DATA ANALYTICS

Unit 1:Types of Data Analytics

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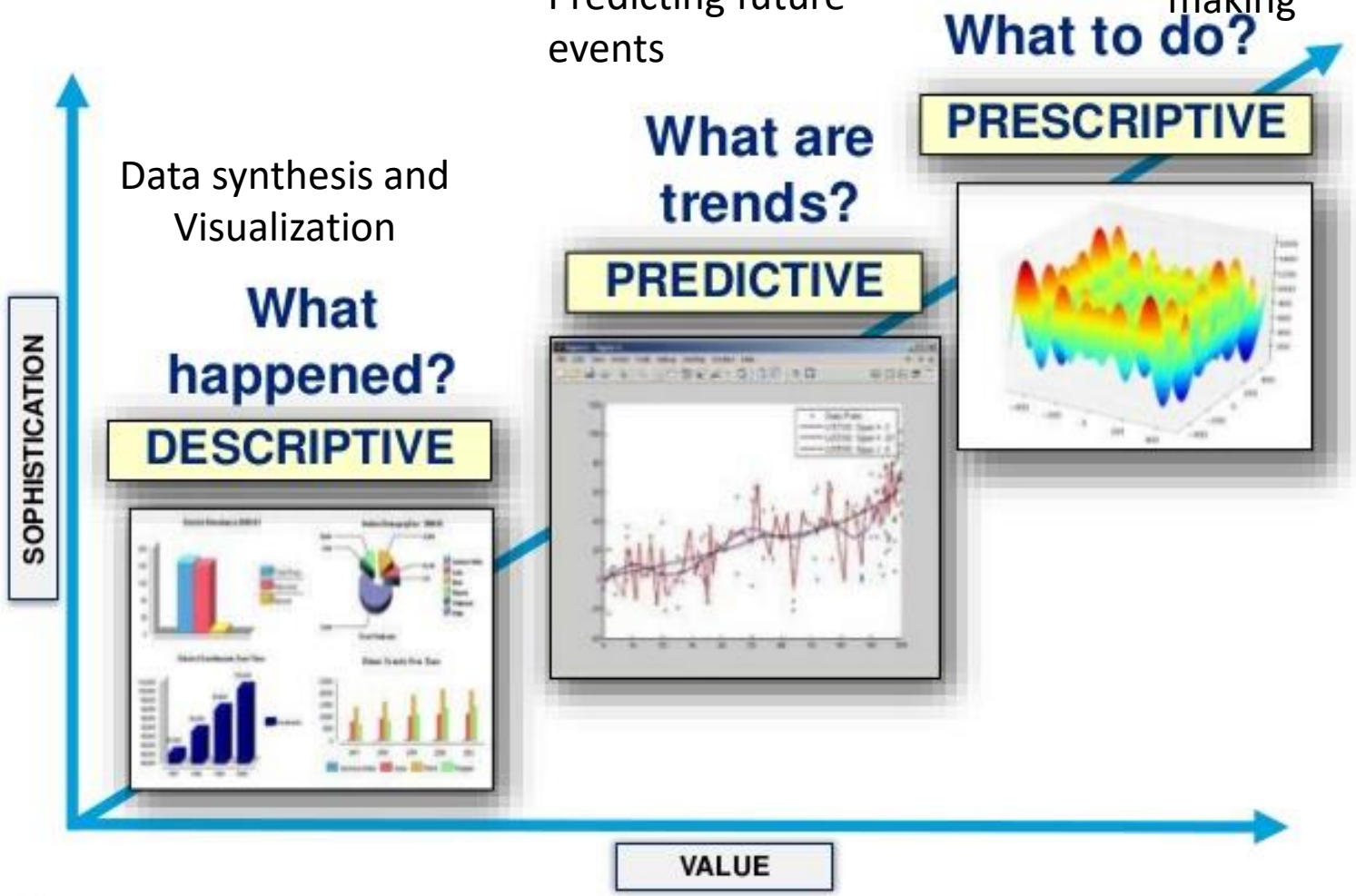
Components of Data Analytics

