | having | isn't | ours | then | we've | you've |
| international | above | cannot | he | it | ourselves | there | were | your |
| business | after | could | he'd | it's | out | there's | weren't | yours |
| incorporated | again | couldn't | he'll | its | over | these | what | yourself |
| technology | against | did | he's | itself | own | they | what's | yourselves |
| technologies | all | didn't | her | let's | same | they'd | when |  |
| using | am | do | here | me | shan't | they'll | when's |  |
| company | an | does | here's | more | she | they're | where |  |
| machines | and | doesn't | hers | most | she'd | they've | where's |  |
| includes | any | doing | herself | mustn't | she'll | this | which |  |
| data | are | don't | him | my | she's | those | while |  |
| one | aren't | down | himself | myself | should | through | who |  |
| first | as | during | his | no | shouldn't | to | who's |  |
| second | at | each | how | nor | so | too | whom |  |
| inc | be | few | how's | not | some | under | why |  |
| may | because | for | i | of | such | until | why's |  |
| <==========> | been | from | i'd | off | than | up | with |  |
| apparatus | before | further | i'll | on | that | very | won't |  |
| system | being | had | i'm | once | that's | was | would |  |
| systems | below | hadn't | i've | only | the | wasn't | wouldn't |  |
| method | between | has | if | or | their | we | you |  |
| methods | both | hasn't | in | other | theirs | we'd | you'd |  |
| device | but | have | into | ought | them | we'll | you'll |  |
| a | by | haven't | is | our | themselves | we're | you're |  |

# 18. Data Assembly and Cleanup



Politics Inner Join Revenue On

Politics.Year = Revenue.Data Year-Fiscal

Revenue Left Join Csr On

Revenue.Ticker = Csr.Ticker And Revenue.Year = Csr.Year

Revenue Left Join Eupatent On

Revenue.Tickersymbol = Eupatent.Symbol And Revenue. Data Year-Fiscal = Eupatent.Year

Revenue Left Join Uspatent On

Revenue.Tickersymbol = Uspatent.Symbol And Revenue.Data Year-Fiscal = Eupatent.Year

Revenue Left Join Fortune On

Revenue.Tickersymbol = Fortune.Ticker

**Query: LookupCompFortuneNamePatentName\_Symbol**

**Map each fortune 500 company name to the patent assignee name and populate the ticker and patent count by using the lookup table of 1 to many mappings of company name aliases**

SELECT [7\_LookupCompFortuneNamePatentName\_Symboll].ID, [7\_LookupCompFortuneNamePatentName\_Symboll].FortuneName, [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName1, [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName2, [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName3, [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName4, [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName5, [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName6, [7\_LookupCompFortuneNamePatentName\_Symboll].Pos, [7\_LookupCompFortuneNamePatentName\_Symboll].Symbol, [7\_LookupCompFortuneNamePatentName\_Symboll].Specialty, [CompPatentCount\_MapReduce].PatentOrganizationName, [CompPatentCount\_MapReduce].PatentCount, [CompPatentCount\_MapReduce].Year

FROM CompPatentCount\_MapReduce LEFT JOIN 7\_LookupCompFortuneNamePatentName\_Symboll ON [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName1 Like CompPatentCount\_MapReduce.PatentOrganizationName Or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName2 Like CompPatentCount\_MapReduce.PatentOrganizationName Or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName3 Like CompPatentCount\_MapReduce.PatentOrganizationName Or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName4 Like CompPatentCount\_MapReduce.PatentOrganizationName Or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName5 Like CompPatentCount\_MapReduce.PatentOrganizationName Or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName6 Like CompPatentCount\_MapReduce.PatentOrganizationName;

**Query: Fortune 500 total current patent count**

**Count of total number of current patents for each of the Fortune 500 company name by ticker**

SELECT [7\_LookupCompFortuneNamePatentName\_Symboll].FortuneName, [7\_LookupCompFortuneNamePatentName\_Symboll].Pos, [7\_LookupCompFortuneNamePatentName\_Symboll].Symbol, [7\_LookupCompFortuneNamePatentName\_Symboll].Specialty, CompanyPatentsAllYears.[total]

FROM CompanyPatentsAllYears, 7\_LookupCompFortuneNamePatentName\_Symboll

WHERE ([7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName1 = [CompanyPatentsAllYears].CompanyName

or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName2 = [CompanyPatentsAllYears].CompanyName

or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName3 = [CompanyPatentsAllYears].CompanyName

or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName4 = [CompanyPatentsAllYears].CompanyName

or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName5 = [CompanyPatentsAllYears].CompanyName

or [7\_LookupCompFortuneNamePatentName\_Symboll].PatentAssigneeName6 = [CompanyPatentsAllYears].CompanyName);

# 19. Data Output Cleaning

The excel file exported from above produced a handful of junk files (sort by Ticker\_Symbol and delete top 228 records) and was missing some NAICS code that were manually added to the file. Duplicate column names were also produced with this output, which were also manually deleted. The below variables were the only ones left in the final data set used for all analyses in SPSS and MS Excel.

