# JIGSAW ACADEMY

Analytics for Professionals

# ANALYTICS  OVERVIEW

# COMPANY VALUATION

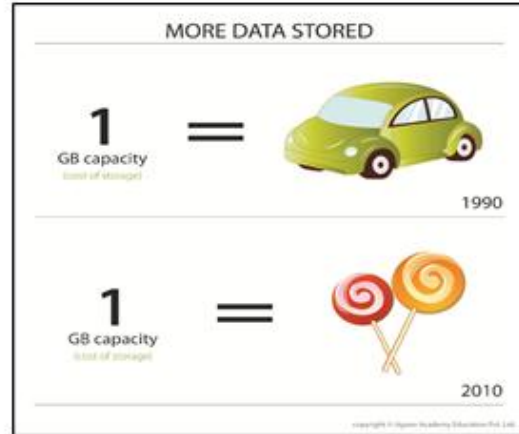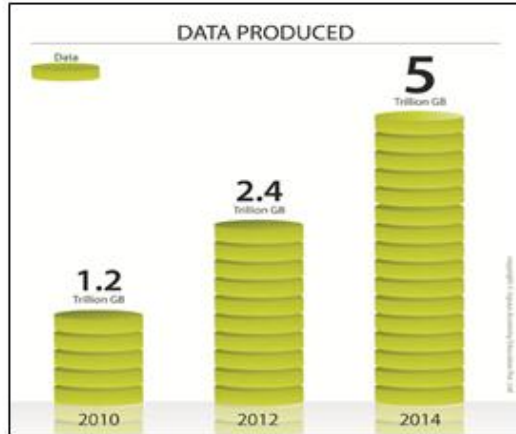|  | Company A | Company B |
|---|---|---|
| **Profits** | $ 1.5 billion | $ 1 billion |
| **Revenue** | $6 billion | $3.7 billion |
| **Valuation** | $30 billion | $100 billion |

# AGENDA

- Why do businesses need analytics?
- How do businesses use analytics?
- Case studies on application of analytics
- What is analytics?
- Problems in analytics
- Analytic tools
- Companies in analytics
- Career path in analytics
- Qualities of a good analyst

# WHY DO BUSINESSES NEED ANALYTICS?

## DATA PRODUCED

Data

5
Trillion GB

2.4
Trillion GB

1.2
Trillion GB

2010    2012    2014

## MORE DATA STORED

1
GB capacity
(cost of storage)

=

1990

1
GB capacity
(cost of storage)

=

2010

**90% of the world's data has been generated in the last 2 years**
*- IBM*

# WHY DO BUSINESSES NEED ANALYTICS?

**More data being generated**

An analysis of a chain of coffee shops

**Coffee Cafe**

1200 outlets

✖

80 transactions per outlet per day

**100,000 transactions a day!**

# WHY DO BUSINESSES NEED ANALYTICS?

**More data being generated**

An analysis of a chain of coffee shops

Coffee Cafe

100,000 transactions a day

✖

5 years of historical data

**Historical data of 180 MM transactions**

# WHY DO BUSINESSES NEED ANALYTICS?

**More data being generated**

An analysis of a chain of coffee shops

Coffee Cafe

180 MM transactions

✖

25 data fields

✖

40 characters

**180 Gb worth of data**
**4.5 billion pieces of information**

# WHY DO BUSINESSES NEED ANALYTICS?

**More data being stored**

An analysis of a chain of coffee shops

**Coffee Cafe**

Cost of 1 Tb storage in 1990 ?

$9 Million!

