

# **Analytics for Professionals**



## **Analytics Overview**



# COMPANY VALUATION



**Company A**

**facebook**

**Company B**

**Gross  
Profits**

**\$3.5 billion**

**\$ 15 billion**

**Revenue**

**\$9.5 billion**

**\$22.16 billion**

**Valuation**

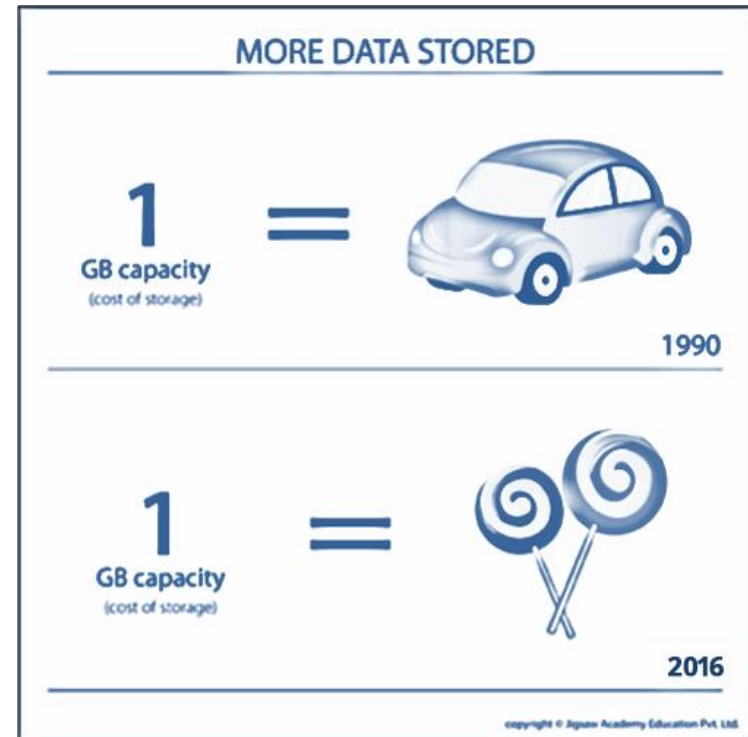
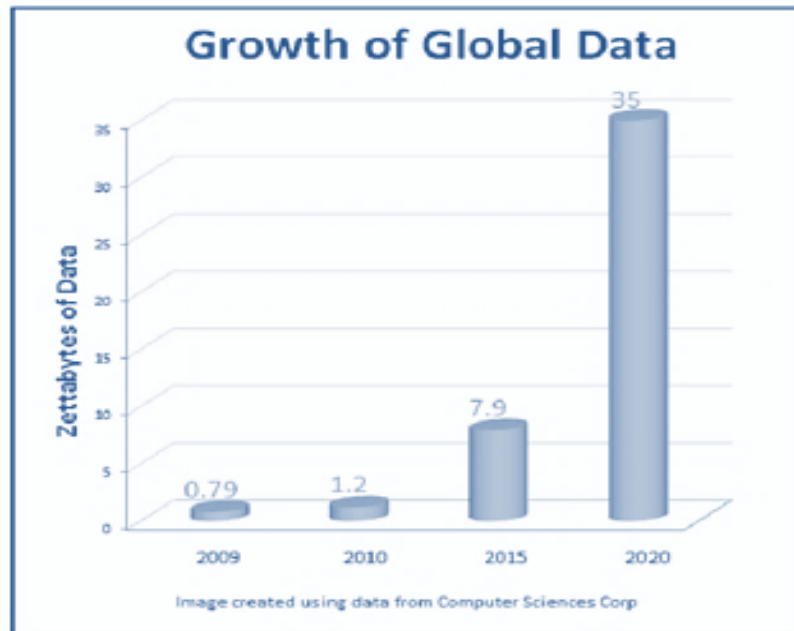
**\$2694 billion**

**\$192 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



**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



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

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



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**

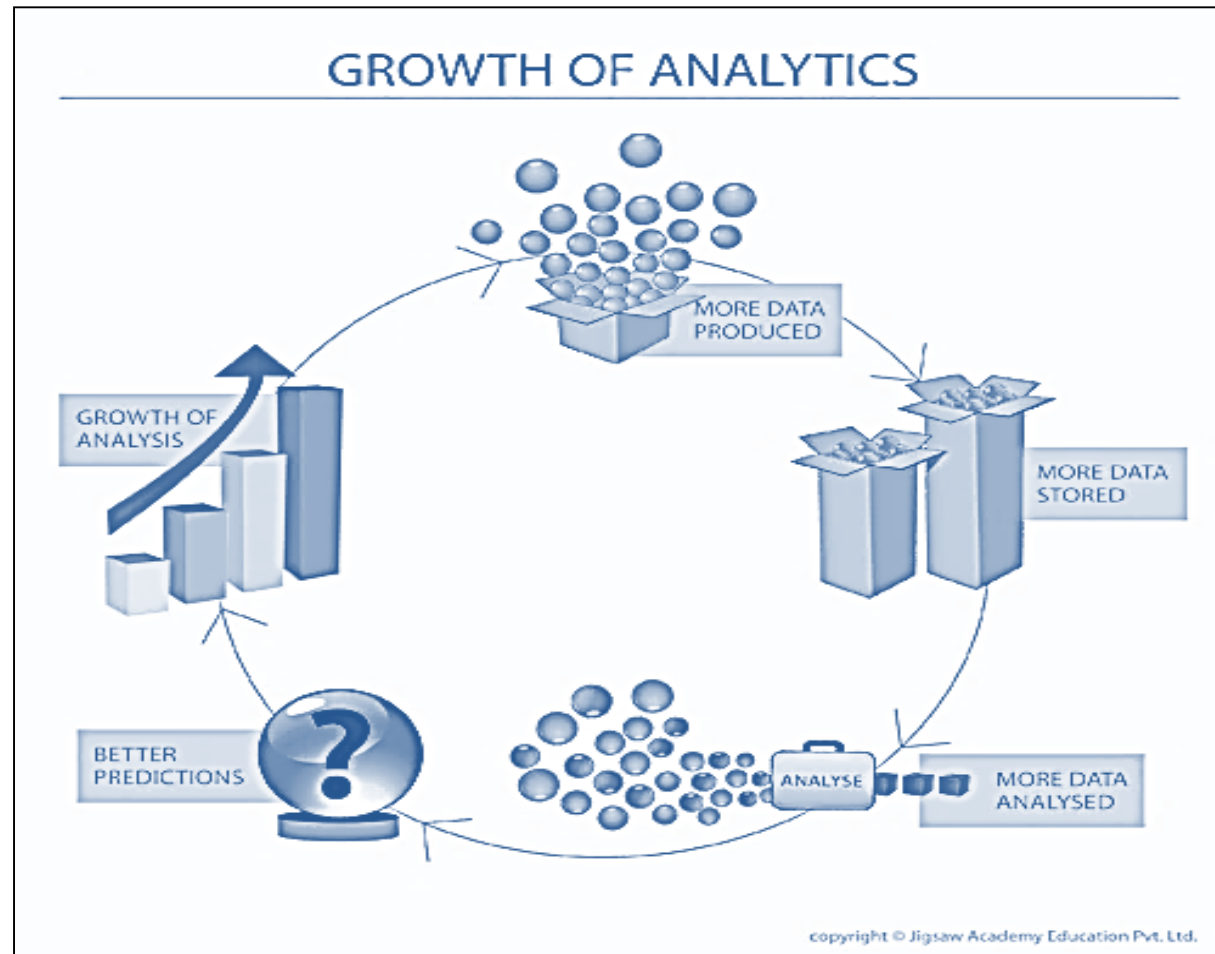
**1 Terabyte of space required  
for this data**





