Introduction to Analytics

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About: Introduction to the Analytics, the type of analytics, the key data used and overview

2012

Introduction to Analytics

LAB NOTEBOOK

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Table of Contents

Lesson 1: Introduction to Analytics 2
Overview 2
What is Analytics? (Max 3 mins) 2
Why do We Use Analytics? (Max 4 mins) 2
Few Real-Life Applications of Analytics: 3
Analytics in Decision Making (Max 4 mins) 3
Type of Analytics (Max 4 mins) 4
Tools Used 4
Predictive Analytics (Max 4 mins) 5
Organizations using Predictive Analysis (Max 2 mins) 5
Predictive Analysis Outline of process (Max 4 mins) 5
Typical House of Analytics Excellence 6
What has changed to push analytics (Max 3 mins) 6
Challenges in setting up Analytics 7
Analytics in Different Industries: (Max 7 mins) 7
- Consumer Product & Service Industry 7
- Insurance & Risk assessment 7
- Manufacturing 7
- Health Care 7
- IT 7
- Telecom 8
- Supply Chain 8
- Digital Analytics 8

Road Map of Implementing Analytics (Max 10 Mins) 8
Type of Analytics Tools Used (Max 16 mins) 9
References: 11

Lesson 1: Introduction to Analytics

Overview

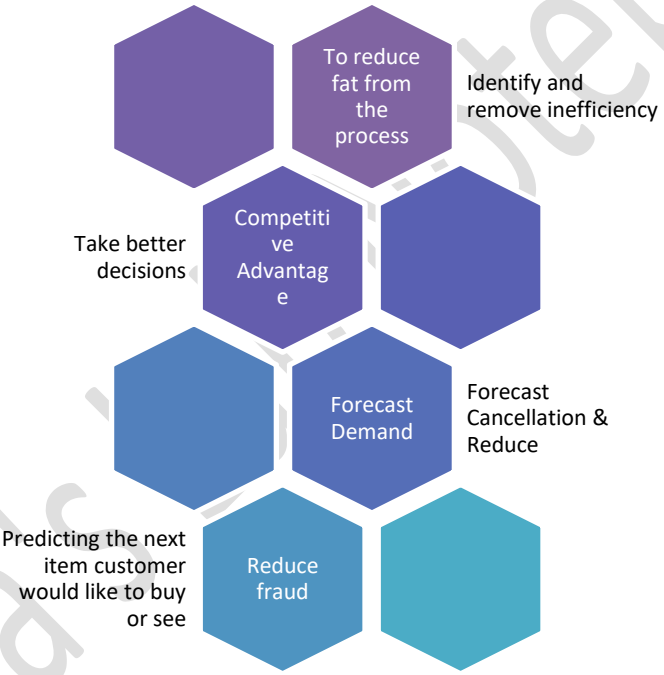
What is Analytics? (Max 3 mins)

Definition:

As per Wikipedia - Analytics is the discovery, interpretation, and communication of meaningful patterns in data. Especially valuable in areas rich with recorded information, analytics relies on the simultaneous application of statistics, computer programming and operations research to quantify performance.

In short, analytics is nothing more than understanding the requirement for which we are collecting data, collection of data, understanding the trend, the explicit and implicit patterns or observation and interpretation of those observation into a meaningful actionable, SMART recommendations.

Why do We Use Analytics? (Max 4 mins)



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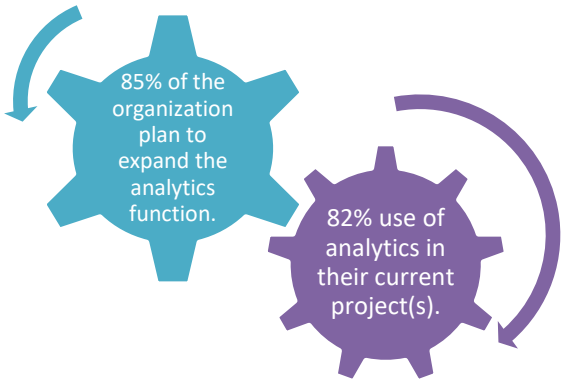
[1]The survey revealed the following important aspects on "data-driven decision making":



[1] Handout Week one - QM901x Team from EdX **IIMBx:** QM901x Predictive Analytics

Few Real-Life Applications of Analytics:

- Marketing Analytics – To predict the outcome of a campaign. Best example that I can think about is Google Analytics
- People Analytics – Used extensively by HR for the purpose of hiring, RnR etc
- Portfolio Analytics – Used by Financial institutes for decisions on where to invest
- Digital Analytics – Transforms the digital inputs from various source to meaningful data, like SEO
- Security Analytics – IT wings where effort is to understand and minimize events that causes breach
- Software Analytics – It is all about how a software is produced and used

Analytics in Decision Making (Max 4 mins)

Medical Application – From Number of beds in each department to the popularity of doctor and getting his patience when he is hired

Casinos – As they say the house never loose. How do they manage it? Simple, it is a complex science involving customer profiling, right kind of advertisement for that customer and extensive probability

Channels to renew or not renew
Let's take a look at Vampire Diaries.