Optimization and decision making

Predicting future events

Data synthesis and Visualization



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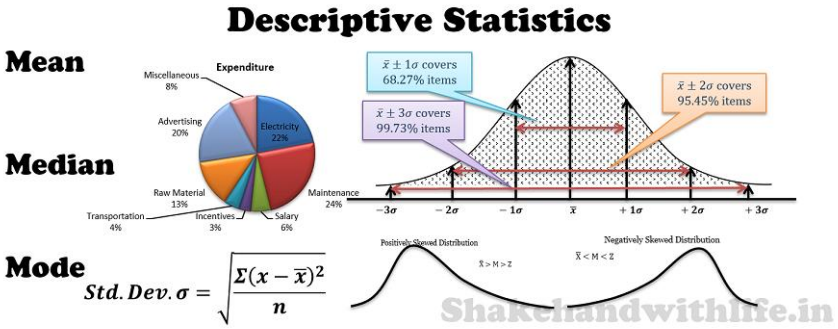
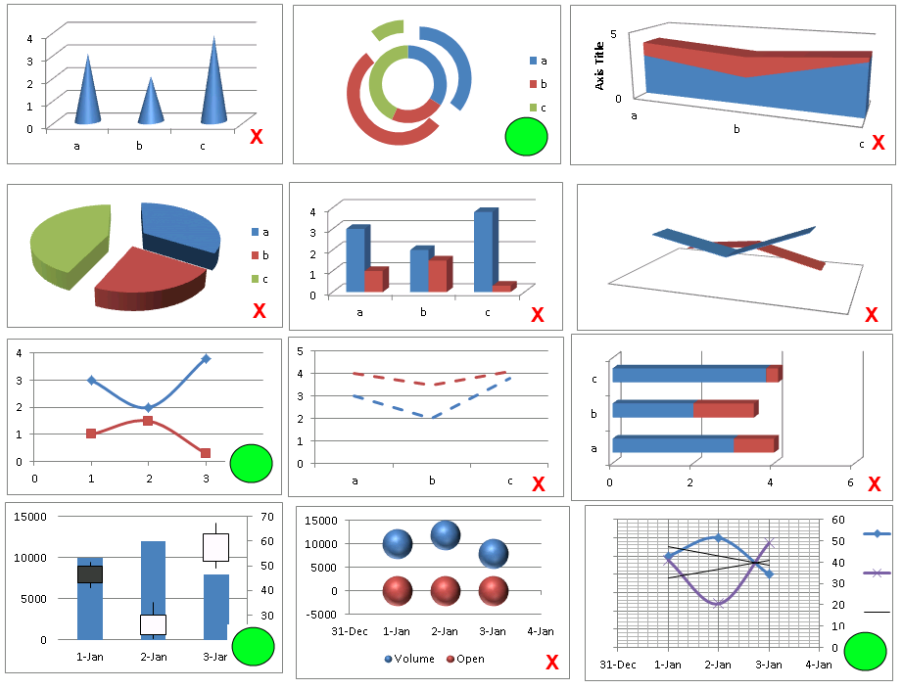
Descriptive Analytics

Descriptive analytics mainly uses descriptive statistics, visualization techniques and business related queries for generating insights by understanding the trends in the past data which in turn can be used to derive actionable items.





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Descriptive Analytics Applications

- Most shoppers turn towards right when they enter the a retail store.
- Conversion rate of women shoppers is higher than male shoppers among electronic gadgets purchasers (Radio Shack).
- Strawberry pop-tarts sell 7 times more during hurricane compared to regular period (Wal Mart).
- Women car buyers prefer women sales person.

What Wal-Mart Knows About Customers' Habits

Hurricane Charley struck the US in 2004
-Hays 2004

Linda M. Dillman, Wal-Mart's chief information officer
"We didn't know in the past that strawberry Pop-Tarts increase in sales, like seven times their normal sales rate, ahead of a hurricane," Ms. Dillman said in a recent interview. "And the pre-hurricane top-selling item was beer."