# 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 : BARTK  
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?

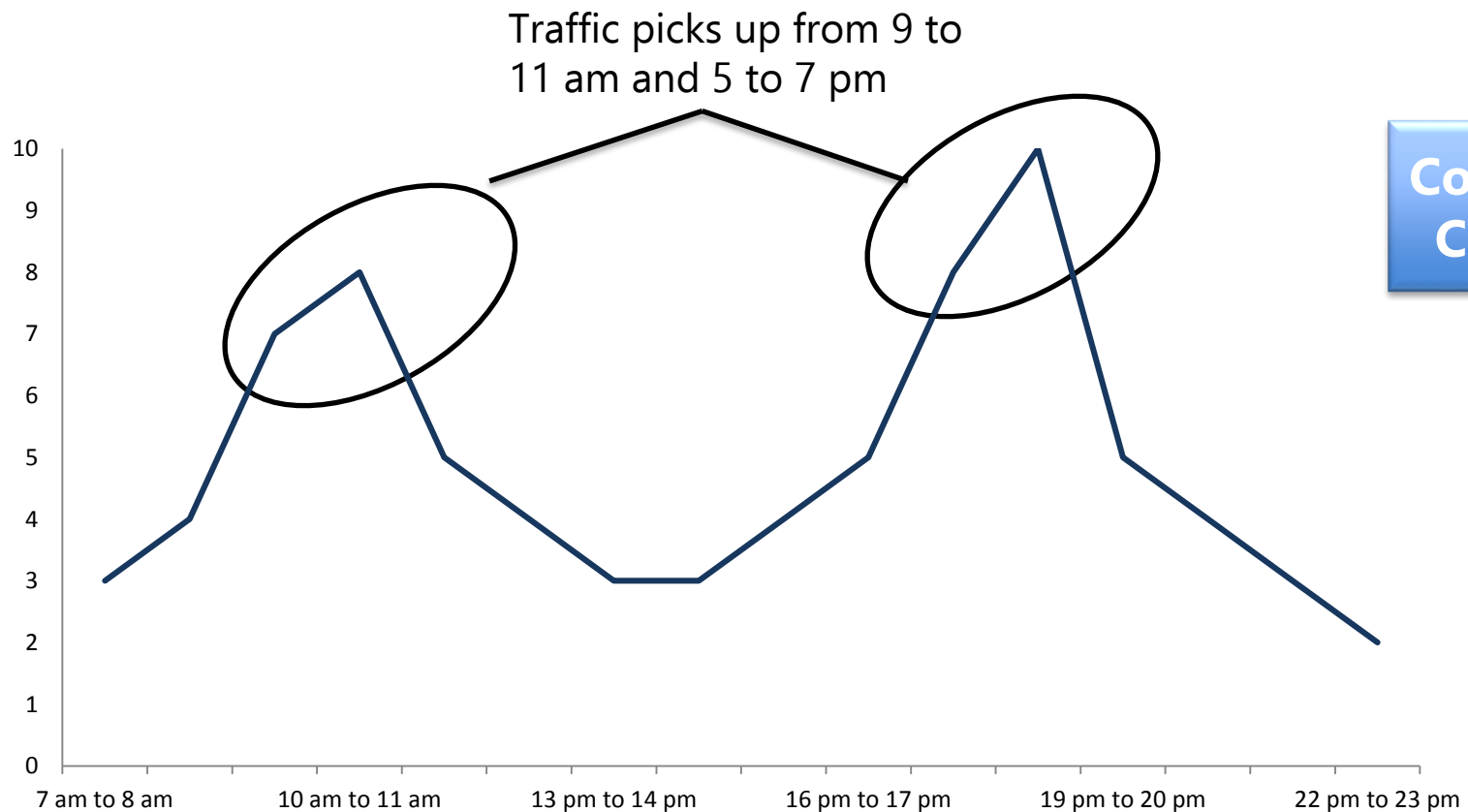
- What % of items are bought on discounts?
- What is the average discount?