Season	First aired		Last aired		Rank
	Date	Viewers (millions)	Date	Viewers (millions)	
1	September 10, 2009	4.91[50]	May 13, 2010	3.47[51]	118
2	September 9, 2010	3.36[52]	May 12, 2011	2.86[53]	193
3	September 15, 2011	3.10[55]	May 10, 2012	2.53[56]	166
4	October 11, 2012	3.18[58]	May 16, 2013	2.24[59]	133
5	October 3, 2013	2.59[61]	May 15, 2014	1.61[62]	147
6	October 2, 2014	1.81[64]	May 14, 2015	1.44[3]	160
7	October 8, 2015	1.38[64]	May 13, 2016	1.04[66]	160

8	October 21, 2016	0.98[68]	March 10, 2017	1.15[69]	TBD

What do we see – the ranking was erratic. Could we base our judgement to renew on this basis only? Not quite! Let's look at the attrition of viewers between the seasons. Every season has seen attrition and the viewership is on steep decline. Started with around 5 million and the last season was about 1 million views only. You see when the viewership fell below 1.5 million the makers thought it was the time to wrap it up

Ancestry.com
They help in tracing your family story with a family tree. They make it easy.
Unlock the family story in your DNA. Imagine an American finds out that his DNA is 16% Asian, 12% Mexican, 10% African & 23% Brit. I would say, it would reduce racism!!!

Type of Analytics (Max 4 mins)

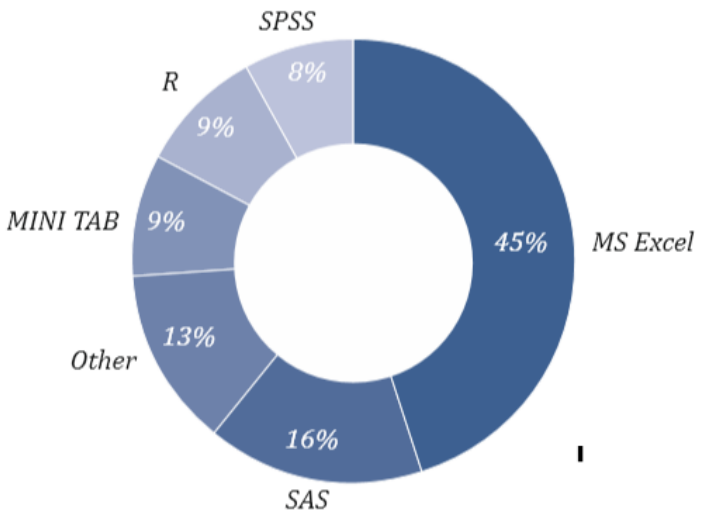
Descriptive: Provides data, offers low level of data synthesis and visualization. Find the gap, and helps to reduce inefficiency

Predictive: Used to Predict future event as indicated by trend. Help to be prepared and plan for the future even like excess demand of flight calls weeks before holiday.

Prescriptive: takes the prediction from predictive analysis and tries to fix the problem to fix the problem in future using decision making algorithm or optimization model. Provide optimal solutions, like the increased staffing from the normal

Tools Used

What tool(s) is predominantly used for decision making in your organisation?



Predictive Analytics (Max 4 mins)

Most commonly used predictive analytics are in:

- Consumer Product & Service **Demand Analysis** & **Customer Transaction Analysis**
  - Products or services that a consumer is interested in
  - Products or services that a consumer wants to buy
  - And how much should they produce that the demand and supply is met
    - Customer transactional data
    - Customer master data
- Risk assessment **Credit Scoring** -
  - Defaulter
  - Frauds
    - Loan originating system and credit scoring data
- Cancellation
  - If cancellation is within the limit
  - What should be the non-refundable amount% and timeline associated with it
    - Customer transaction data & Vendor Supply data

Organizations using Predictive Analysis (Max 2 mins)