These insights were used by Walmart when the next Hurricane Frances hit the US

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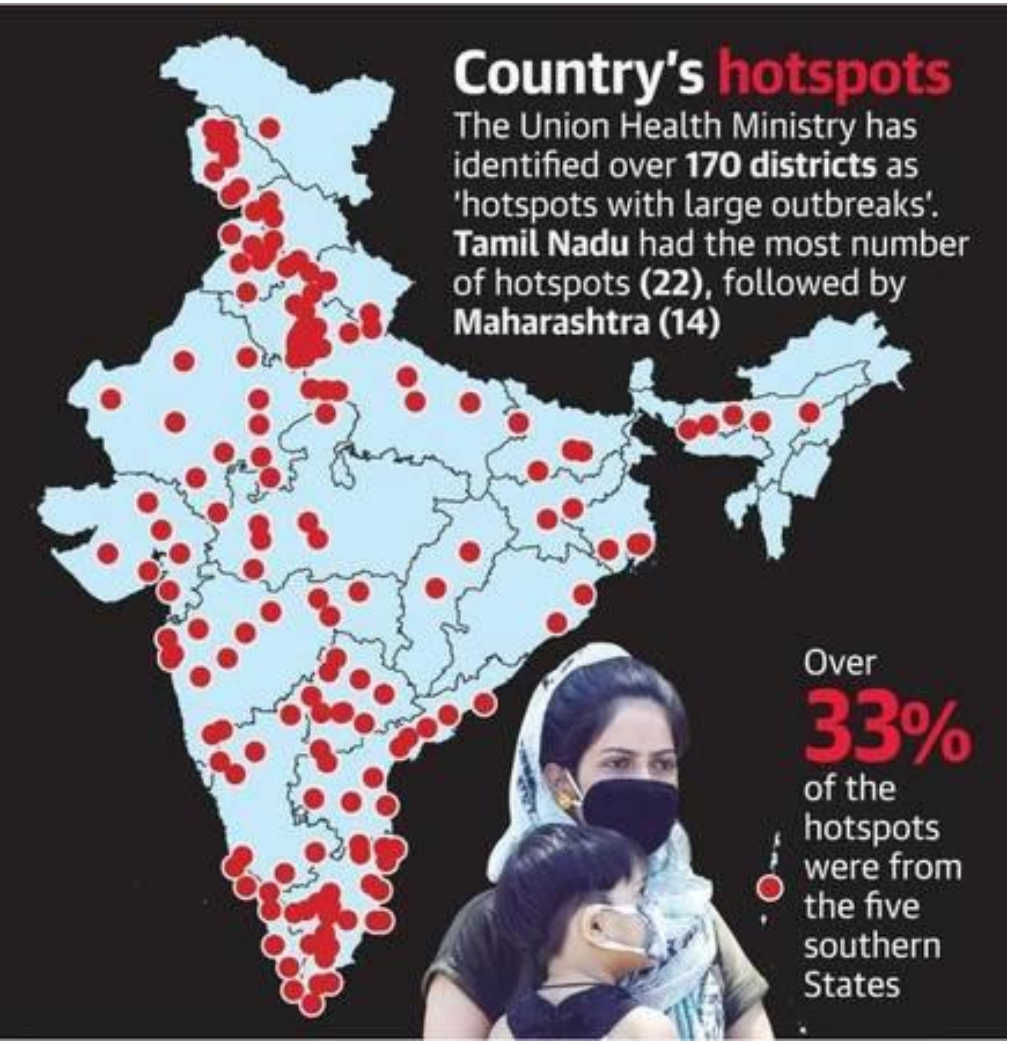
Descriptive Analytics- case study



Covid 19 outbreak in India

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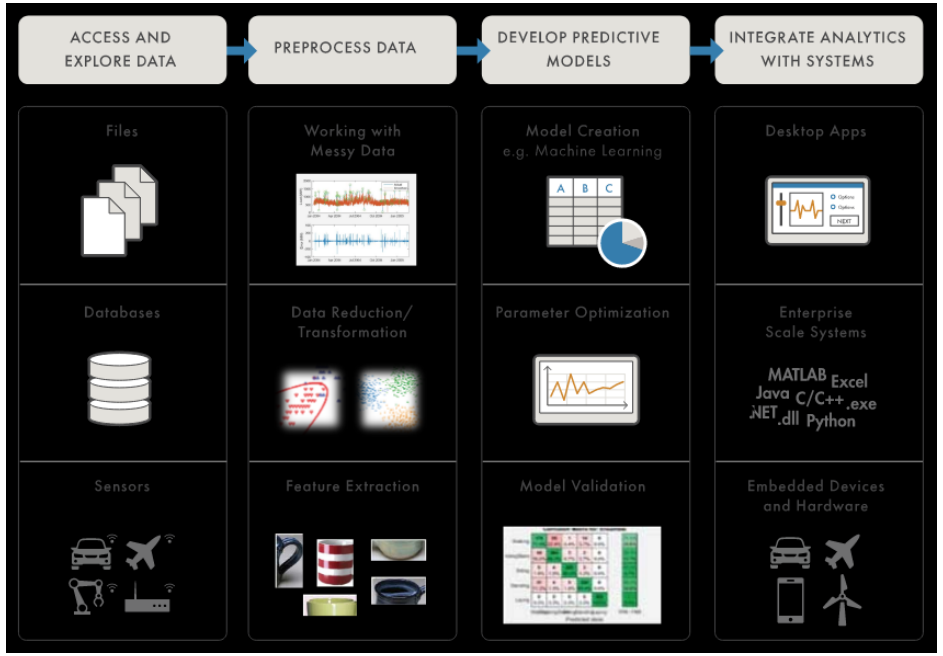
Predictive Analytics

Predictive analytics is a form of advanced analytics that uses both new and historical data to forecast activity, behavior and trends.