Cost of 1 Tb storage in 2011 ?
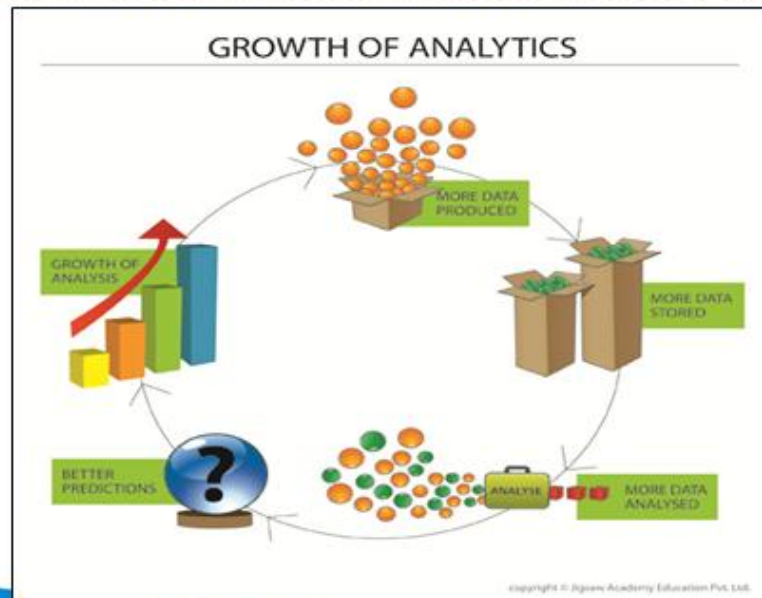
$80

1 Terabyte of space required for this data

# WHY DO BUSINESSES NEED ANALYTICS?

Analytics: Now more than ever

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# HOW DO BUSINESSES USE ANALYTICS

## Power of POS Data

**Store address**

*Where was the product bought?*
- Are different stores of the same chain performing differently?
- What are the item or category sales across different stores?
- How is promotion activity working in different stores?

**Product Id**

*What was bought?*
- What products are bought together?
- Why do people buy what they buy?

**Quantity**

*How much was bought?*
- What is the average number of items bought per transaction?
- Does this vary by store?

```
            Inventis Retail India Pvt Ltd
                      appleofmyi
            #2985, 12th Main, HAL 2nd Stage,
             Indiranagar, Bangalore-560008
                   Phone: 41154031
                   TIN: 29860726166
                   TAX SALES INVOICE
        Invoice # :  15681    Date: 9/20/2010
        ------------------------------------
        ITEM # Qty Description   price   Net Amt
        ------------------------------------
        15053  1   4-DOGS MOBILE 300.00  300.00
        2404   1   CTIVITY CHAIN 199.00  199.00
        62554  1   BABY CAP E20   45.00   45.00
        22628  1   BABY MITTENS   25.00   25.00
        45213  1   Y MITTON PRIN  20.00   20.00
        50571  1   AINBOW CAP C2  40.00   40.00
        21029  1   ACTVATED CRIB 695.00  695.00
        ------------------------------------
        Sub Total :  1,324.00
        Total Qty:  7
         Net Bill Amount:   1,324.00
        ------------------------------------
        Mode of Payment :  Credit Card
        Paid by Cr.Crd :   MASTER    .  1,324.00

        NO exchange
        E. & O.E.     Cashier :  BARIK
        Terms & Conditions1) Unused, unopened
```

**Time of transaction**

*When was it bought?*
- How do sales for a product/category/store vary by hour of day?
- How do sales vary by day of week?

**Price**

*How much was it priced at?*
- What is the average spend per customer?
- What is the distribution of spend across customers?
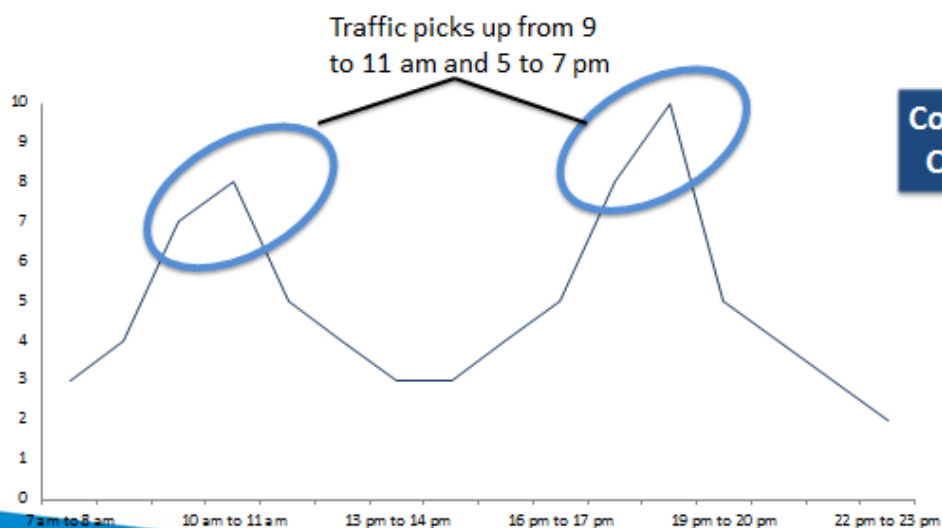- What was the size of purchases?