Table 1: List of Predictive Analytics Applications

Organisation	Predictive Analytics Model
Polyphonic HMI	Predicts whether a song will be a hit using machine learning algorithms. Their product "Hit Song Science" uses mathematical and statistical techniques to predict the success of a song on a scale of 1 to 10. [9]
Okcupid	Predicts which on-line dating message is likely to get a response from the opposite sex (Siegel, 2013).
Amazon.com	Uses predictive analytics to recommend products to their customers. It is reported that 35% of Amazon's sales is achieved through their recommender system (Siegel, 2013).
Hewlett Packard (HP)	Developed a flight risk score for its employees to predict who is likely to leave the company (Siegel, 2013).
University of Maryland	Claimed that dreams can predict whether one's spouse will cheat. [10]
Flight Caster	Predicts flight delays 6 hours before the airline's alerts.
Netflix	Predicts which movie their customer is likely to watch next.
Capital One Bank	Predicts the most profitable customer.
Google	Predicted the spread of H1N1 flu using the query terms.
Farecast	Developed a model to predict airfare, whether it is likely to increase or decrease, and the amount of increase/decrease. [11]

Predictive Analysis Outline of process (Max 4 mins)

- Identify the problem area or Improvement area or the Goal
- Identification of data source, relevance, collection of data & removal of outliers
- Data preprocessing – Identifying the data items that cause abnormal reading, multicollinearity, removal or addition of data items or variables that would help in reaching goal
- Model Building – Goes with multiple model and selection of the best or optimized model.
- Plan the implementation

- Communicate to all stake holders

Typical House of Analytics Excellence

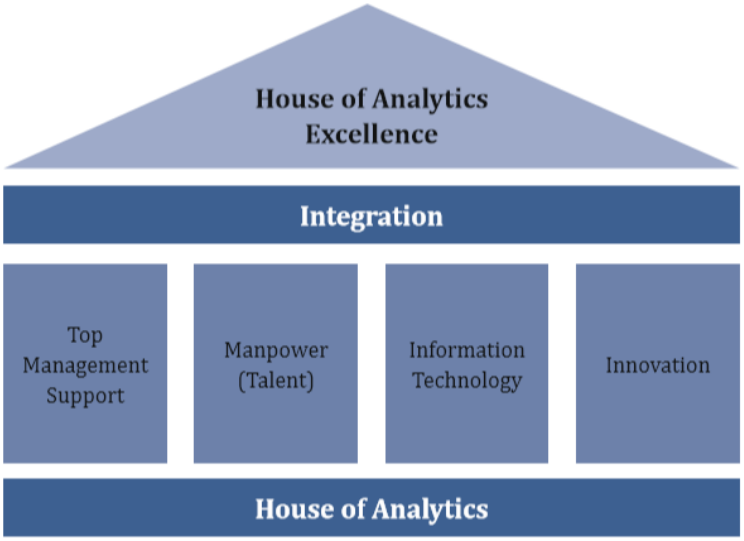
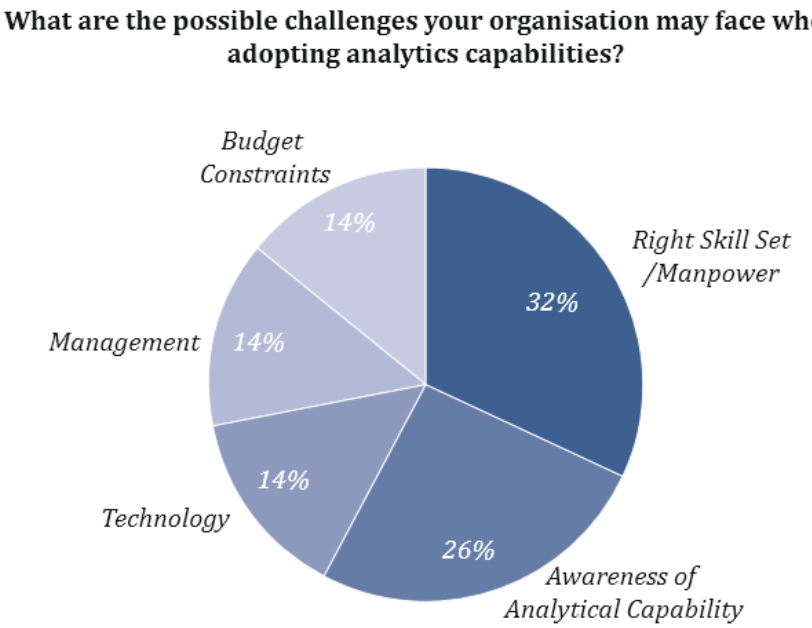


Figure 4: House of Analytics Excellence

What has changed to push analytics (Max 3 mins)