# HOW DO BUSINESSES USE ANALYTICS

## Analysis by Hour of Day

### Number of transactions by hour of day



Coffee  
Cafe

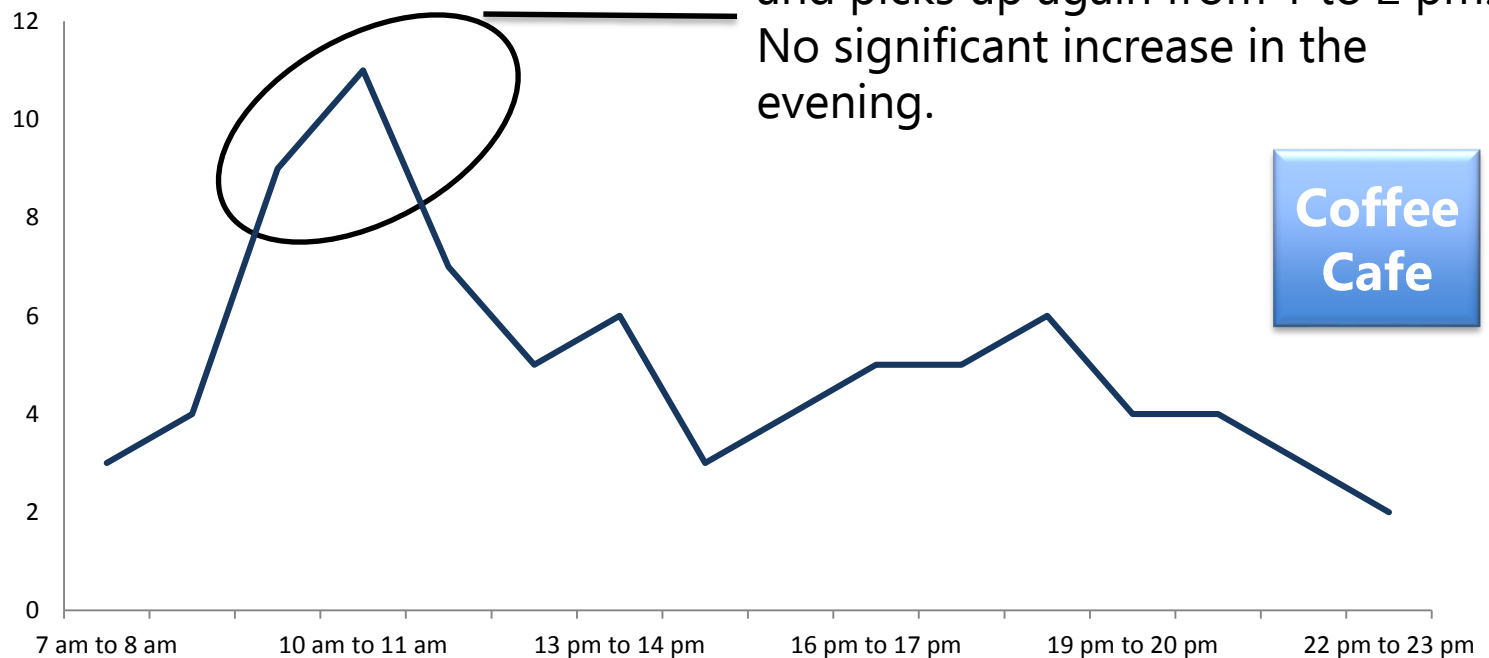


# HOW DO BUSINESSES USE ANALYTICS

## Analysis by Hour of Day

### Number of transactions by hour of day

#### Segment 1



Coffee  
Cafe

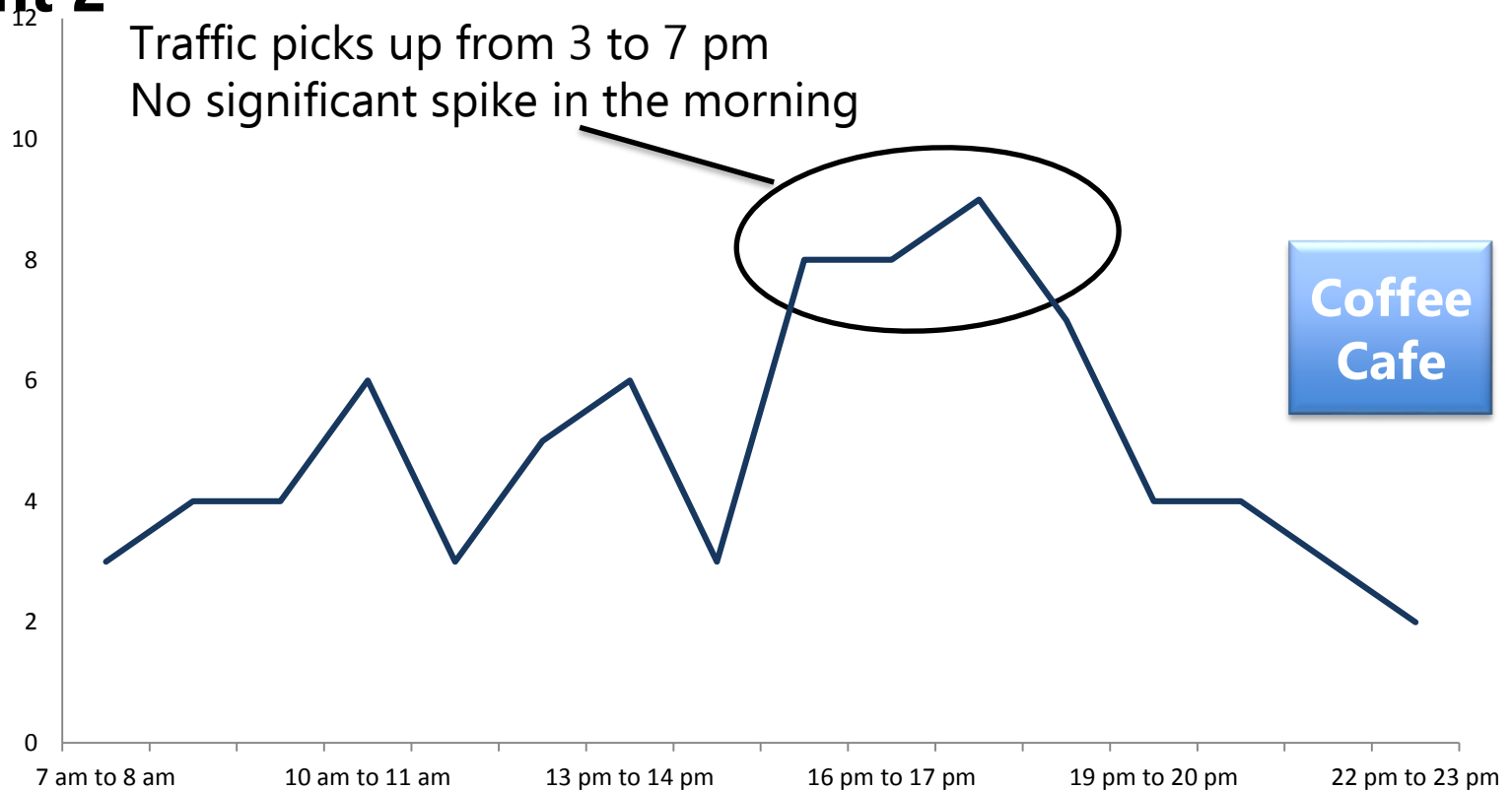


# HOW DO BUSINESSES USE ANALYTICS

## Analysis by Hour of Day

### Number of transactions by hour of day

#### Segment 2



# HOW DO BUSINESSES USE ANALYTICS

## Actionable Insights

### Insights

- Analysis by HOD reveals 2 daily spikes in number of transactions
  - Early mornings and late evenings identified as off-peak hours
- 
- Segment 1 stores show a spike in the morning
  - 75% of stores in segment 1 have one or more office situated nearby
- 
- Stores in segment 2 show a spike in the evening
  - 68% of stores in segment 2 are situated closed to a college

### Actions

- Timed promotions
  - Resource optimization
- 
- Free Wi-fi
  - Quick service
  - Take-away counter
- 
- Discounts
  - Promotions
  - Cheaper menu options



All customers



Office workers



College goers



# HOW DO BUSINESSES USE ANALYTICS

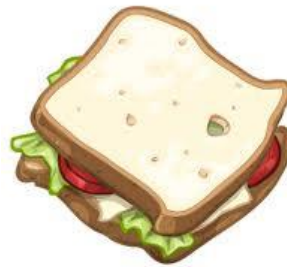
## Product Analysis

**1 MM transactions analyzed**

**Coffee  
Cafe**