**Discounted price**

*What was paid?*
- What % of items are bought on discounts?
- What is the average discount?

# HOW DO BUSINESSES USE ANALYTICS

## Analysis by Hour of Day

### Number of transactions by hour of day
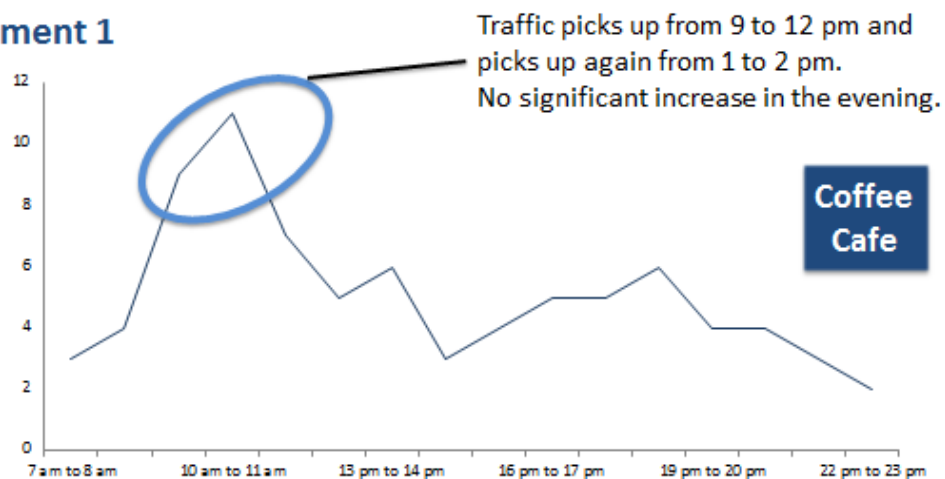


Traffic picks up from 9 to 11 am and 5 to 7 pm

Coffee Cafe

# HOW DO BUSINESSES USE ANALYTICS

**Segment 1**

Traffic picks up from 9 to 12 pm and picks up again from 1 to 2 pm.
No significant increase in the evening.

**Coffee Cafe**
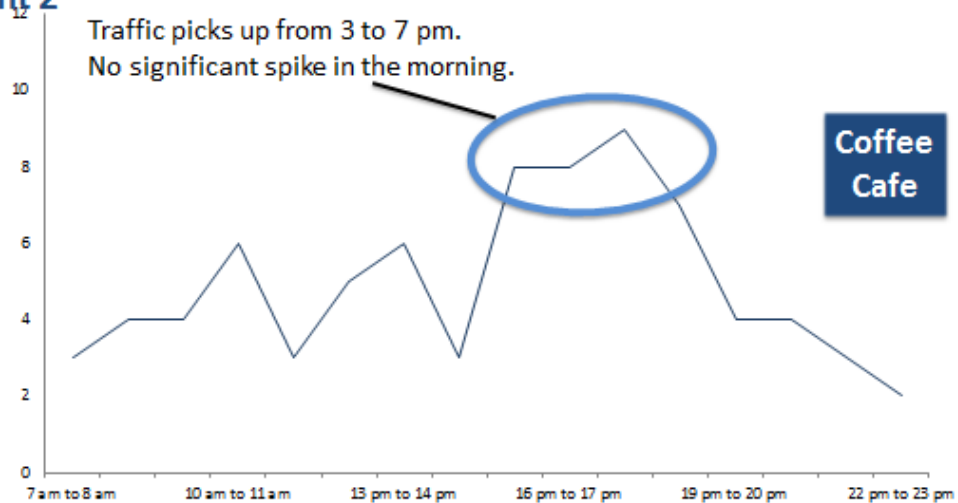
# HOW DO BUSINESSES USE ANALYTICS

## Actionable Insights

| Insights | Actions | |
|---|---|---|
| • Analysis by HOD reveals 2 daily spikes in number of transactions<br>• Early mornings and late evenings identified as off-peak hours | • Timed promotions<br>• Resource optimization | All customers |
| • Segment 1 stores show a spike in the morning<br>• 75% of stores in segment 1 have one or more office situated nearby | • Free Wi-fi<br>• Quick service<br>• Take-away counter | Office workers |
| • Stores in segment 2 show a spike in the evening<br>• 68% of stores in segment 2 are situated closed to a college | • Discounts<br>• Promotions<br>• Cheaper menu options | College goers |