- Technology – Connected devices
  - Your printer can order ink if the ink level is low
- Internet – Social Media
  - Ideas travel fast
  - Crowd funding of ideas and plans
- Easy access to information
  - Earlier you need degrees in stats to know how R^2 and t-score and Z-score will affect your sample size, now access to information is easy and you can google or bing the interpretations
- Informal study session – online classes

Challenges in setting up Analytics



Analytics in Different Industries: (Max 7 mins)

- Consumer Product & Service Industry
  - **Demand Analysis** & **Customer Transaction Analysis**
    - Customer transactional data
    - Customer master data
- Insurance & Risk assessment
  - **Credit Scoring**
    - Loan originating system and credit scoring data
- Manufacturing
  - **Quality and Process Improvement**
    - Product defect data, customer complaints, breakdown data, production and sales data.
  - **Revenue and Cost Management**
    - Commodity price and Manufacturing data.
  - **Warranty Analytics**
    - Bill of material, warranty claims and after sales service data.
- Health Care
  - **Clinical Care**
    - Diagnostics test data, Hospital Information system, Doctors scheduling, Medical Transcripts
  - **Hospitality**
    - Patience details, Customer Relation ship Management
- IT
  - Business Intelligence
    - Enterprise Resource Planning & CRM integration for greater profitability

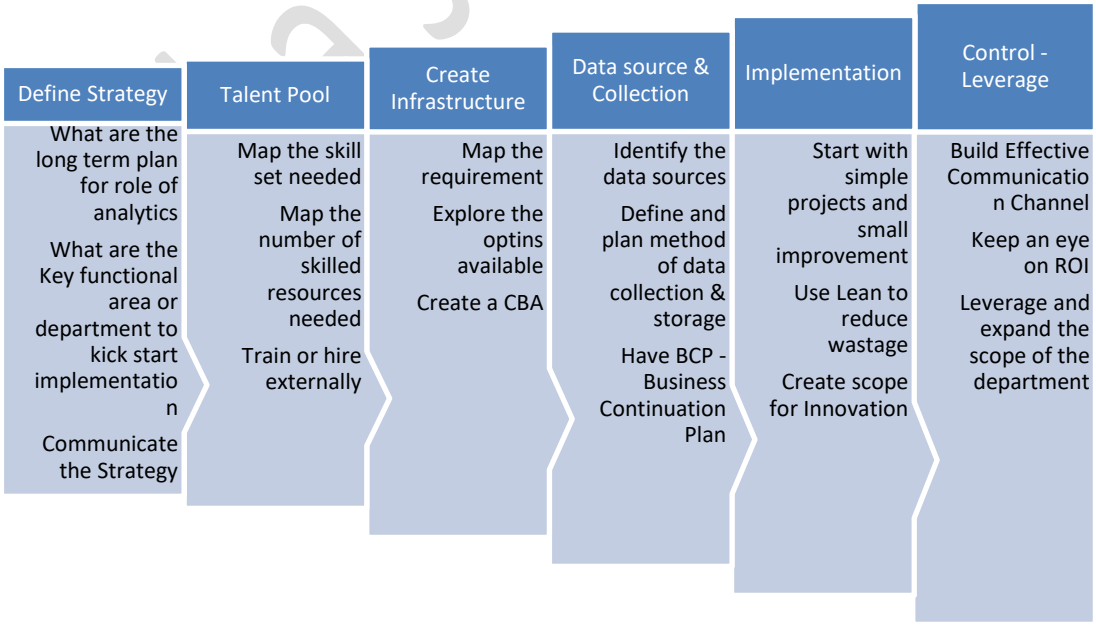
    - Software Development Cycle Time
        - Internal matrix of timeline, products, development stages data

- Telecom
    - Improve customer retention
    - Predicting right product/service
    - X-sell services & Increase average revenue per user (ARPU)
    - Improvement in Customer Experience