# 20. Variables for Analysis & Descriptions

TickerYear – Nominal, String

Ticker symbol, underscore, year for that record

GlobalCompany Key – Nominal, Numeric

Unique identifier for each specific company

CompanyInitialPublicOfferingData – Scale, Numeric

Date the company initially went public coded yyyymmdd (year, month, day)

DataDate – Scale, Numeric

Year of data for that record coded yyyymmdd (year, month, day)

Year – Scale, Numeric

Year of data for that record – year only

PresidentParty – Nominal, String

Which President was in office during the majority of that record’s year (D = Democrat, R=Republican)

ElectionYear – Nominal, Numeric

Binary code indicating if that specific record’s year was an election year (0=not an election year, 1=it was an election year)

Position – Ordinal, Numeric

The company’s Fortune 500 position as of 2015

CompanyName – Nominal, String

The company’s name

TickerSymbol – Nominal, String

The company’s unique ticker symbol

Analyst Jobs in 2016 (Analytics Level) – Scale, Numeric

A count of available “analyst” jobs published as of May 7th, 2016 in indeed.com for each company. This is intended to gove a snapshot of each company’s current analytical level.

ResearchandDevelopmentExpense (Innovation Level) – Scale, Numeric

Research & Development (R&D) Expense for that specific record’s company and year. This is intended to give a snapshot of a company’s level of innovation over the years.

RevenueTotal – Scale, Numeric

Revenue for that specific record’s company and year

PriceCloseAnnualCalendar – Scale, Numeric

Annual stock closing price for that specific record’s company and year

NetIncomeLoss – Scale, Numeric

Net Income or Loss for that specific record’s company and year

Employees – Scale, Numeric

Number of employees for that specific record’s company and year

MarketValueTotalFiscal – Scale, Numeric

The market value for that specific record’s company and year

USPTCount – Scale, Numeric

The United States Patent count for that specific record’s company and year

EUPTCount – Scale, Numeric

European Patent Count for that specific record’s company and year

City – Nominal, String

City in which the company headquarters resides

State – Nominal, String

State in which the company headquarters resides

Age – Scale, Numeric

The Age of the company in 2016

NAICSIndustryCode – Nominal, Numeric

Primary NAICS code for that company

NAICSIndustryConcentration – Nominal, String

The specific name for the NAICS concentration / specialty code

Specialty – Nominal, String

Specialty / domain of focus for each company

StandardIndustryClassificationCode – Nominal, Numeric

Primary SIC code for that company

ComC – Ordinal, Numeric

Community concern (sum of Investment\_Controversies, Negative\_Economic\_Impact, Tax\_Disputes, Community\_Other\_Concerns)

ComS – Ordinal, Numeric

Community strength (sum of Charitable\_Giving\_\_from\_1991\_thr, Innovative\_Giving, Support\_for\_Housing, Other\_Strengths\_\_from\_1991\_throu)

CorpC – Ordinal, Numeric

Corporate governance concern

CorpS – Ordinal, Numeric

Corporate governance strength (sum of Limited\_Compensation, Ownership\_Strength)

DivC – Ordinal, Numeric

Diversity concern

DivS – Ordinal, Numeric

Diversity strength (sum of Gay\_and\_Lesbian\_Policies\_\_from\_1, Board\_Diversity, Women\_and\_Minority\_Contracting, Employment\_of\_the\_Disabled)

EnvC – Ordinal, Numeric

Environment concern (sum of Hazardous\_Waste, Regulatory\_Problems, Ozone\_Depleting\_Chemicals, Substantial\_Emissions, Agriculture\_Chemicals, Environment\_Other\_Concerns)

EnvS – Ordinal, Numeric

Environment strength (sum of Beneficial\_Products\_and\_Services, Pollution\_Prevention, Recycling, Clean\_Energy)

MilC – Ordinal, Numeric

Military concern (sum of Military\_Involvement, Minor\_Weapons\_Contracting\_\_1991\_, Major\_Weapons\_related\_Supplier\_\_)

NucC – Ordinal, Numeric

Nuclear concern (sum of Nuclear\_Involvement, Nuclear\_Design\_\_through\_2002\_, Nuclear\_Fuel\_Cycle\_\_through\_2002)

ProC – Ordinal, Numeric

Product concern (sum of Marketing\_Contracting\_Concern, Antitrust)

ProS – Ordinal, Numeric

Product strength (sum of Quality, R\_D\_Innovation, Benefits\_to\_Economically\_Disadva)

# 22. Additional Variables Added is SPSS for Analysis

**CSR Totals**

In Part 1, Corporate Social Responsibility (CSR) values were combined into 5 distinct variables that were the sum of “strengths” (S) variables, and sum of “concerns” (C) variables for each CSR category (e.g. “Env S” = sum of “Beneficial\_Products\_and\_Services”, “Pollution\_Prevention”, “Recycling”, and “Clean\_Energy”).

