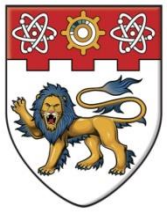


NANYANG TECHNOLOGICAL UNIVERSITY

BC2406 Business Analytics I: Predictive Techniques

Seminar 2
Introduction to Business Analytics

Instructor: Prof. Lee Gun-woong

Nanyang Business School

Learning Objectives

- Get familiar with terms in Business Analytics
- Understand the key elements in Business Analytics
- Appreciate the benefits of using Business Analytics

NANYANG TECHNOLOGICAL UNIVERSITY

Vocabulary Test

- How many terms do you know?
  1. Data and Information
  2. Data Science
  3. Data Mining
  4. Analytics (vs. Analysis)
  5. Data Analytics
  6. Business Analytics
  7. Big Data
  8. Business Problems
  9. Descriptive Analytics
  10. Predictive Analytics

Data and Information

- **What is the difference between Data and Information?**

Data

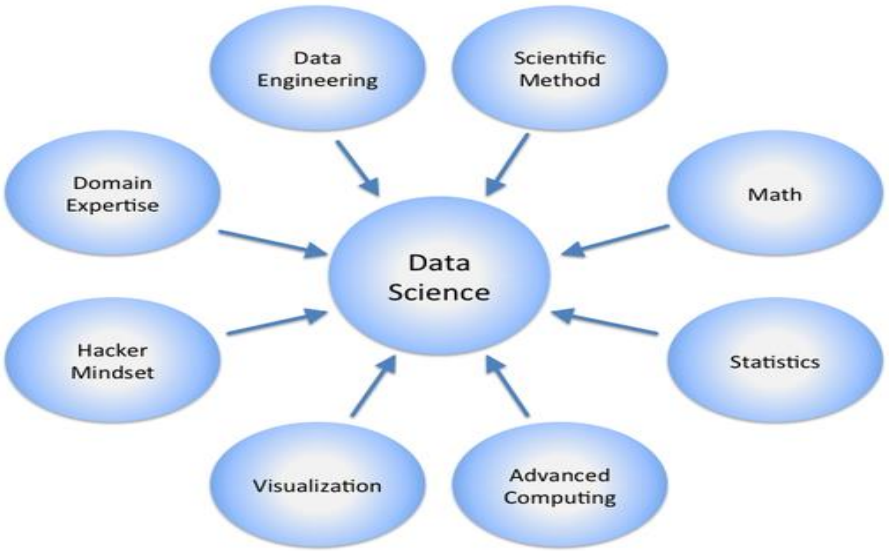
Information

DATA	INFORMATION
- Data is raw, unorganized facts that need to be processed. - It's useless until it's organized and processed.	- Data that has been processed and organized to make it meaningful and useful. - The foundation of correct decision

Data Science and Data Mining

- **Data Science** is a set of fundamental principles that guide the extraction of knowledge from data.
  - Principles: Computer Science, Mathematics, Statistics, Business/Strategy knowledge,…

- **Data Mining** is the extraction of knowledge from data, via technologies that incorporate these principles.



Analytics

- **Analytics** is the discovery, interpretation, and communication of meaningful patterns in data (Wikipedia).

- **Analytics** is defined as the scientific process of transforming data into insight for making better decisions (Informs.org).

Analysis vs. Analytics

- **Analysis**
  - Looks backwards over time
  - A historical view of what has happened
    - How many customers responded to a marketing campaign?
    - How many new loyalty program sign ups did we get last year?

- **Analytics**
  - Looks forward to model the future
  - Predict a result
    - What will happen next?
    - What will happen if a trend continues?

(BIG) Data Analytics

- **Data Analytics** examines large amounts of data to uncover hidden patterns, correlations and other insights (SAS).

- **Data Analytics** is the process of collecting, organizing and analyzing large sets of data to discover patterns and other useful information (Webopedia.com).

Business Analytics

- **Business Analytics** refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. It is the intersection of business and technology (Wikipedia).

- **Business Analytics** gives decision makers consistent, reliable information to answer three critical questions: how are we doing? Why? What should we be doing?
- With insights drawn from answering three questions, managers make better, faster decisions that drive greater efficiencies, reduce costs, and identify growth opportunities while minimizing impact on IT, which in turn lead to better business outcomes (IBM).

What is Business Analytics?