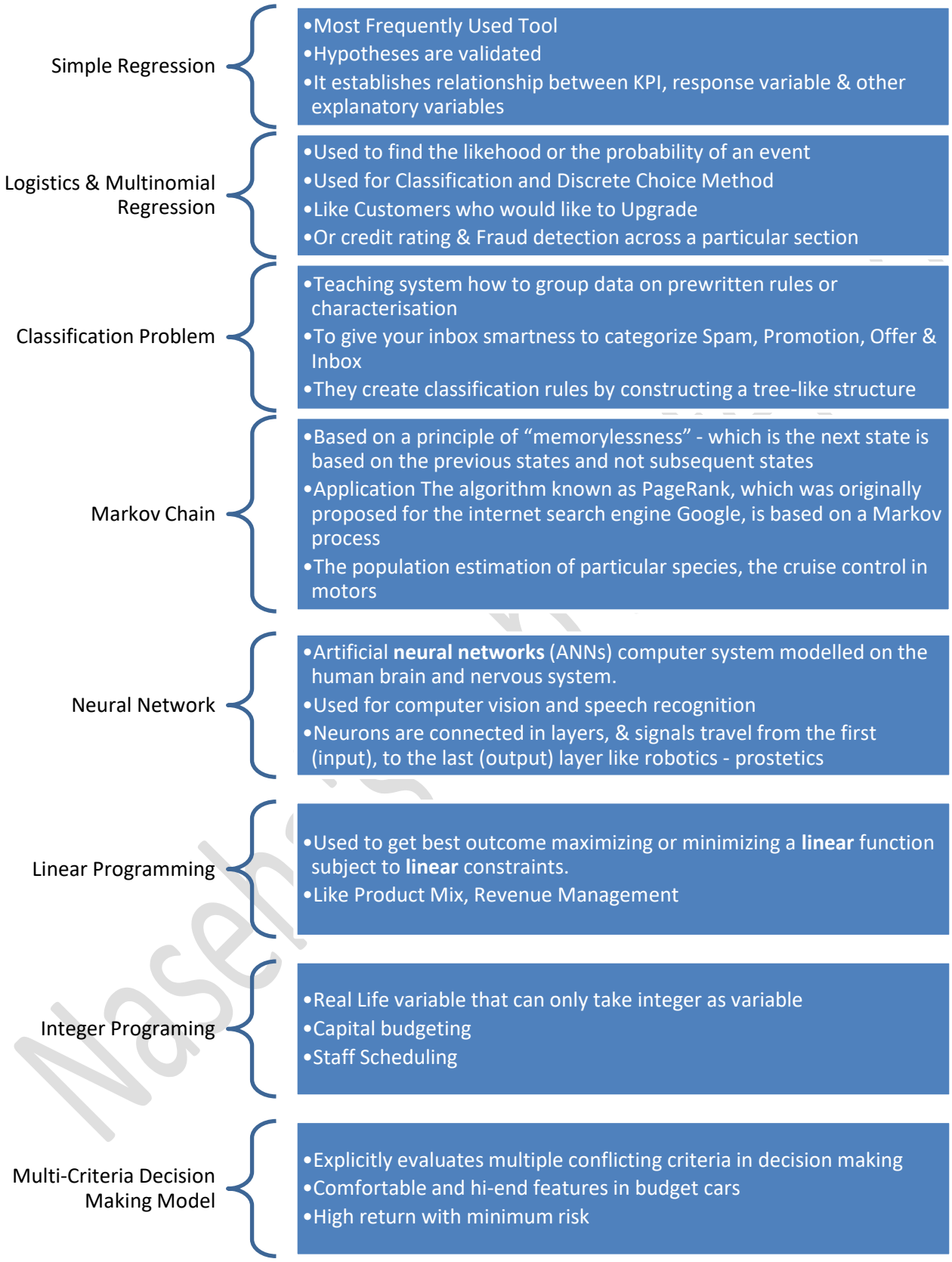
- Supply Chain
    - **Inventory Management**
        - Demand
        - Requirements planning, Procurement, Production of material
    - **Vendor Selection**
        - Vendor rating, efficiency etc from management database,
        - Production data
        - Sales data
    - **Distribution Management**
        - Production, Procurement, Warehousing and Sales data

- Digital Analytics
    - Digital and social media analytics
        - Analysis of qualitative and quantitative data from several digital equipment such as mobile handsets, sensors, Internet of things (IOT), social media sites such as Facebook, Twitter, YouTube etc.
    - Understand the customer behaviour
    - Increase Sales or Service
    - Lead generation
    - To increase traffic and repeat traffic in website
    - Branding

Road Map of Implementing Analytics (Max 10 Mins)



Type of Analytics Tools Used (Max 16 mins)



Combinatorial Optimization	•Picking up the most optimal solutions from list of feasible solutions •Vechicle Routing Program •Minimum Spanning Tree
Linear Programming (NLP)	•Optimization where problem defined by a constrains of equalities & inequalities, over a set of unknown real variables, where some of the constraints or the objective function are nonlinear. •Defence Program including trajectory optimization, •Optimal design of a structure for a satellite, or optimal automatic transmission for cars
Social Media Analytics Tools	•Collection of tools that conversts unstructured digital data like text, click, pictures into usable insights •Like heat map •Most clickable or likable of the profile pics

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