# HOW DO BUSINESSES USE ANALYTICS

**1 MM transactions analyzed**

Coffee
Cafe

63% had coffee

32% had sandwiches

24% had coffee + sandwiches

# HOW DO BUSINESSES USE ANALYTICS

## Product Analysis

**Coffee Cafe**

### Segment A

*Outlets within the city*

81% had coffee

22% had sandwiches

14% had coffee + sandwiches

### Segment B

*Outlets on highway*

55% had coffee

68% had sandwiches

48% had coffee + sandwiches

# HOW DO BUSINESSES USE ANALYTICS

## Actionable Insights

**Insights**

- Segment A store sales are primarily driven by coffee
- Sandwich sales are lower
- Pre-dominance of single item sales

**Actions**

- More variety in the coffee menu
- Take-away counters
- Promotion of cookies as add-ons to coffee

---

- Segment B store sales more focused on sandwiches
- Coffee figures in 55% of the orders
- Most people buying coffee also buy sandwiches

- Sit-down menus in segment B stores
- Comfortable seating (Sofas)

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# JET AIRWAYS AND CITIBANK

## Customizing marketing strategy

*Co-branded cards to leverage synergies*
*No joining fee, annual fee, add-on fee or renewal fee*
*World-wide acceptance*
*2 JP Miles for every Rs.100 spent*
*Additional features like extra baggage allowance,*
*free upgrade vouchers etc.*
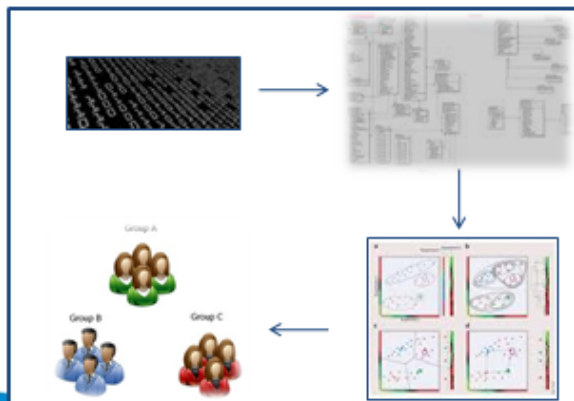
**Marketing Analytics**

a. Create differentiated customer segments
b. Calculate profitability by segment
c. Create customized marketing strategies
    a. Increase focus on most profitable segments
    b. Increase profitability of low value segments

# AMAZON.COM

## Improving customer experience

### Frequently Bought Together

**Price For All Three: $72.51**

[Add all three to Cart] [Add all three to Wish List]

Show availability and shipping details

amazon.com
and you're done.™

☑ **This item:** Competing on Analytics: The New Science of Winning by Thomas H. Davenport  Hardcover  $19.77

☑ Analytics at Work: Smarter Decisions, Better Results by Thomas H. Davenport  Hardcover  $19.77

☑ How to Measure Anything: Finding the Value of Intangibles in Business by Douglas W. Hubbard  Hardcover  $32.97

### Customers Who Bought This Item Also Bought

| Analytics at Work: Smarter Decisions, Bett... by Thomas H. Davenport | The Lords of Strategy: The Secret Intellectual... by Walter Kiechel | How to Measure Anything: Finding the Value... by Douglas W. Hubbard | Seizing the White Space: Business Model Innovatio... by A. G. Lafley | Data Driven: Profiting from Your Most Importa... by Thomas C. Redman | Super Crunchers: Why Thinking-By-Numbers is the New... by Ian Ayres |
|---|---|---|---|---|---|
| ★★★★☆ (15) | ★★★★☆ (19) | ★★★★★ (60) | ★★★★☆ (17) | ★★★★★ (27) | ★★★★☆ (11) |
| $19.77 | $17.79 | $32.97 | $19.77 | $19.77 | $10.88 |