In part 2, the concerns were subtracted from the strengths in all five categories where both were listed to give a total value for each CSR category. Code Template:

COMPUTE ***ENV***=***EnvS*** - ***EnvC***.

EXECUTE.

These values were then added together to give a TOTAL CSR value (sum of COM, CORP, DIV, ENV, and PRO). Code:

COMPUTE TotalCSR =COM + CORP + DIV + ENV + PRO.

EXECUTE.

**Total Patent Count**

Sum of US Patents and European Patents. Code:

TOTAL PATENT COUNT

COMPUTE TOTALPatent=USPTCount + EUPTCount.

EXECUTE.

**President in Office (Binary)**

Which president was in office was initially coded as “D” for Democrat and “R” for Republican. To allow SPSS to analyze these variables, D was coded as “0” and R was coded as “1”. Code:

RECODE AdjustedPresidentParty ('D'=0) ('R'=1) INTO BinaryPresidentParty.

EXECUTE.

# 23. Determining Highest Revenue Company & Highest Patent Count Company

Revenue and Patent between 2005 – 2014 was averaged and examined for all Fortune 500 companies. This data range was selected because patent data was unavailable prior to 2005 and incomplete revenue data began after 2014. Wal-mart was revealed to have had the highest average revenue and IBM to have the highest average patent count over the 9 years examined.

# 24. Competitor Selection

Competitors for Wal-mart and IBM were selected on a number of factors. First, Team 5 researched these companies on Hoovers.com to see what Hoovers deemed each company’s top 3 competitors. Two of the top three for each company were included in Team 5’s Fortune 500 list. Then, research into NASDEQ’s recommendations for top competitors along with compiling a list from our data of companies with similar NAICS codes and specialities revealed a long list of competitor options. The 2 competitors for each company found on Hoovers appeared in most lists and were included for analysis. A third competitor was obtained for each company by examining any competitor that appeared in multiple lists and where it was placed on the Fortune 500 list. The top three competitors for each company with the best Fortune 500 rankings were used for comparison.

Walmart: Sears, Target, Costco

IBM: HP, Microsoft, Apple

# 25. Correlations Between All Variables

**Program used**: SPSS

**Code**:

CORRELATIONS

/VARIABLES=GlobalCompanyKey CompanyInitialPublicOfferingDate DataDate Year BinaryPresidentParty

ElectionYear Position RevenueTotal PriceCloseAnnualCalendar NetIncomeLoss

ResearchandDevelopmentExpense Employees MarketValueTotalFiscal USPTCount EUPTCount Age

NAICSIndustryCode StandardIndustryClassificationCode ComC ComS CorpC CorpS DivC DivS EnvC EnvS MilC

NucC ProC ProS TotalCSR COM CORP DIV ENV PRO

/PRINT=TWOTAIL NOSIG

/MISSING=PAIRWISE.

# 26. Scatter Plots Between Variables of Interest

**Program used**: SPSS

**First Technique**: Scatterplots were created for all relationships with correlation coefficients greater than 0.4 or less than -0.4 and comparing all numeric variables to Revenue, Price Close, Net Income, Market Value, Patent Count, and all CSR measures.

**Code**:

GRAPH

/SCATTERPLOT(BIVAR)=***variable1*** WITH ***variable2***

/MISSING=LISTWISE.

**Results**: Most relationships observed appeared insignificant. The ones that appeared to be related seemed linear in nature.

**Second Technique**: Scatterplots were created to examine the impact of different CSR varioables, Patent counts, and Research & Development expenses on Revenue, split by Specialty.

**Code**:

SORT CASES BY Specialty.

SPLIT FILE SEPARATE BY Specialty.

GRAPH

/SCATTERPLOT(BIVAR)=***variable1*** WITH ***variable2***

/MISSING=LISTWISE.

**Results**: Most relationships observed appeared insignificant. The ones that appeared to be related seemed linear in nature. The specialties with the strongest linear relationships were examined further using Linear Regression for each specific specialty.

# 27. Linear Regression

**Program used:** SPSS

**Code:**

REGRESSION

/MISSING PAIRWISE

/STATISTICS COEFF OUTS CI(95) R ANOVA CHANGE

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

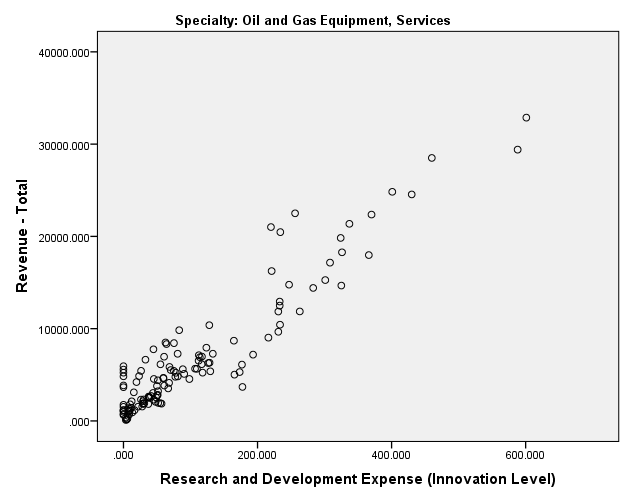
/DEPENDENT ***DVVariable***

/METHOD=ENTER ***IVVariable***.