It involves applying statistical analysis techniques, analytical queries and automated machine learning algorithms to data sets to create predictive models that place a numerical value or score on the likelihood of a particular event happening.



Predictive Analytics Problems

- Which product the customer is likely to buy in his next purchase (recommender system).
- Which customer is likely to default in his/her loan payment.
- Who is likely to cancel the product that was ordered through e-commerce portal.

Predictive Analytics-case study

Polyphonic HMI: Mixing Music and Math

The technology, referred to as Hit Song Science (HSS), analyzed the mathematical characteristics of music and compared them to characteristics of past music hits, making it possible to determine a new song's hit potential.

FlightCaster

For a given flight, FlightCaster will predict the chance of an on-time, slightly delayed (less than 60 minutes late) or very delayed (more than 60 minutes late) arrival, up to six hours ahead of the flight.

Netflix, Amazon –Recommendation system

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Prescriptive analytics

Prescriptive analytics is the area of business analytics (BA) dedicated to finding the best course of action for a given situation.

Prescriptive analytics is related to both descriptive and predictive analytics.

While descriptive analytics aims to provide insight into what has happened and predictive analytics helps model and forecast what might happen, prescriptive analytics seeks to determine the best solution or outcome among various choices, given the known parameters.

Prescriptive Analytics Problem

- What is the optimal product mix?
- What is the optimal route for a delivery truck.
- Best markdown pricing for fashion products.
- Optimal assignment of aircraft to flight.
- How to manage the fleet of vehicles owned by a company for employee drop and pick up?

Prescriptive analytics-Case study

Akshaya Patra Foundation(TAPF)

Mid-day meal programme in South Bangalore
84000 school children
650 schools
35 vehicles

The Akshaya Patra Midday Meal Routing and Transportation Algorithm(AMRUTA) was developed to solve the vehicle routing problem resulting in savings of USD 75000 per annum.

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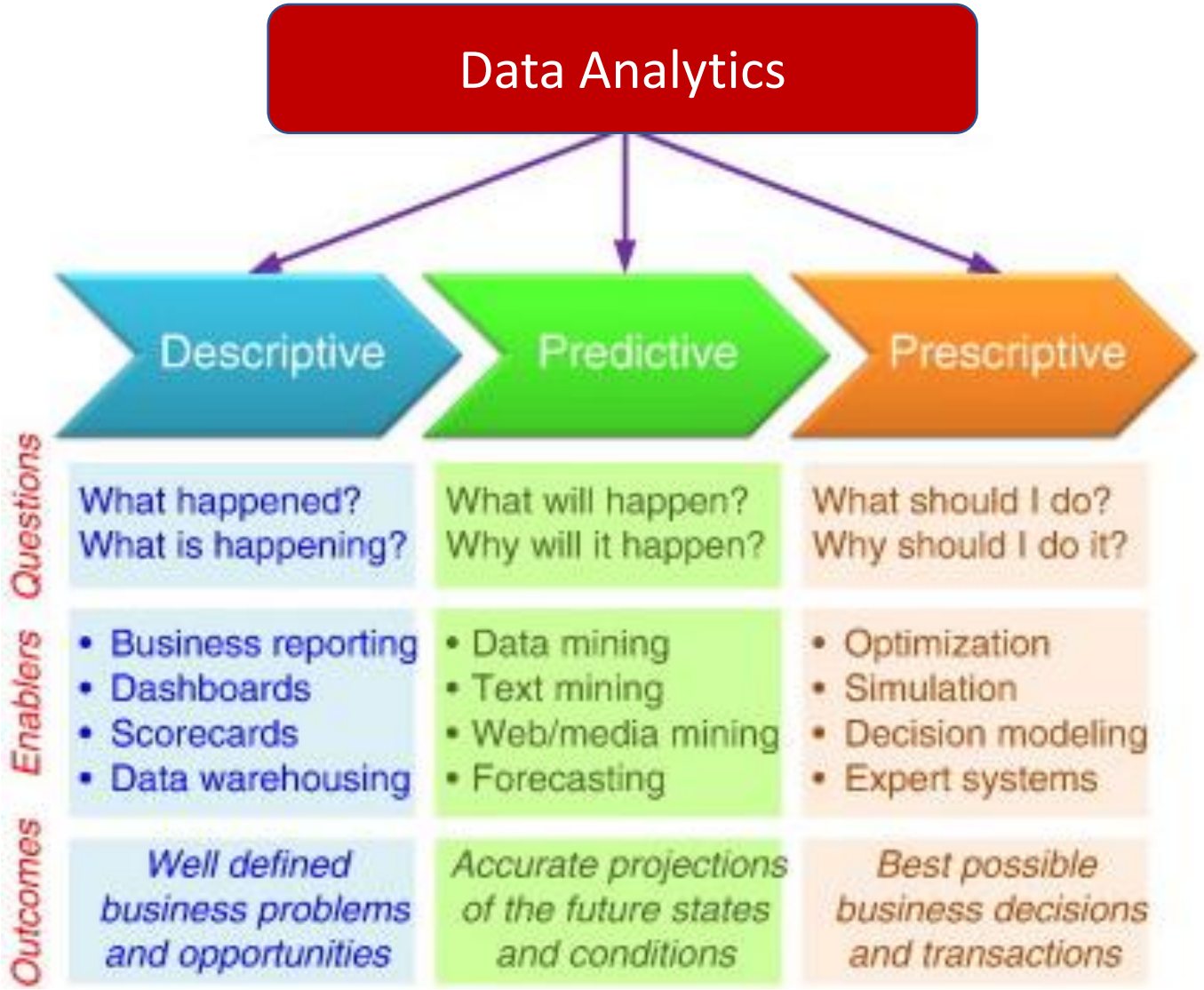
Comparison of different types of Data Analytics