# CAPITAL ONE

## Risk analytics

### Revolutionaries of the credit card industry

*Capital One revolutionized the credit card industry in the early 90s with the idea that customer information is a credit card issuer's most valuable asset.*

*Today it is a Fortune 200 company with over $15BN in revenues and assets over $200BN*
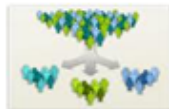
### Risk analytics

a. First credit card company to create a truly analytical approach to marketing
b. Identified most profitable customers through data analysis
c. Identified and targeted sub-segments of low risk populations within a large mass of population generally classified as 'high risk'

# VERTEX

## Healthcare Analytics

**Leveraging analytics in research**
*"What you need in business is more information than the other guy. Not more smarts. Not more intuition. Just more information."*
*Today it is a $250MM plus company with a healthy growth rate.*

### R&D analytics

a. Focused on analyses that attempt to maximize likelihood of a compound's success

b. Used analytics to design more informative and effective clinical trial reducing trial costs

# SPORTS CLUBS

## Sports analytics

### Analytics in professional sports

*AC Milan – 7 times European champions; 17 times Serie A winners, one of the greatest football clubs in the world*

*Bolton Wanderers – a fast rising English club, part of the EPL*

### Sports analytics

a. Use predictive models to prevent player injuries
b. Use analytics to evaluate player performance and team strategies
c. Identify most valuable supporters and offer them benefits to help build loyalty

# WHEN ANALYTICS DOES NOT WORK?
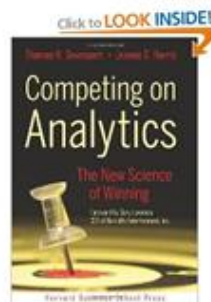


### Search inside the book:
- Impossible to test unless applied to a critical mass of books (120k in Amazon's case
- Expensive to develop

### Crash of the home mortgage market in the US:
- Loans disbursed to customers based on their risk profile under conditions of general economic prosperity
- When the economy took a downturn, the conditions were no longer valid

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# WHAT IS ANALYTICS

## Defining Analytics

Use of statistical and quantitative techniques on large volumes of data to discover meaningful patterns and rules.
Analytics helps businesses be proactive rather than retrospective.



Optimization
Predictive modeling
Forecasting
Statistical analysis
} Analytics

Alerts
Drill-downs
Ad hoc reports
Standard reports
} Access and reporting
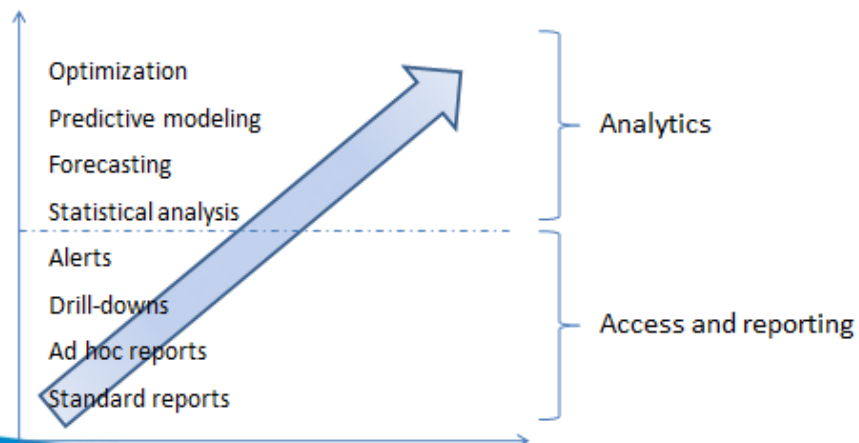
*Source: Adapted from 'Competing on Analytics' by Thomas Davenport*

# WHAT IS ANALYTICS

ANALYTICS IS....