**63% had  
coffee**



**32% had  
sandwiches**



**24% had coffee +  
sandwiches**



# HOW DO BUSINESSES USE ANALYTICS

## Product Analysis

### Segment A



81% had  
coffee

Outlets within the  
city



22% had  
sandwiches



14% had coffee +  
sandwiches



### Segment B



55% had coffee

Outlets on highway



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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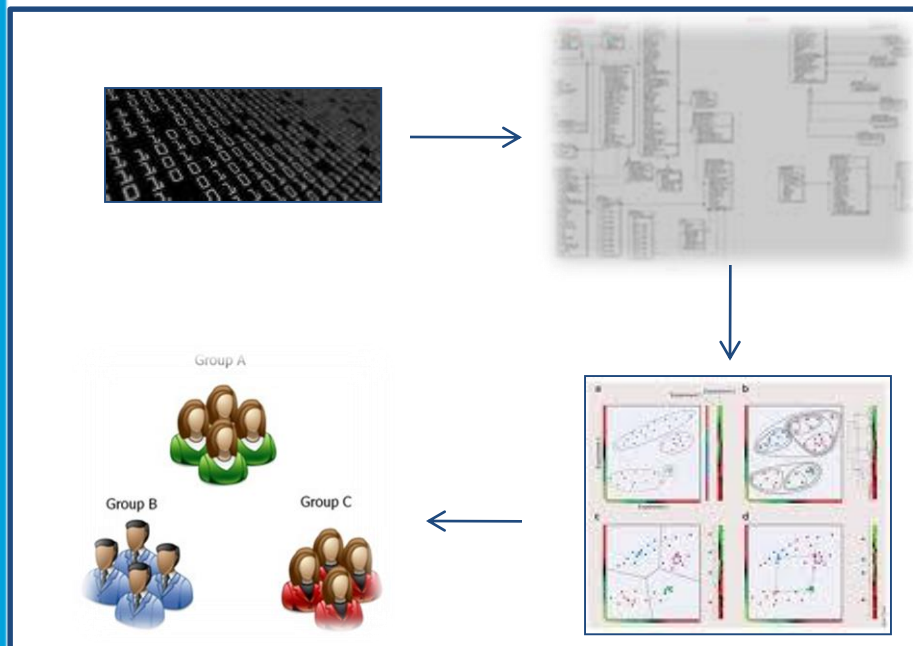
# JET AIRWAYS AND CITIBANK

## 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

- Create differentiated customer segments
- Calculate profitability by segment
- Create customized marketing strategies
- Increase focus on most profitable segments
- 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, Better Results by Thomas H. Davenport  
★★★★☆ (15)  
\$19.77



The Lords of Strategy: The Secret Intellectual Property by Walter Kiechel  
★★★★☆ (19)  
\$17.79



How to Measure Anything: Finding the Value of Intangibles in Business by Douglas W. Hubbard  
★★★★☆ (60)  
\$32.97



Seizing the White Space: Business Model Innovation by A. G. Lafley  
★★★★★ (17)  
\$19.77



Data Driven: Profiting from Your Most Important Data by Thomas C. Redman  
★★★★★ (27)  
\$19.77