**Results for most linear relationships:**

**IV: Research & Development Expense, DV: Revenue**

Specialty: Oil & Gas Equipment, Services

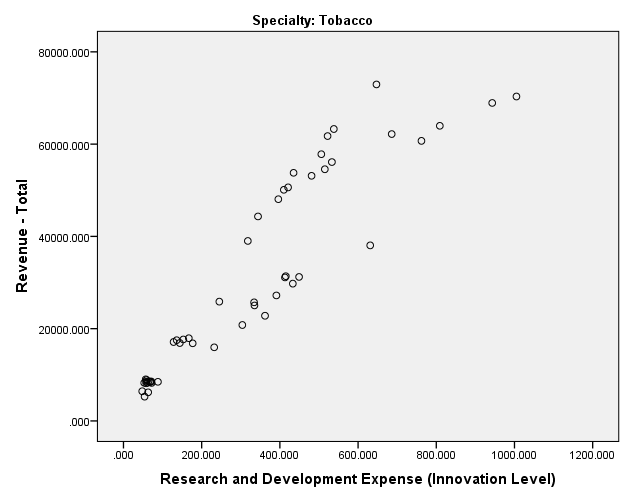


|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .937b | .879 | .878 | 2366.206328 |
| a. Specialty = Oil and Gas Equipment, Services | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 5231880821.998 | 1 | 5231880821.998 | 934.443 | .000c |
| Residual | 722262278.052 | 129 | 5598932.388 |  |  |
| Total | 5954143100.050 | 130 |  |  |  |
| a. Specialty = Oil and Gas Equipment, Services | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 1259.571 | 273.352 |  | 4.608 | .000 |
| Research and Development Expense (Innovation Level) | 51.496 | 1.685 | .937 | 30.569 | .000 |
| a. Specialty = Oil and Gas Equipment, Services | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |

Specialty: Tobacco



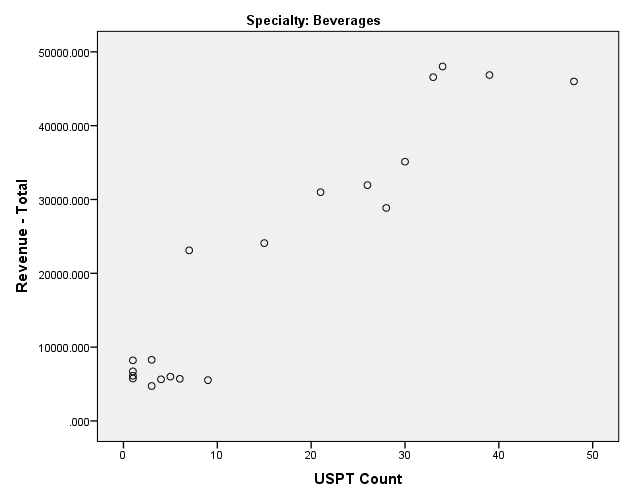
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .923b | .853 | .850 | 8408.315043 |
| a. Specialty = Tobacco | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 20040363226.387 | 1 | 20040363226.387 | 283.457 | .000c |
| Residual | 3464288331.260 | 49 | 70699761.862 |  |  |
| Total | 23504651557.647 | 50 |  |  |  |
| a. Specialty = Tobacco | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 4844.357 | 1948.553 |  | 2.486 | .016 |
| Research and Development Expense (Innovation Level) | 80.001 | 4.752 | .923 | 16.836 | .000 |
| a. Specialty = Tobacco | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |