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Analytics capability versus organizational value add

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Industry wide applications of analytics

Industry Sector	Sample Analytical problems	Data Sources
Manufacturing	• Supply Chain Analytics • Quality and process improvement • Revenue and cost management • Warranty Analytics	• Procurement , sales and production data • Warranty and after sales service • Commodity Price Data • Manufacturing Data • Macroeconomic Data
Retail	• Assortment Planning • Promotion Planning • Demand forecasting • Market Basket Analysis • Customer Segmentation	• Price data • Demand data at SKU and at category level • SKU level sales data with and without promotions • Planogram • Customer demographics data • Point of sales data • Loyalty program data
Healthcare	• Clinical care • Hospitality related data	• All patient care related data • Hospitality related data • Patient feedback data

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Contd..

Industry Sector	Sample Analytical problems	Data Sources
Service	• Demand forecasting • NPS Optimization • Service Quality Analysis • Customer Segmentation • Promotion	• Transactional and feedback data • Pricing and demand data • Promotional data
Banking & Finance	• Assortment Planning • Promotion Planning • Demand forecasting • Market Basket Analysis • Customer Segmentation	• Customer transactional data • Loan originating data • Credit scoring data
IT and ITES(IT enabling Services)	• Demand for Analytics Services • Software Development Cycle time	• Customer interaction and market research data • Internal product development data

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4 BINS OF ANALYTICS PROBLEMS

Prediction	Classification	Matching	Optimization
Forecasting	Customer Churn	Fingerprint matching	Vehicle Routing
Customer lifetime value	Credit Risk	Recommender Systems	Bin-packing

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FRAMEWORK- DATA-DRIVEN DECISION MAKING

Problem or Opportunity Identification

- Domain knowledge is very important at this stage of the analytics project.
- This will be a major challenge for many companies who do not know the capabilities of analytics.

Collection of relevant data

- Once the problem is defined clearly, the project team should identify and collect the relevant data.
- This may be an interactive process since "relevant data" may not be known in advance in many analytics projects.
- The existence of ERP systems will be very useful at this stage.

Data Pre-processing

- Data preparation and data processing forms a significant proportion of any analytics project. T
- his would include data imputation and the creation of additional variables such as interaction variables and dummy variables in the case of predictive analytics projects.

Model Building

- Analytics model building is an iterative process that aims to find the best model.
- Several analytical tools and solution procedures will be used to find the best analytical model in this stage.

Communication and deployment of the data analysis

- The communication of the analytics output to the top management and clients plays a crucial role.
- Deploy the solution

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Case Study

- **Identify an analytics problem. State which type of analytics it belongs to and why?**

- **List the different applications of data analytics built to address Covid 19 outbreak. Take an application and explore how data analytics is used.**

References

Text Book:

"Business Analytics, The Science of Data-Driven Decision Making", U. Dinesh Kumar, Wiley 2017

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Image Courtesy

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THANK YOU

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