Super Crunchers: Why Thinking-By-Numbers is the New Normal by Ian Ayres  
★★★★☆ (11)  
\$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

- First credit card company to create a truly analytical approach to marketing
- Identified most profitable customers through data analysis
- 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**

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



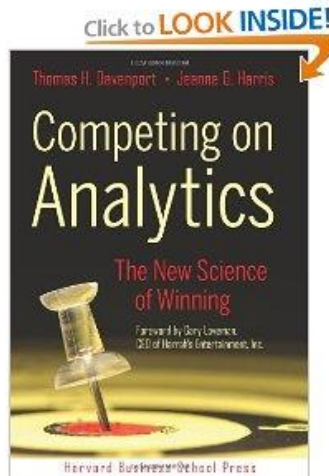
### **Sports analytics**

- Use predictive models to prevent player injuries
- Use analytics to evaluate player performance and team strategies
- 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



# AGENDA

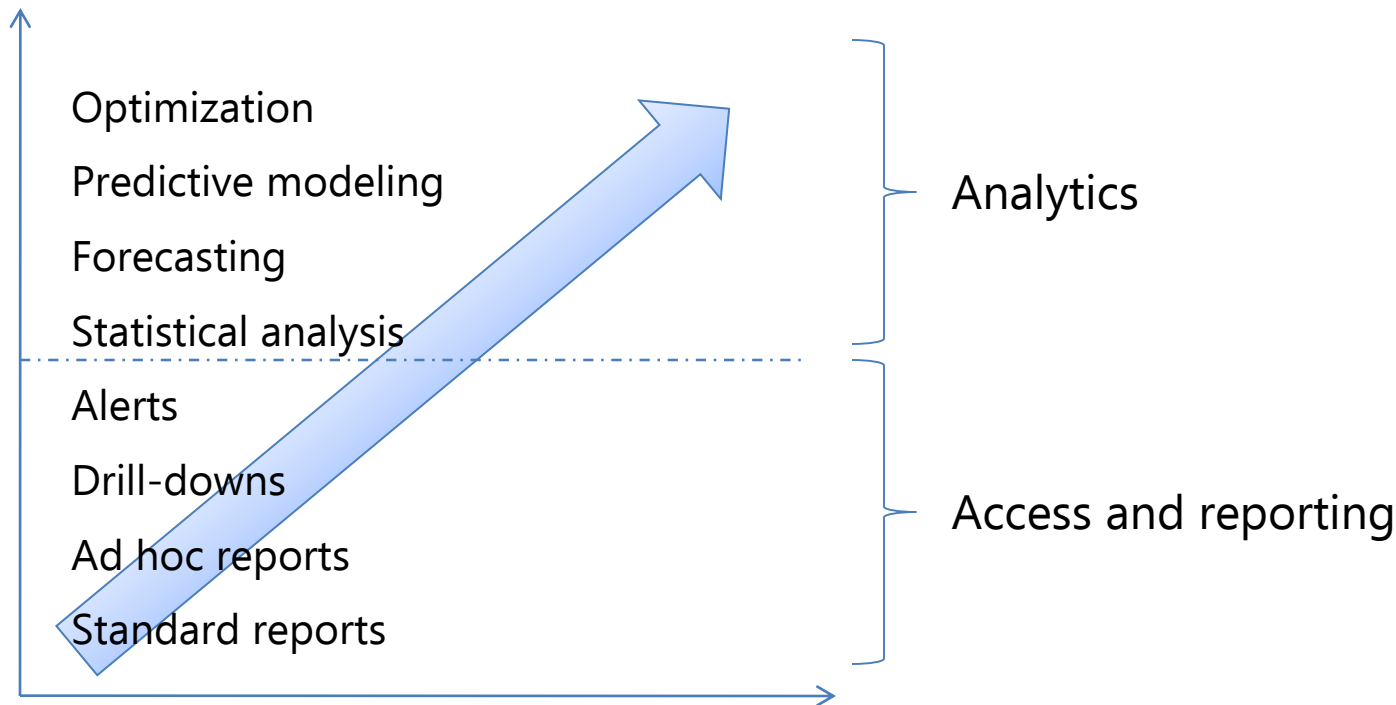
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# WHAT IS ANALYTICS