**IV: US Patent Count, DV: Revenue**

Specialty: Beverages

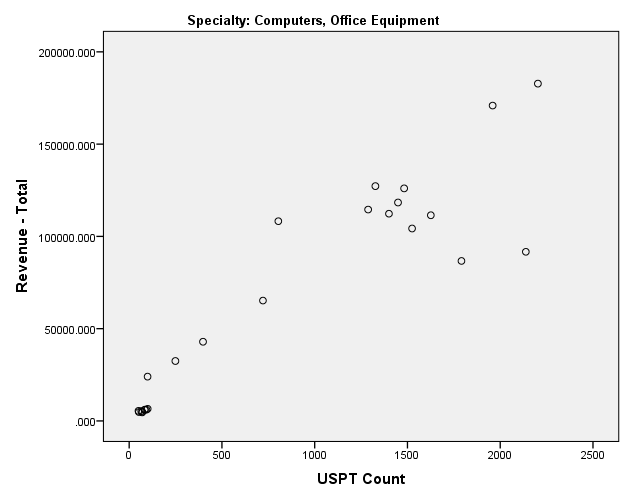


|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .950b | .902 | .897 | 5385.023298 |
| a. Specialty = Beverages | | | | |
| b. Predictors: (Constant), USPT Count | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 4830658896.712 | 1 | 4830658896.712 | 166.583 | .000c |
| Residual | 521972566.488 | 18 | 28998475.916 |  |  |
| Total | 5352631463.200 | 19 |  |  |  |
| a. Specialty = Beverages | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), USPT Count | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 4640.006 | 1760.221 |  | 2.636 | .017 |
| USPT Count | 1052.139 | 81.519 | .950 | 12.907 | .000 |
| a. Specialty = Beverages | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |

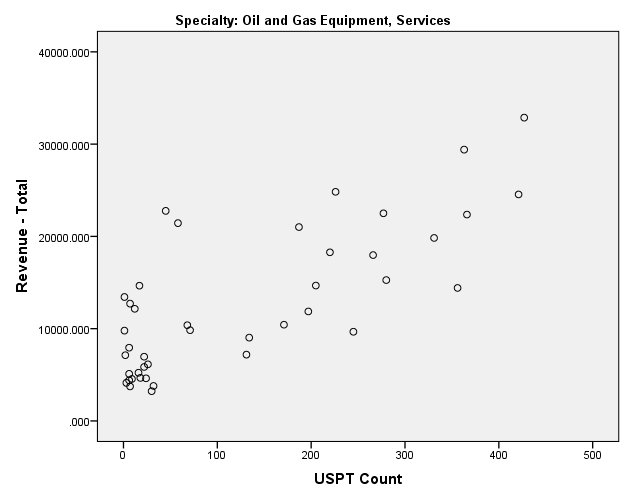
Specialty: Computers & Office Equipment



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .925b | .856 | .850 | 22651.912271 |
| a. Specialty = Computers, Office Equipment | | | | |
| b. Predictors: (Constant), USPT Count | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 70133668192.817 | 1 | 70133668192.817 | 136.684 | .000c |
| Residual | 11801509979.023 | 23 | 513109129.523 |  |  |
| Total | 81935178171.840 | 24 |  |  |  |
| a. Specialty = Computers, Office Equipment | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), USPT Count | | | | | | |

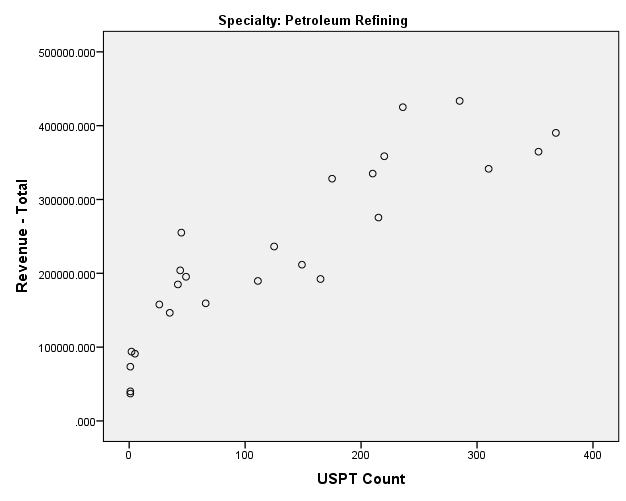
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 8409.006 | 6741.029 |  | 1.247 | .225 |
| USPT Count | 69.054 | 5.907 | .925 | 11.691 | .000 |
| a. Specialty = Computers, Office Equipment | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |

Specialty: Oil & Gas Equipment, Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .764b | .583 | .573 | 5100.675777 |
| a. Specialty = Oil and Gas Equipment, Services | | | | |
| b. Predictors: (Constant), USPT Count | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 1455979582.993 | 1 | 1455979582.993 | 55.963 | .000c |
| Residual | 1040675735.163 | 40 | 26016893.379 |  |  |
| Total | 2496655318.156 | 41 |  |  |  |
| a. Specialty = Oil and Gas Equipment, Services | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), USPT Count | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 1455979582.993 | 1 | 1455979582.993 | 55.963 | .000c |
| Residual | 1040675735.163 | 40 | 26016893.379 |  |  |
| Total | 2496655318.156 | 41 |  |  |  |
| a. Specialty = Oil and Gas Equipment, Services | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), USPT Count | | | | | | |