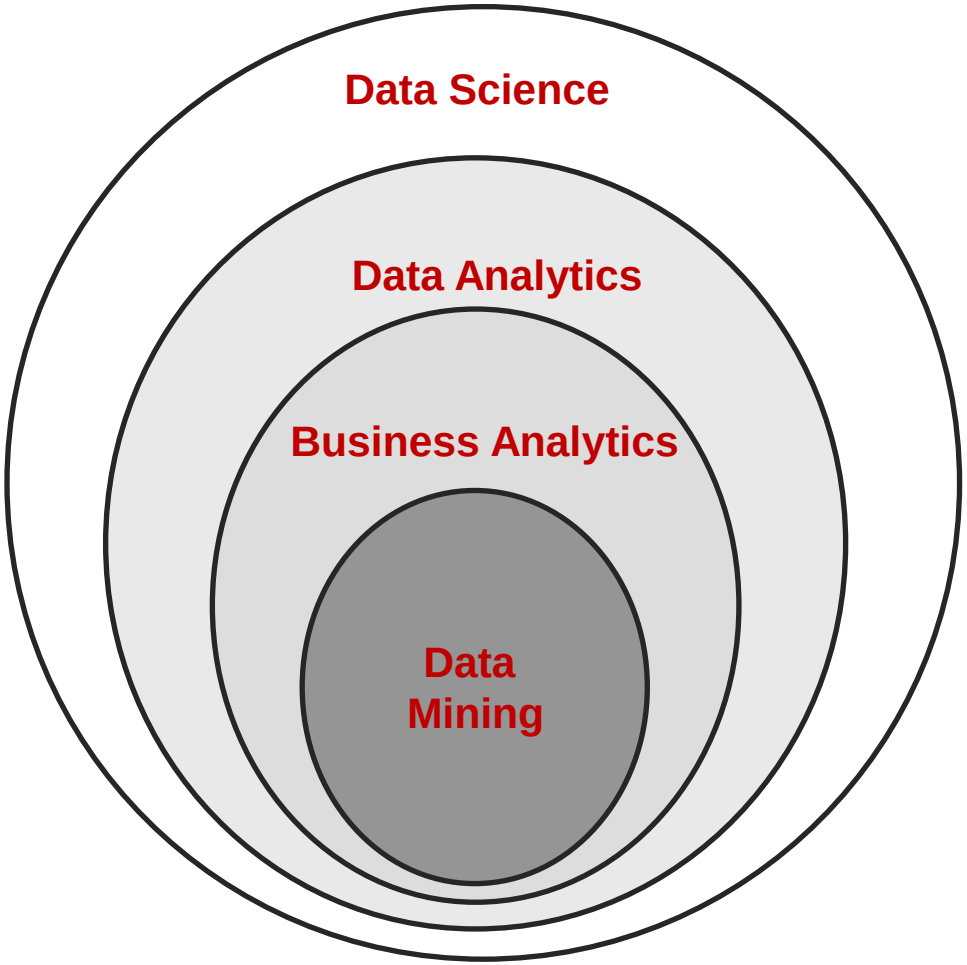
- Please watch the following video clip:

https://www.youtube.com/watch?v=6jDjeNJrN14

Business Analytics is

- the intersection of *business*, *analytics* & *data*
- to improve financial performance, operational efficiency and strategic advantage
- in **EVERY** sector, in **EVERY** economy, in **EVERY** organization.

Summary



Key Elements of Business Analytics

Key Elements of Business Analytics

- **Data**
- Analytics
- Business Problem
- Insights for Decision Making

Big Data

- Lots of data is being collected
  - Web data, e-commerce
  - Purchases at department/ grocery stores
  - Bank/Credit Card transactions
  - Social Networks

3Vs of Big Data

- Volume
  - Data quantity
  - Data volumes are becoming unmanageable
- Velocity
  - Data speed
  - Some data is arriving so rapidly that it must either be processed instantly, or lost
- Variety
  - Data type
  - Data complexity is growing
  - More types of data captured than previously

Drowning in Data & Starving for Information

- Google processes 20 PB a day
- Wayback Machine has 3 PB + 100 TB/month
- Facebook has 2.5 PB of user data + 15 TB/day
- eBay has 6.5 PB of user data + 50 TB/day
- CERN's Large Hydron Collider (LHC) generates 15 PB a year

Difficulties

- Data is accumulating at tremendous rates
- But what can big data tell us?
- How to deal with big data?
  - It is really becoming a challenge to store and process it all in a meaningful way
- Big data has special characteristics

Data

- Why does Business Analytics rely on Data?
- Important questions about data
  - What kinds of data?
  - How to get data (data collection)?
  - How to manage data (data management)?
  - How to analyze data (data analytics)?