## 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

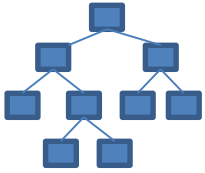


Source: Adapted from 'Competing on Analytics' by Thomas Davenport

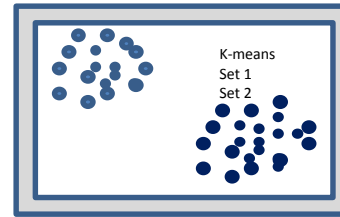


# WHAT IS ANALYTICS

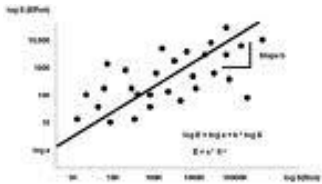
## ANALYTICS IS



Decision Trees



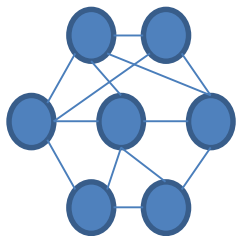
K-means clustering



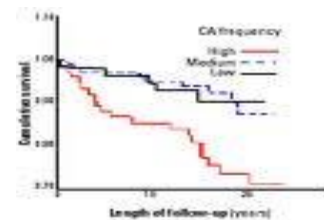
Regression

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

Association rules



Neural Networks



Survival analysis

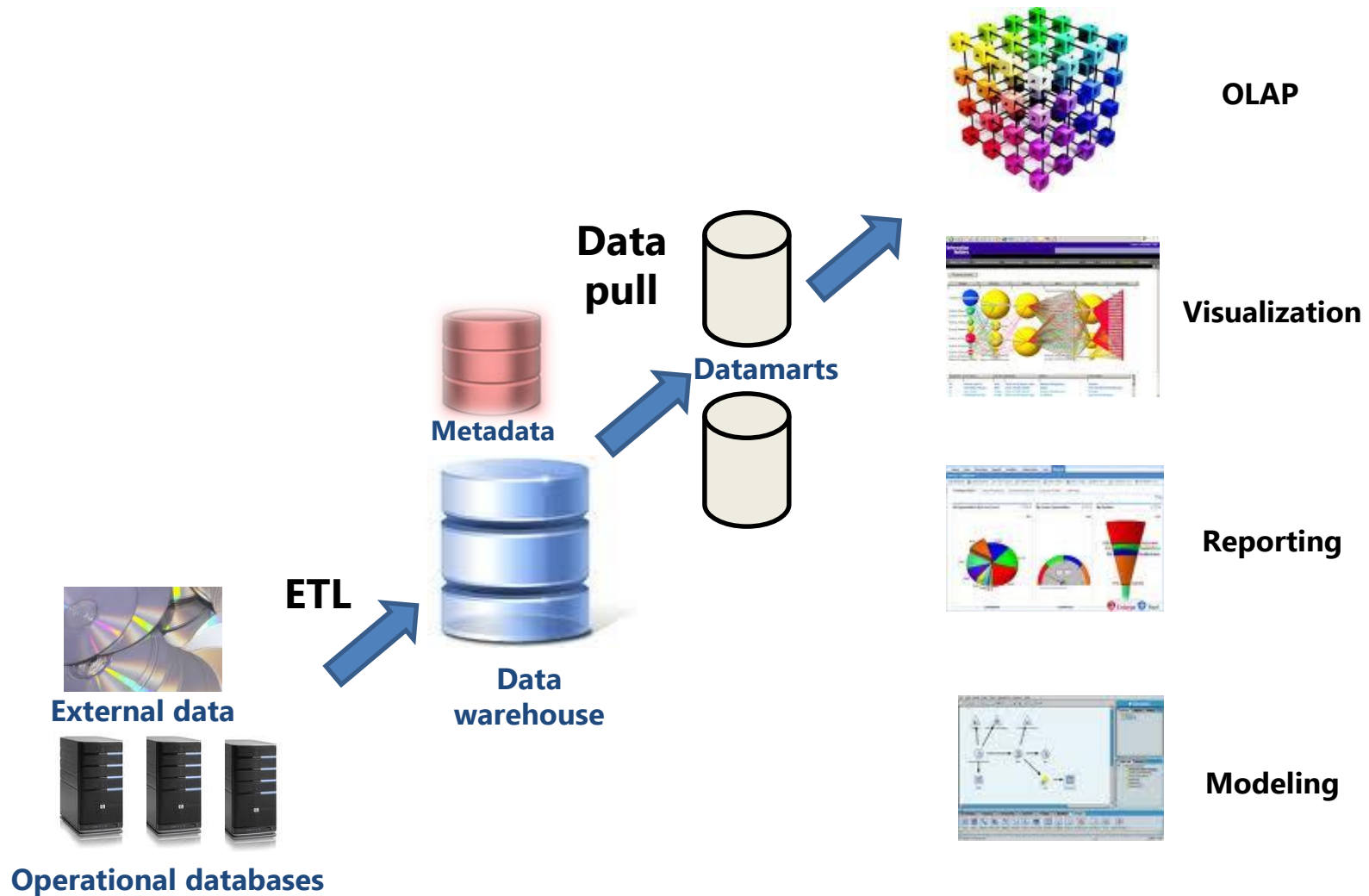


# WHAT IS ANALYTICS

## ANALYTICS IS NOT

- Data entry
- Data warehousing
- ETL
- Software Agents
- Online Analytical Processing (OLAP)

# ANALYTICS AND DATA WAREHOUSING



# 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 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

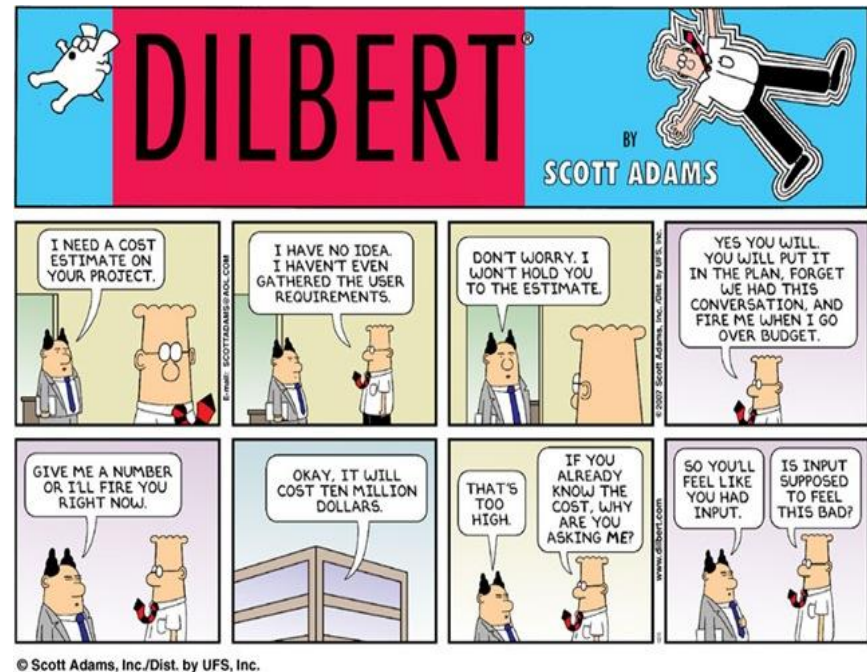


# ESTIMATION

**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



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# 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