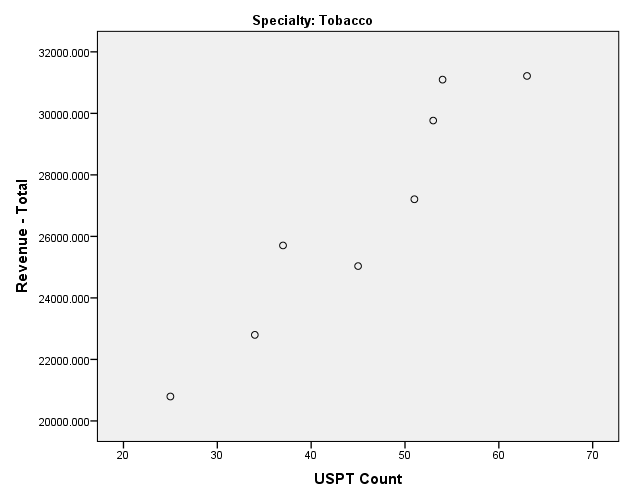
Specialty: Petroleum Refining

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .892b | .796 | .787 | 54574.305258 |
| a. Specialty = Petroleum Refining | | | | |
| b. Predictors: (Constant), USPT Count | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 267299747938.570 | 1 | 267299747938.570 | 89.747 | .000c |
| Residual | 68502160271.990 | 23 | 2978354794.434 |  |  |
| Total | 335801908210.560 | 24 |  |  |  |
| a. Specialty = Petroleum Refining | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), USPT Count | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 113032.793 | 16388.185 |  | 6.897 | .000 |
| USPT Count | 893.864 | 94.354 | .892 | 9.474 | .000 |
| a. Specialty = Petroleum Refining | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |

Specialty: Tobacco

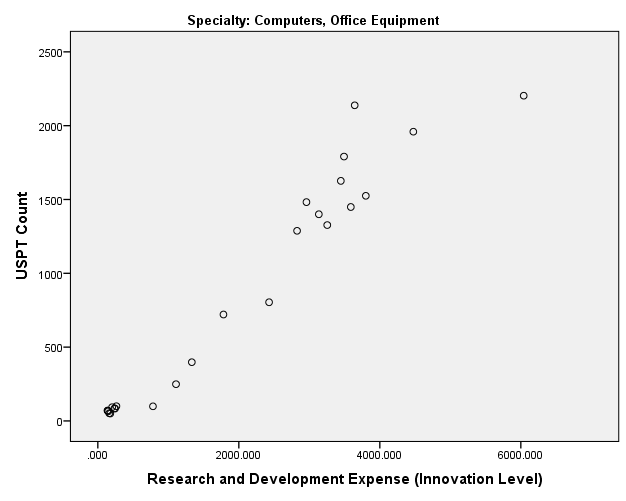


|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .946b | .896 | .878 | 1339.670520 |
| a. Specialty = Tobacco | | | | |
| b. Predictors: (Constant), USPT Count | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 92501783.268 | 1 | 92501783.268 | 51.541 | .000c |
| Residual | 10768302.607 | 6 | 1794717.101 |  |  |
| Total | 103270085.875 | 7 |  |  |  |
| a. Specialty = Tobacco | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |
| c. Predictors: (Constant), USPT Count | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 13517.628 | 1896.644 |  | 7.127 | .000 |
| USPT Count | 291.381 | 40.587 | .946 | 7.179 | .000 |
| a. Specialty = Tobacco | | | | | | |
| b. Dependent Variable: Revenue - Total | | | | | | |

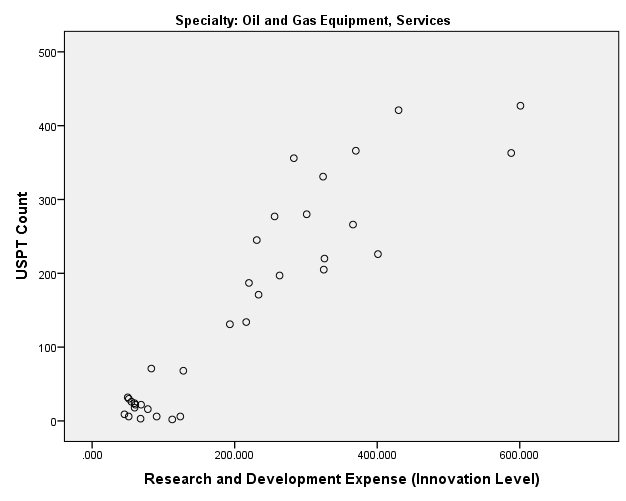
**IV: R&D Expense, DV: US Patent Count**

Specialty: Computers, Office Equipment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .970b | .942 | .939 | 193.231 |
| a. Specialty = Computers, Office Equipment | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 13849064.618 | 1 | 13849064.618 | 370.910 | .000c |
| Residual | 858776.022 | 23 | 37338.088 |  |  |
| Total | 14707840.640 | 24 |  |  |  |
| a. Specialty = Computers, Office Equipment | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |
| c. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | | | |

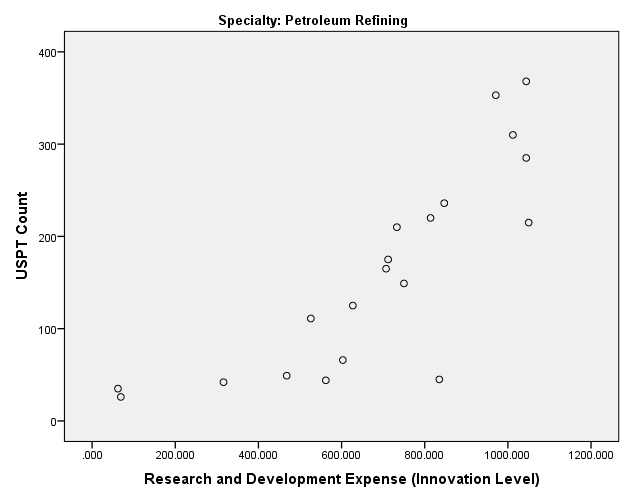
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -27.745 | 59.562 |  | -.466 | .646 |
| Research and Development Expense (Innovation Level) | .438 | .023 | .970 | 19.259 | .000 |
| a. Specialty = Computers, Office Equipment | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |

Specialty: Oil & Gas Equipment Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .923b | .851 | .847 | 55.277 |
| a. Specialty = Oil and Gas Equipment, Services | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .923b | .851 | .847 | 55.277 |
| a. Specialty = Oil and Gas Equipment, Services | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -23.496 | 16.056 |  | -1.463 | .153 |
| Research and Development Expense (Innovation Level) | .838 | .062 | .923 | 13.533 | .000 |
| a. Specialty = Oil and Gas Equipment, Services | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |

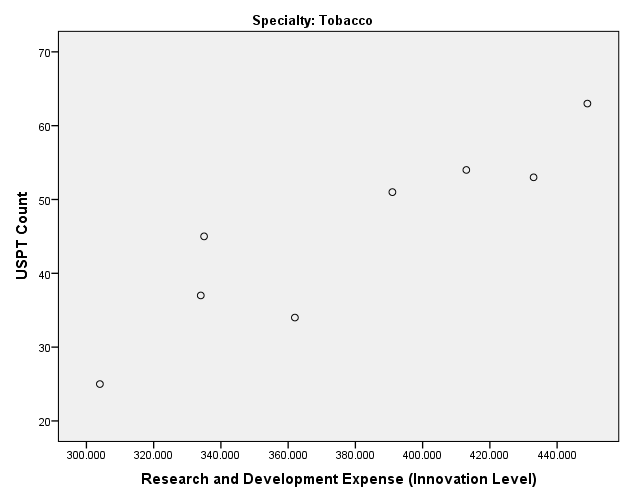
Specialty: Petroleum Refining

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .820b | .672 | .654 | 65.159 |
| a. Specialty = Petroleum Refining | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 156415.067 | 1 | 156415.067 | 36.841 | .000c |
| Residual | 76421.883 | 18 | 4245.660 |  |  |
| Total | 232836.950 | 19 |  |  |  |
| a. Specialty = Petroleum Refining | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |
| c. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -49.998 | 37.761 |  | -1.324 | .202 |
| Research and Development Expense (Innovation Level) | .308 | .051 | .820 | 6.070 | .000 |
| a. Specialty = Petroleum Refining | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |

Specialty: Tobacco



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summarya** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .906b | .821 | .791 | 5.702 |
| a. Specialty = Tobacco | | | | |
| b. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa,b** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 894.417 | 1 | 894.417 | 27.509 | .002c |
| Residual | 195.083 | 6 | 32.514 |  |  |
| Total | 1089.500 | 7 |  |  |  |
| a. Specialty = Tobacco | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |
| c. Predictors: (Constant), Research and Development Expense (Innovation Level) | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa,b** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -36.734 | 15.761 |  | -2.331 | .059 |
| Research and Development Expense (Innovation Level) | .217 | .041 | .906 | 5.245 | .002 |
| a. Specialty = Tobacco | | | | | | |
| b. Dependent Variable: USPT Count | | | | | | |

# 28. Cluster Analysis of CSR Variables

**Software used:** SPSS

**Code for Hierarchical Clustering:**

CLUSTER ComC ComS CorpC CorpS DivC DivS EnvC EnvS ProC ProS

/METHOD BAVERAGE

/MEASURE=SEUCLID

/PRINT SCHEDULE

/PLOT NONE.

**Code for Factoring:**

FACTOR

/VARIABLES ComC ComS CorpC CorpS DivC DivS EnvC EnvS ProC ProS

/MISSING LISTWISE

/ANALYSIS ComC ComS CorpC CorpS DivC DivS EnvC EnvS ProC ProS

/PRINT INITIAL EXTRACTION ROTATION

/CRITERIA MINEIGEN(1) ITERATE(25)

/EXTRACTION PC

/CRITERIA ITERATE(25)

/ROTATION VARIMAX

/METHOD=CORRELATION.