Key Elements of Business Analytics

- Data
- **Analytics**
- Business Problem
- Insights for decision making

Analytics

- Refers to various methods
  - Statistics
  - Mathematics
  - Optimization

- Types of analytics
  - Descriptive Analytics
  - Predictive Analytics

Descriptive Analytics

- Identify, classify, and count objects or events
  - Money spent or number of widgets manufactured in the past time period.
  - They are critical for knowing how the organization is performing—your current situation.
  - For example, they let you know if you are above or below budget, or are performing up to standards.
  - This category includes reports, dashboards, and ad hoc queries.

Google Analytics

My Account | Help | Contact Us | Sign Out

- Dashboard
  - Saved Reports
- Visitors
- Traffic Sources
- Content
- Goals

Settings
Email

Help Resources
- About this Report
- Conversion University
- Common Questions
- Report Finder
- Beta Feedback

Dashboard

Export | Email

Apr 1, 2007 - Apr 30, 2007

Avg. Time on Site

Site Usage

16,635 Visits	**28,827** Pageviews
1.73 Pages/Visit	**00:02:05** Avg. Time on Site
69.56% Bounce Rate	**65.52%** % New Visits

Visitors Overview

11,916 Visitors

view report

Traffic Sources Overview

- **Referring Sites** 6,785 (40.79%)
- **Search Engines** 6,276 (37.73%)
- **Direct** 3,567 (21.44%)
- **Other** 7 (0.04%)