Decision Trees
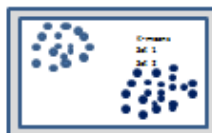
K-means clustering

Regression
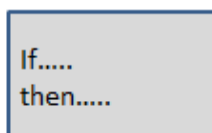
Association rules

If.....
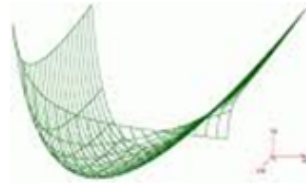then.....

Neural Networks
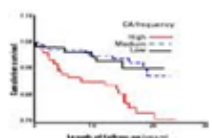
Survival analysis

# WHAT IS ANALYTICS

## ANALYTICS IS NOT.....

- Data entry

- Data warehousing

- ETL

- Software Agents

- Online Analytical Processing (OLAP)
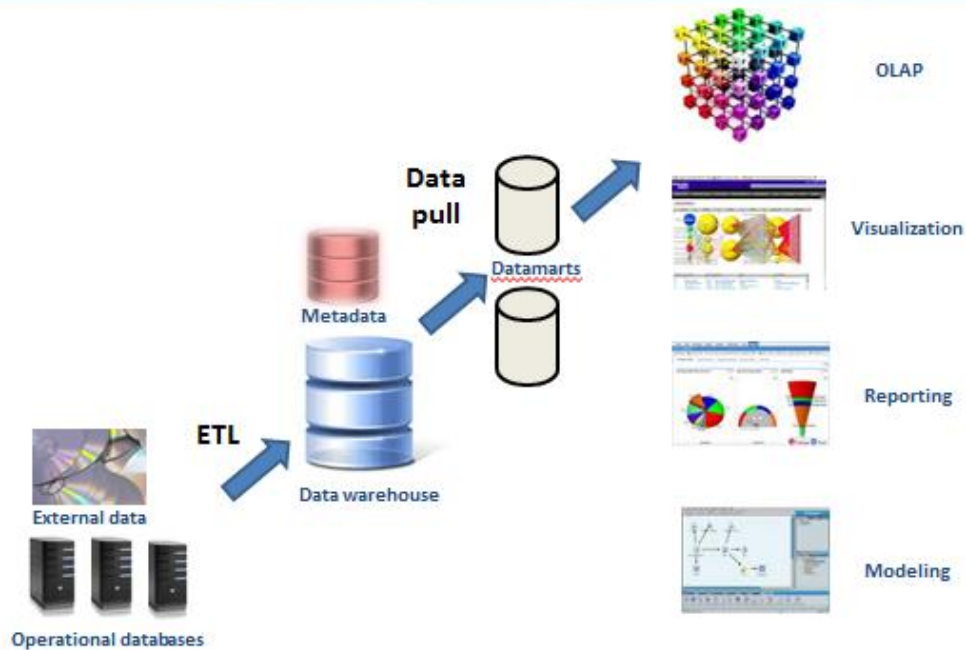
# ANALYTICS AND OLAP

- How many units of Coke were sold in Spencer's in Sep 2010?
- How many credit card customers used up more than 50% of their limit last month?

- Coke wants to understand its ROI from various promotional activities in order to optimize its marketing strategy
- Citibank wants to identify 100k customers who are most likely to respond to a new product offer

# ANALYTICS AND STATISTICS

- Analytics is an extension of statistics

- Increased computing power has led to development of new models based on brute force rather than an elegant theory

- Analysts are different from Statisticians

  - Focus on the problem definition in the business context

  - Actionable results

  - Ease of explaining results

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# WHAT CAN ANALYTICS DO?

- Classification

- Estimation

- Affinity grouping

- Clustering

- Summarization

# CLASSIFICATION

Classification consists of examining the features of a newly presented object and assigning it to one of a predefined set of classes.

## Examples:

- Classifying credit applications as low, medium and high risk

- Spotting fraudulent loan applications

- Assigning products into sub-categories, categories etc. within a product hierarchy

# ESTIMATION

Estimation is the calculated approximation of a continuous variable such as income, height or credit card balance which is usable even if input data may be incomplete or uncertain.