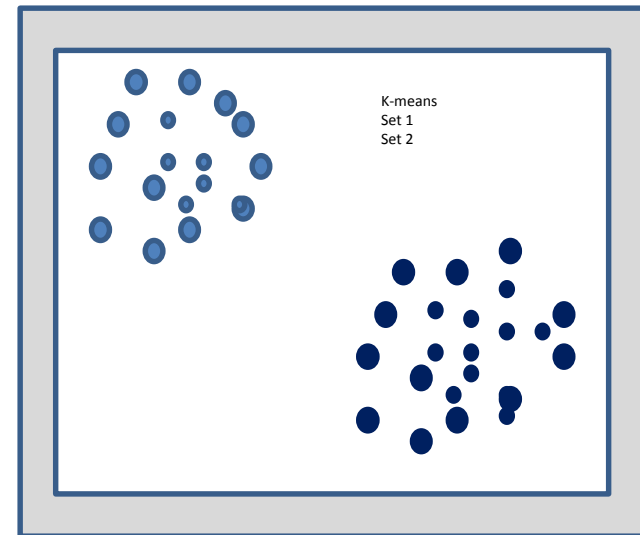


# CLUSTERING

**Clustering** is the task of segmenting a heterogeneous group of population into a number of more homogeneous sub-groups or clusters. It 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 that improves our understanding of the events triggering 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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# WIDELY USED ANALYTICS TOOLS



Logos belong to respective companies

# COMPARISON OF SOFTWARE TOOLS



Source – Gartner report 2016

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# ANALYTICS COMPANIES

## Niche Analytics Companies



Logos belong to respective companies

# ANALYTICS COMPANIES

## MNCs



Bank of America



Logos belong to respective companies

# ANALYTICS COMPANIES

## Global Analytics Companies

McKinsey&Company

Deloitte.

  
*Fair Isaac.*

**KPMG**

 AC Nielsen

  
**Dun & Bradstreet**

 Millward Brown

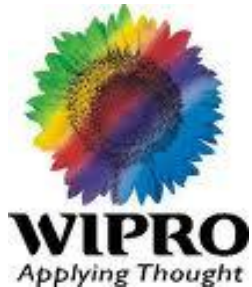
dunnhumby

**Boston**  
Analytics

**ims**<sup>TM</sup>

# ANALYTICS COMPANIES

## Indian IT Giants





# ANALYTICS COMPANIES

## Indian market leaders



भारतीय स्टेट बैंक



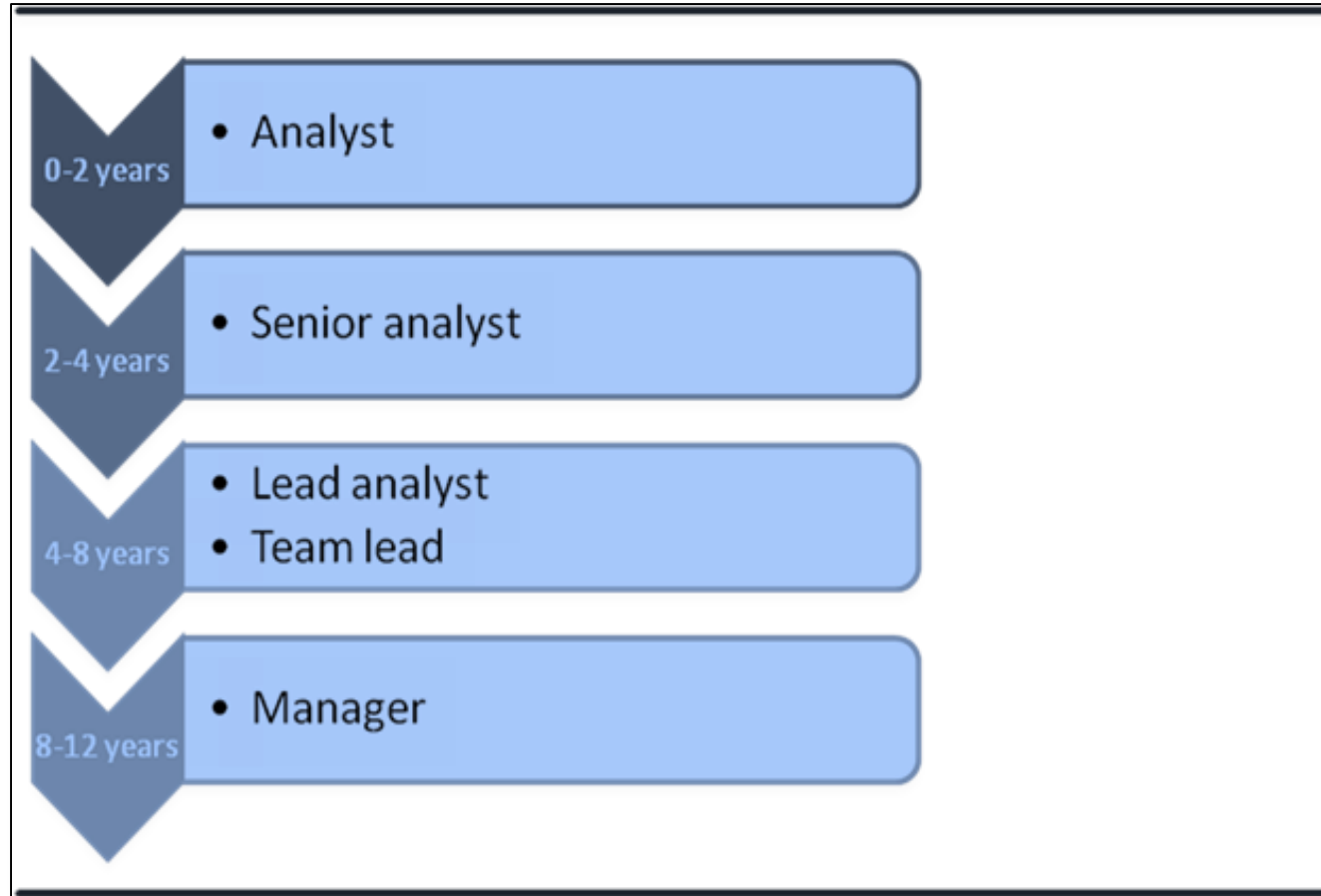
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# CAREER PATH