view report

Goals Overview

709 Goal Conversions

view report

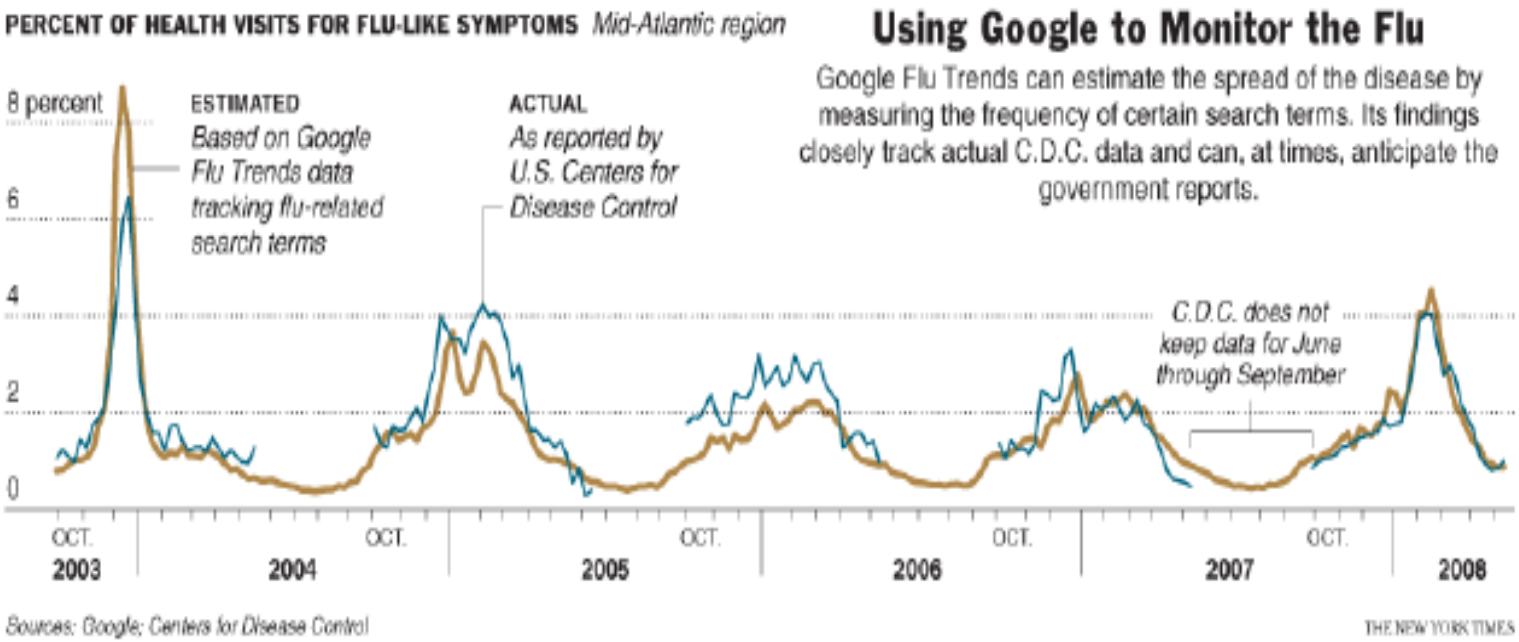
Map Overlay

view report

Predictive Analytics

- Look at the trend of past events to anticipate possible future outcomes.
  - This allows the organization to better plan for the future—deciding what actions to take that can improve the future results.
  - Discover patterns and correlations in data that might be missed by the human eye.
  - Build a model that will allow "What if" analyses to decide on the best course of action.

- Google Flu Trends



Flu-related Google search

Flu incidences by US CDC

Healthcare system advisory, planning & optimisation

Key Elements of Business Analytics

- Data
- Analytics
- **Business Problem**
- Insights for Decision Making

Business Problems

- Definition: "A perceived gap between the existing state and a desired state, or a deviation from a norm, standard, or status quo" (Business Dictionary.com)
- Examples:
  - CEO needs a development plan for the next 10 years.
  - CIO needs to decide whether to purchase a ERP system.
  - HR needs to decide whether to promote YOU.
  - HR wants to decide how much bonus to increase.
  - When a user comes to Amazon, Amazon needs to decide which books to recommend.

Common Business Analytics Problems

- How likely is client X to buy product Y?
- Which clients are “at risk” of going to our competitors?
- What kind of promotions should we offer to retain our customers?

Andrew Pole had just started working as a statistician for Target in 2002, when two colleagues from the marketing department stopped by his desk to ask an odd question: "If we wanted to figure out if a customer is pregnant, even if she didn't want us to know, can you do that? "

As the marketers explained to Pole — and as Pole later explained to me, back when we were still speaking and before Target told him to stop — new parents are a retailer's holy grail. Most shoppers don't buy everything they need at one store. Instead, they buy groceries at the grocery store and toys at the toy store, and they visit Target only when they need certain items they associate with Target — cleaning supplies, say, or new socks or a six-month supply of toilet paper. But Target sells everything from milk to stuffed animals to lawn furniture to electronics, so one of the company's primary goals is convincing customers that the only store they need is Target. But it's a tough message to get across, even with the most ingenious ad campaigns, because once consumers' shopping habits are ingrained, it's incredibly difficult to change them.

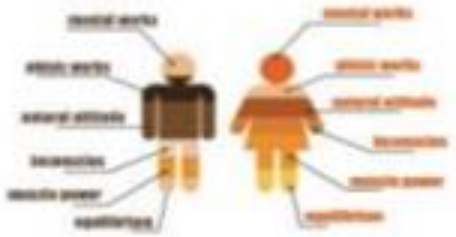
From NewYorkTimes

Target Case

- What business problems does Target have?
- Who initial the business problems?
- Why need to have Pole to solve problems?

Better understand and target customers: To better understand and target customers, companies expand their traditional data sets with social media data, browser, text analytics or sensor data to get a more complete picture of their customers. The big objective, in many cases, is to create predictive models. Using big data, Telecom companies can now better predict customer churn; retailers can predict what products will sell, and car insurance companies understand how well their customers actually drive.

Understand and Optimize Business Processes: Big data is also increasingly used to optimize business processes. Retailers are able to optimize their stock based on predictive models generated from social media data, web search trends and weather forecasts. Another example is supply chain or delivery route optimization using data from geographic positioning and radio frequency identification sensors.



Improving Health: The computing power of big data analytics enables us to find new cures and better understand and predict disease patterns. We can use all the data from smart watches and wearable devices to better understand links between lifestyles and diseases. Big data analytics also allow us to monitor and predict epidemics and disease outbreaks, simply by listening to what people are saying, i.e. "Feeling rubbish today - in bed with a cold" or searching for on the Internet.

Key Elements of Business Analytics

- Data
- Analytics
- Business Problem
- **Insights for Decision Making**

Insights

- Gain an understanding of a business situation that allows a manager to make the best possible decision
  - "best" refers to a numerically measurable business outcome that is consistent with the goals and objectives of the organization in question
- What kinds of insights can we get?