## Examples:

- Estimating a family's household income
- Estimating the probability of someone responding to a solicitation
- Estimating lifetime value of a customer
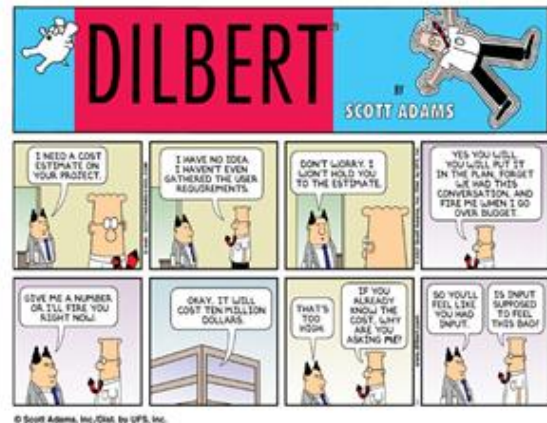
# AFFINITY GROUPING

Affinity grouping helps determine which things go together. Affinity grouping is often used to perform **market basket analysis**, in which retailers seek to understand the purchase behavior of customers.

### Example

▪ People who buy milk and cornflakes

also buy bananas

▪ "Beer and Diapers" – Urban legend

# CLUSTERING

Clustering is the task of segmenting a heterogeneous group of population into a number of more homogeneous sub-groups or clusters. Clustering is an example of undirected analytics and is often a prelude to some other form of modeling.

### Example

- Creating clusters based on the buying behavior of customers to form customer segments
- Creating clusters of patients with similar symptoms to identify different diseases
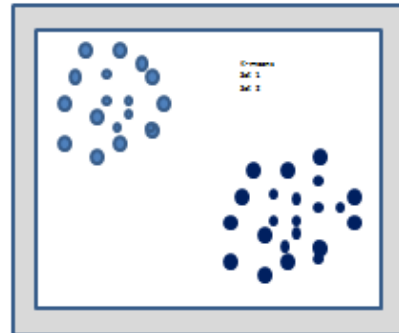
# SUMMARIZATION

Analytics can be done simply to describe what is going on in a complicated database in a way that improves our understanding of the events that trigger the data.

Profiling is an integral part of analytics and is the precursor for almost any kind of modeling.

## Example

- Profiling and exploration of transaction data to better understand the buying behavior of customers

- Profiling of loan applications to understand the risk profile of the underlying population

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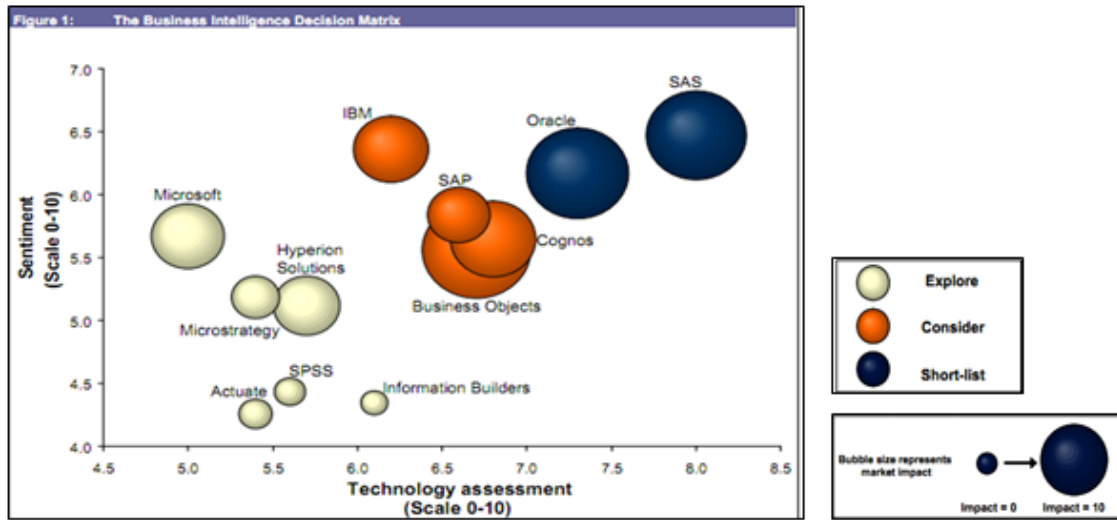- Career path in analytics
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# WIDELY USED ANALYTICS TOOLS