# GLOBAL SALARIES IN ANALYTICS

Region	Employer Type	Salary or Income
<b>US/Canada</b> (154)	<b>Company/Self</b>	\$128K 
	Academic/Gov/Non-profit	\$86K 
<b>Europe</b> (43)	<b>Company/Self</b>	\$82K 
	Academic/Gov/Non-profit	\$35K 
<b>Asia</b> (14)	<b>Company/Self</b>	\$59K 
	Academic/Gov/Non-profit	\$40K 
<b>Australia/NZ</b> (9)	<b>Company/Self</b>	\$90K 
	Academic/Gov/Non-profit	\$105K 
<b>Other</b> (6)	<b>Company/Self</b>	\$75K 
	Academic/Gov/Non-profit	\$88K 

Source – Kd nuggets poll 2014

# ANALYTICS SALARIES IN INDIA

**2004**

**INR 2-3 LPA**

**Starting  
salaries**

**2016**

**INR 6-10 LPA**

---

**Analyst**

**INR 6-10 LPA**

**Salaries at  
various levels**

**Sr. Analyst**

**INR 10-14 LPA**

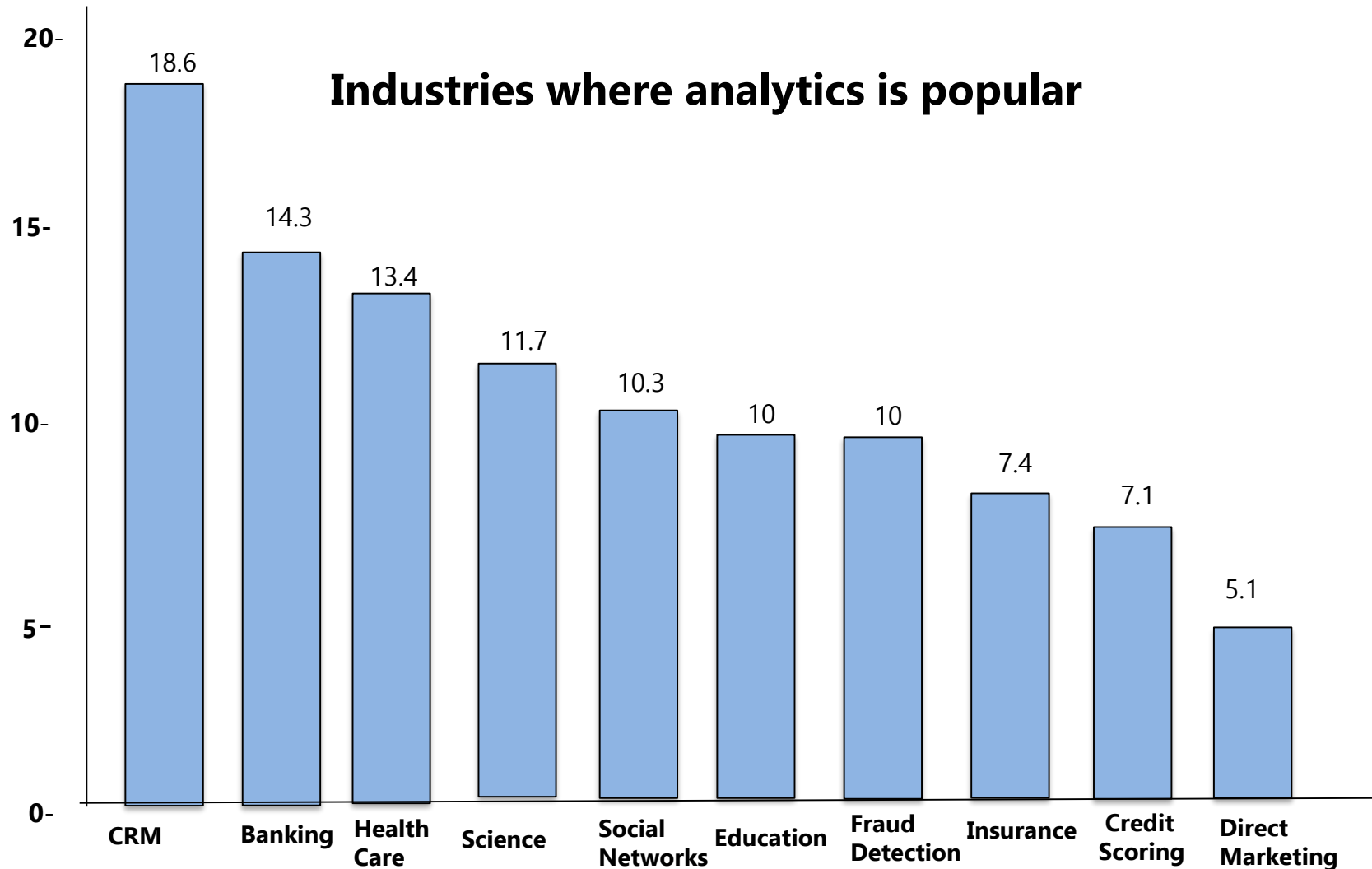
**Lead Analyst**

**INR 16-20 LPA**

**Manager**

**INR 30+ LPA**

# ANALYTICS USAGE BY INDUSTRY



Source – Kd nuggets poll 2015

# Popularity of Algorithms

1 Linear Regression

2 Logistic Regression

3 k - means

4 SVMs

5 Random Forests

6 Matrix Factorization/SVD

7 Gradient Boosted Decision Trees/Machines

8 Naïve Bayes

9 Artificial Neural Networks

10 Bayesian Networks

**Source – Kd nuggets poll 2015**

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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





**JIGSAW ACADEMY**

THE ONLINE SCHOOL OF ANALYTICS