CS 535 Large Scale Data Analysis

Amit Jain

Big Data, Big Disks, Cheap Computers

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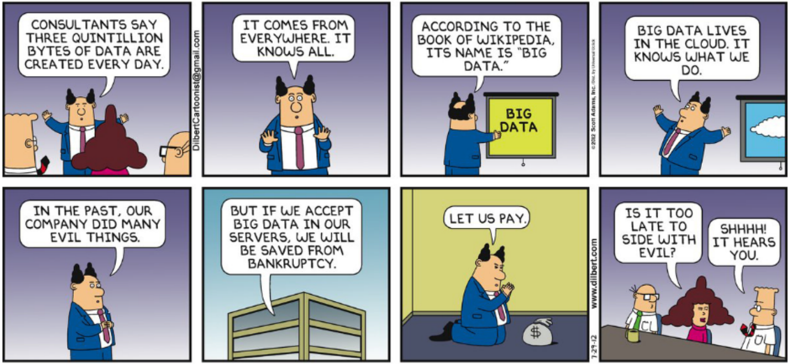
- *"The good news is that Big Data is here. The bad news is that we are struggling to store and analyze it."* Tom White.

Units and Units

Check out http://en.wikipedia.org/wiki /Petabyte

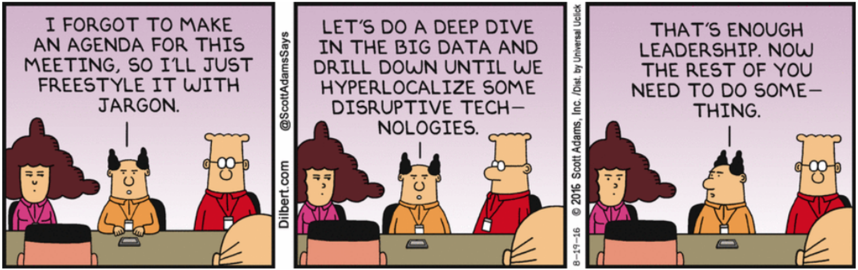
Big Data

Big Data knows everything



Big Data

Friday August 19, 2016 *Boss Freestyles With Jargon*



Big Data


DO WE HAVE ANY ACTIONABLE ANALYTICS FROM OUR BIG DATA IN THE CLOUD?
Dilbert.com DilbertCartoonist@gmail.com
YES, THE DATA SHOWS THAT MY PRODUCTIVITY PLUNGES WHENEVER YOU LEARN NEW JARGON.
1-9-13 ©2013 Scott Adams, Inc./Dist. by Universal Uclick
MAYBE IN-MEMORY COMPUTING WILL ACCEL-ERATE YOUR APPLICA-TIONS.
PLUNGE, PLUNGE, PLUNGE.

Word-count: Hello World of Big Data

Problem: Given a collection of text files, find the frequency of each word.

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Questions: Do we want the output sorted by frequency? Sorted by word? How would you solve this problem?

Sequential Solutions (1)

```
for f over all input files
    open file f
    while not end of file f
        read next word
        if search(word, dictionary)
            increment frequency count for word
        else
            add word to the dictionary

open output file
iterate over dicitionary
    write next word to output file
```

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- So the main loop takes $O(n)$ time on average and $O(n \lg n)$ in the worst case
- The time to output is insignificant as the size of the dictionary will be much smaller than n. Why?

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- How do you modify your solution from before? Assume that you have a cluster of n servers available with the files distributed across the servers.
- But how do we create a cluster and get the files on it?

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- What if the some system administrator reboots some of your servers for software/hardware updates without letting you know?

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- Typical languages would be Java (with Hadoop and/or Spark), Scala, Python (at smaller scales)

Insights from Big Data (1)

The point of large scale data analysis is meaningful insight!
We should consider two things about insights presented by analysis:

- Investigate carefully to see if it really uses a significant amount of data.
- Think about each of the insights and label them Actionable, Useless (trivia), or potentially Misleading or dangerous.

For example:
https://blogs.scientificamerican.com/guest-blog/9-bizarre-and-surprising-insights-from-data-science/