# COMPARISON OF SOFTWARE TOOLS
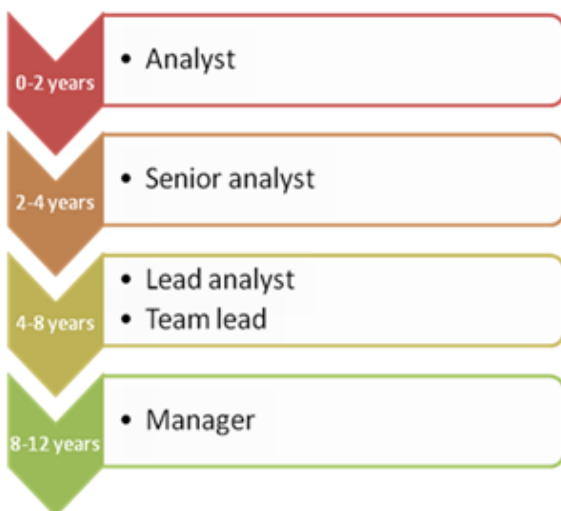


Source – Gartner report 2010

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# ANALYTICS COMPANIES

## Niche analytics companies

# ANALYTICS COMPANIES

## MNCs

# ANALYTICS COMPANIES

## Global analytics companies

McKinsey&Company

Deloitte.

FairIsaac.

ACNielsen

Dun & Bradstreet

Millward Brown

dunnhumby

Boston Analytics

KPMG

ims

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# CAREER PATH

| 0-2 years | • Analyst |
| 2-4 years | • Senior analyst |
| 4-8 years | • Lead analyst<br>• Team lead |
| 8-12 years | • Manager |

# POPULARITY OF ALGORITHMS

## Most popular algorithms in analytics

Covered in the Foundation course
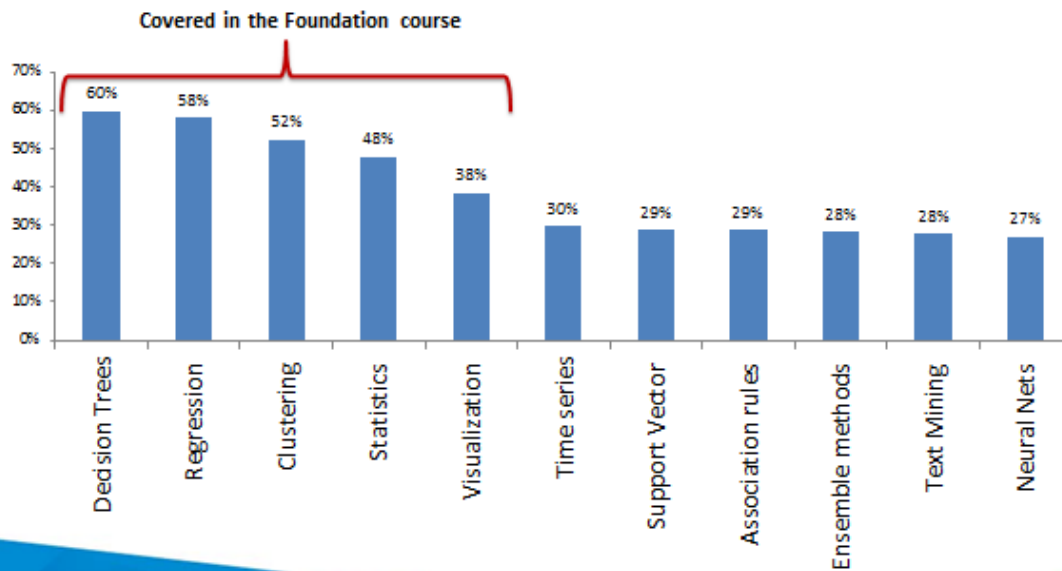


Source – Kd nuggets poll 2012

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# A GOOD ANALYST...

- Understands business issue
- Able to convert business issue into analytical problem
- Takes time to understand data
- Applies the right analytical technique
- Focuses on usability
- Focuses on understandability
- Articulates analytical results in business language
- Does not believe in 're-inventing the wheel'
- Leverages google

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THANK YOU

# CASE STUDY



## Risk-based pricing for Car Insurance in India

# WHAT IS RISK-BASED INSURANCE PRICING?

# POTENTIAL RISK DETERMINANTS

Location

Model