Insights for These Common BA Problems?

- How likely is client X to buy product Y?
  - After knowing client X's likelihood of purchasing the product Y, what a firm can do next?
- Which clients are "at risk" of going to our competitors?
  - After knowing clients' propensity to leave, what is your suggestion to the firm?
- What kind of promotions should we offer to retain our customers?
  - After knowing effectives of promotions, what are the implications?

Benefits of Business Analytics

Values of Business Analytics

- Examine large amount of data
- Identify hidden patterns and unknown correlations
- Better business decisions: strategic and operations
- Improve financial performance, strategic management, and operational efficiency
- Effective marketing, customer satisfaction, increased revenue
  - https://www.youtube.com/watch?v=HbHTvqZE3D8
- Competitive advantage

Competitive Advantage

- Competing on analytics:
  - What does analytics competitor mean?
  - Why need to use analytics?

What's Next…

- Course Topic
  - Seminar 3: Basics in Predictive Analyses
  - Readings
    - "Seminar 3_Lecture.pdf" lecture slides
- Assignment
  - Read "Seminar 3_R.pdf" tutorial, and Do the exercises in the document

Supplementary Slides for Your Reference

Popularity of Business Analytics

Big Data and Big Money

Business analytics services spending to reach $89.6 bn by 2018 - IDC

The corporate IT spending on business analytics services will reach $89.6 billion by 2018 and $51.6 billion in 2014 with an expected compound annual growth rate (CAGR) of 14.7 percent, according to a newly published report by IDC.

Image courtesy: Svilen Milev/freeimages.com

The report, Worldwide Business Analytics Services 2014–2018 Forecast, assesses the trends in the worldwide business analytics services market from 2009 to 2018. Ali Zaidi, senior research analyst, for IT consulting and systems integration strategies at IDC believes that the high interest in adoption of new technologies coupled with talent shortage and desire to consume the entire life cycle of business analytics services will stimulate spending growth across all service lines.

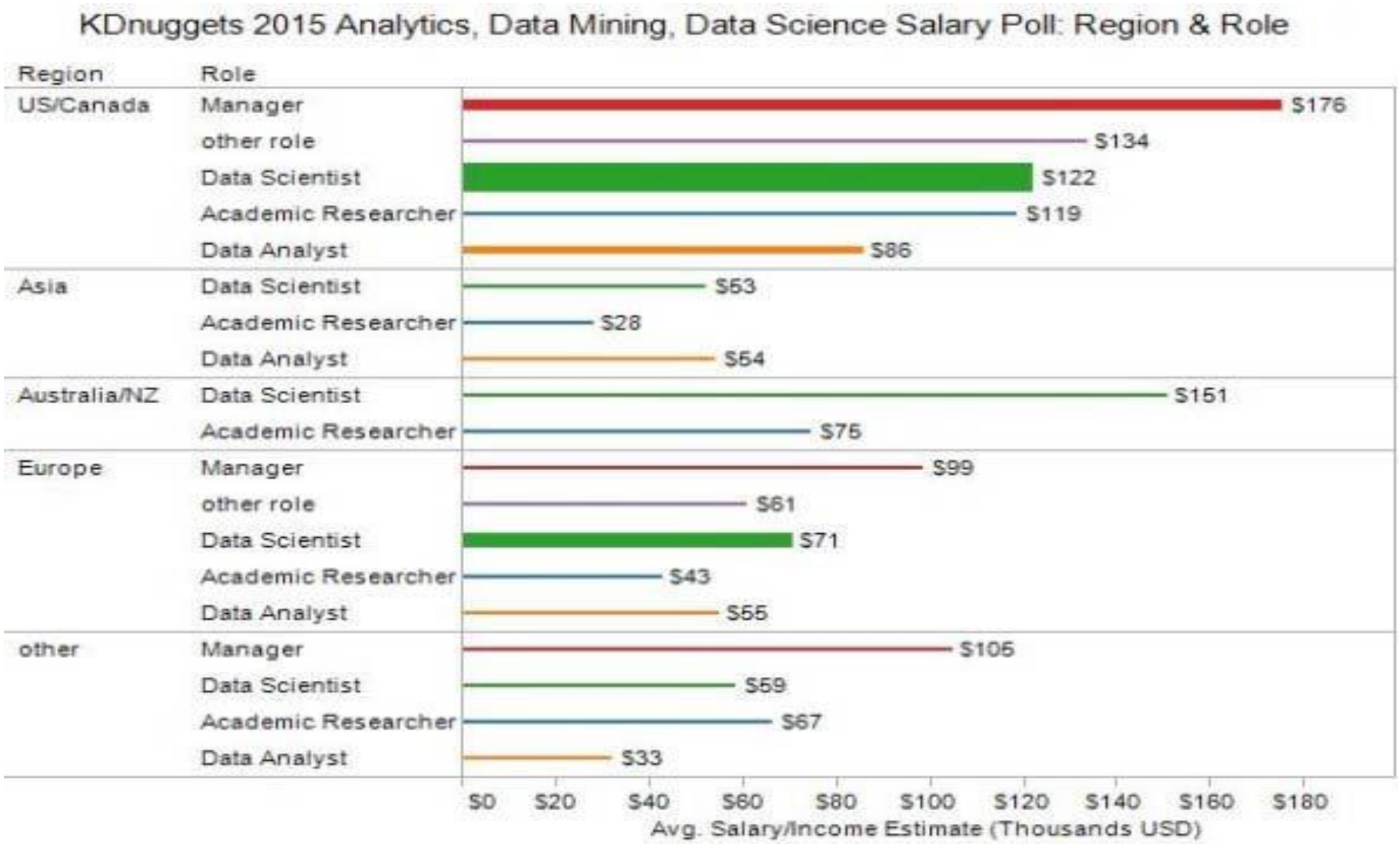
How BIG is the Big Data Market?