**Code for K-Means Clustering:**

QUICK CLUSTER ComC ComS CorpC CorpS DivC DivS EnvC EnvS ProC ProS

/MISSING=LISTWISE

/CRITERIA=CLUSTER(4) MXITER(10) CONVERGE(0)

/METHOD=KMEANS(NOUPDATE)

/PRINT INITIAL.

# 29. Multiple Linear Regression: Types of Firms impacted by President Party

**Software used**: SAS

**Code for Multiple Linear Regression**:

proc import out=Fortune datafile="C:\Users\XIAZHI\Desktop\DSBA\00database\!fortune 500 list.xlsx" dbms=xlsx replace; getnames=yes; run; data fortune; set fortune; ticker0=strip(ticker); run; proc import out=Revenue datafile="C:\Users\XIAZHI\Desktop\DSBA\00database\13PivotDataSet SPSS\_sherri.xlsx" dbms=xlsx replace; sheet="Revenue0"; getnames=yes; run; data revenue (drop=r\_d); set revenue; RD\_expense=input(r\_d,8.); run; proc import out=Politics datafile="C:\Users\XIAZHI\Desktop\DSBA\00database\13PivotDataSet SPSS\_sherri.xlsx" dbms=xlsx replace; sheet="Politics"; getnames=yes; run; proc sql; CREATE table r\_p as select a.\*, b.\*, c.\* from revenue as a, politics as b, fortune as c where a.year=b.year and a.ticker=c.ticker0; quit; data r\_p\_1; set r\_p; if policy="D" then politics=1; if policy="R" then politics=0; drop ticker0; specialty0=strip(specialty); logrev=log(revenue); logemp=log(employees); run; data check; set r\_p\_1; where logemp<=0; run; proc sort data=r\_p\_1 out=check nodupkey;by specialty; run; proc sort data=r\_p\_1;by specialty0; run; %macro reg(specialty=); proc reg data=r\_p\_1; model logrev= year logemp politics; where specialty0="%bquote(&specialty.)"; title "%bquote(&specialty.)"; run; %mend; %reg(specialty=Airlines); %reg(specialty=Financial Data Services); %reg(specialty=Food and Drug Stores); %reg(specialty=Food Consumer Products); %reg(specialty=Pharmaceuticals); %reg(specialty=Pipelines); %reg(specialty=Telecommunications);/\*significant\*/ %reg(specialty=Transportation and Logistics); proc reg data=r\_p\_1; model logrev= year logemp politics; where specialty0="Computers, Office Equipment"; title "Computers, Office Equipment"; run; proc reg data=r\_p\_1; model logrev= year logemp politics; where specialty0="Oil and Gas Equipment, Services"; title "Oil and Gas Equipment, Services"; run; proc reg data=r\_p\_1; model logrev= year logemp politics; where specialty0="Utilities: Gas and Electric";/\*significant\*/ title "Utilities: Gas and Electric"; run; %macro plots(specialty=); proc sgplot data=r\_p\_1; scatter y=revenue x=year; where specialty0="&specialty."; title "&specialty."; run; proc sgplot data=r\_p\_1; scatter y=revenue x=employees; where specialty0="&specialty."; title "&specialty."; run; proc sgplot data=r\_p\_1; scatter y=revenue x=politics; where specialty0="&specialty."; title "&specialty."; run; %mend; %plots(specialty=Airlines); %plots(specialty=Financial Data Services); %plots(specialty=Food and Drug Stores); %plots(specialty=Food Consumer Products); %plots(specialty=Pharmaceuticals); %plots(specialty=Pipelines); %plots(specialty=Telecommunications); %plots(specialty=Transportation and Logistics); %plots(specialty=Utilities: Gas and Electric); proc reg data=r\_p\_1; model logrev= year logemp politics; by specialty0; run;

**Results**

Based on the analysis, the following industries revenue were positively influenced by Democratic as president:

* Airlines (n=299, p<0.01, R2 = 0.75)
* Financial Data Services (n=141, p<0.01, R2 = 0.60)
* Food and Drug Stores (n=394, p<0.01, R2 = 0.75)
* Food Consumer Products (n=512, p<0.01, R2 = 0.65)
* Pharmaceuticals (n=461, p<0.01, R2 = 0.77)
* Pipelines (n=178, p<0.01, R2 = 0.35)
* Telecommunications (n=256, p<0.01, R2 = 0.86)
* Transportation and Logistics (n=116, p<0.01, R2 = 0.60)
* Computers, Office Equipment (n=155, p<0.01, R2 = 0.65)
* Oil and Gas Equipment, Services (n=176, p<0.01, R2 = 0.69)
* Utilities: Gas and Electric (n=1205, p<0.01, R2 = 0.62)

**Limitations**: some data appear not to have a linear relationship. Transforming the data may be necessary to gain a complete understanding of these variables on revenue.