90.0%	Fortune 500 companies are likely to have big data initiatives
1,500,000	Data-savvy managers are needed by 2018 to capably exploit data for strategic business decisions
$114 billion	Total industry market value for big data hardware, software and services by 2018

Business Analytics Careers & Jobs

- Data Analyst
- Business Intelligence Analyst
- Marketing Analyst
- IT Business Analyst
- Data Scientist
- Web Analytics Consultant
- Management Consultant
- Project Manager (Business Analytics/Intelligence)
- Business Analytics Manager
- Director (Business Analytics & Planning)
- Chief Information Officer

Salary: Business Analytics Professionals



Source: http://www.kdnuggets.com/2015/03/salary-analytics-data-science-poll-well-compensated.html

THE MAGAZINE

October 2012

Data Scientist: The Sexiest Job of the 21st Century

by Thomas H. Davenport and D.J. Patil

Comments (77)

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Executive Summary

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Position	Senior Manager (Data Analytics)
Organisation	Central Provident Fund
Date Posted	Friday, November 01, 2013
Application Deadline	Sunday, December 01, 2013
Location	79 Robinson Road, CPF Building, Singapore 068897
No. of Vacancies	1

As trustee of the nation's savings, we understand what it means to be trusted. In our hands we hold the future of real people and real lives.

We foster an environment of trust and encourage positive relationships for effective teamwork. We offer you the space to develop with meaningful opportunities and fresh challenges. We adopt a total rewards focus comprising competitive remuneration, attractive benefits and non-monetary recognition.

Responsibilities

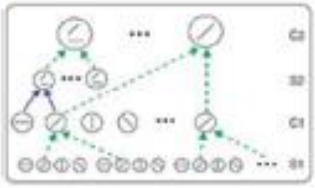
- Plan, design and implement overall data analytics strategy
- Lead the design and development of data analytics projects using CAAT tools
- Identify opportunities to develop data-driven analysis on key business behaviours and evaluating risks
- Work with stakeholders to make informed decisions by identifying trends and patterns of information
- Maintain and upgrade IT infrastructure supporting data analytics
- Perform any other duties as assigned

Skill Sets for Business Analytics

Manipulate, integrate and analyse big data

Domain knowledge and skills to develop right questions, determine which data is important

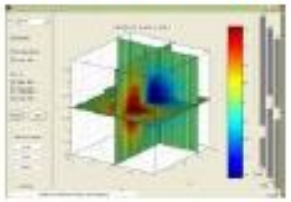
Mathematics, statistics and computer science to develop analytics algorithms



Executive and management skills to know when and how to use data for making decisions

Develop tools to mask the complexity of data and analytics to lower skill boundaries

Visualisation skills to interpret data and present in meaningful ways



Business Analysis Tools

- **Statistic tools**
  - Excel
  - KXEN
  - Statistica
  - Matlab
- **BI tools**
  - SAS
  - Clementine
- **Open Source Software**
  - R
  - Weka