

WPC 300

WEEK 1

Transaction

- capture information about the data, the product that the customer bought

Analytics

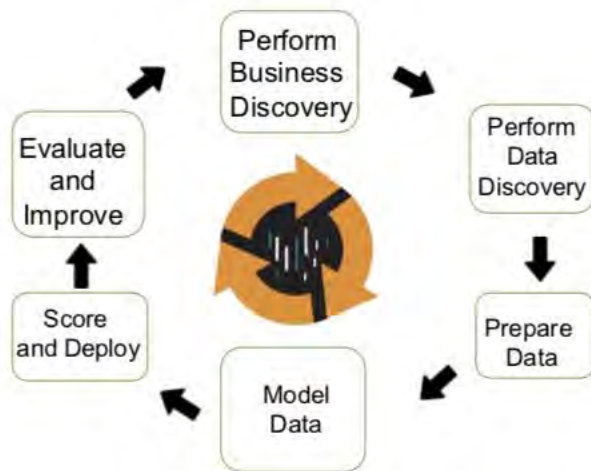
- the process of developing actionable decisions or recommendations for actions based on insights generated from historical data
- according to the Institute for Operations Research and management science
- represents the combination of computer technology management science techniques, and statistics to solve real problem

Problem framing

- 1. Tell an interesting and complete story**
 - a. The problem you address should be meaningful
 - b. Solution could be reused for related problems
 - c. Assumptions, boundaries
- 2. Find an appropriate solution framework**
 - a. Break down the problem into pieces
 - b. Iterative process
 - c. Identify appropriate analytical/modeling techniques
- 3. Routinize the procedure**
 - a. Documentation
 - b. Next similar question can be solved quickly
 - c. Build a system

Agile Approach (empirical process control)

1. Perform business discovery
2. Perform data discovery
3. Prepare data
4. Model data
5. Score and deploy
6. Evaluate and improve



Waterfall approach (defined process control)

- Traditional process
 - o Requirement -> design -> implementation -> verification -> maintenance

Data Collection

1. **Primary data**
 - a. Survey (census current population survey)
 - b. Interviews
 - c. Used a lot in marketing research
2. **Secondary data**
 - a. Survey data collected by census
 - b. Firm's proprietary database
 - c. Internet data (crawlers)
 - d. Stock/capital market data
 - e. Accounting disclosure data (10k, 10q)
3. **Simulated data**
 - a. Data based on assumption and simulation
 - b. Used a lot in scheduling, routing and queuing
4. Cleaning
5. Analyses
6. Communication

Data Preparation for analysis

- **Clean the data to the correct/consistent format**
- **ETL**
- **Data Extraction 提取**
 - o Extract data from primary and secondary source
- **Data Transformation**
 - o Transform and clean data into proper format or structure for the purpose or structure for the purpose of querying and analysis
- **Data Load**

- Load data into final target database, more specifically and operational data store, data mart or data warehouse



Analytics in Management (video)

- Organizational behavior: individuals and teams
- Strategy: companies and industries
- Data Analytics
 - The capability to source, store, analyze, transform, visualize, and draw insight from large amount of data
- Stakeholders
 - Internal
 - Employees
 - Managers
 - Board members
 - External
 - Capital market
 - Shareholders
 - Suppliers of capital
 - Product market
 - Customer
 - Supplier
 - Unions
 - Local communities
- Conclusion
 - Amount of data continues to explode
 - Techniques to collect and analyze data continue to advance
 - Data analytics provide manager with evidence

Business Analytics for Economics (video)

- Regression
 - Estimate the impact of the consumption of the product
- Data analysis in Business
 - Economist might use data to estimate a demand curve
 - Firm can use these estimates to help determine the optimal price
 - Economists might use data to estimate the impact of exchange rate fluctuations on profits

- Use data to estimate credit risk

Accounting Analytics (video)

- Supply Chain Analytics
 - Determine the optimal route for a good that's manufactured in in country to another country
- Marketing Analytics
 - Determine potential customer who are willing to buy the new product and how much they are willing to spend
- Management Analytics
 - Determine who is the best candidate for a job
- Accounting Lane
 - Accurate? -> steal
 - People works the same way as they always do
 - U cheat least time, u gonna cheat next time too
 - Use IBM Watson to catch bad people
 - Shareholders
 - Employees
 - Banks
 - Other business

Marketing Analytics (video)

- Moving from interesting question into actionable answers
- More accurately describe and model the behavior of the customers
- Data Collection
 - Survey
 - Interview
- Data Analytics
 - Segmentation

Week 2

(see overview of analytical tech. from week 2!!!)

Types of Data Analytics Model

- **Descriptive Analytics 描述性 (explore the data)**
 - This is a preliminary stage of data processing that creates a summary of historical data to yield useful information and possibly prepare the data for further analysis
 - Modeling
 - Basic plots of variables, find patterns in data, descriptive statistics, correlation, outliers, sampling, data value distribution
 - Question:
 - What happened?
 - Methods:
 - Standard reporting, Dashboards, Visual analytics

- Outcome:
 - Well defined business problems and opportunities
- **Explanatory 解釋 Analytics (Trying to understand a relationship)**
 - This is about looking into the past and determining why a certain thing happened.
This type of analytics usually revolves around working on a dashboard
 - Modeling
 - T-test, regression analyses, causal modeling (correlation, temporal precedence, no confounding), ANNOVA test, natural science
 - Question:
 - Why did it happen
 - Methods:
 - Inferential Statistics, Visual
 - Outcome:
 - Discover, understand casual relationships of an outcome
- **Predictive Analytics 預測性**
 - The use of data, statistical, algorithms and machine learning techniques to identify the likelihood of future outcomes based on historical data
 - The goal is going beyond knowing what has happened to provide a best assessment of what will happen in the future
 - Modeling
 - Linear regression, data mining, simulation
 - Question:
 - What will happen next?
 - Weather forecasting
 - **Predict** when a person would go to depression?
 - **Predict** performance for certain stock portfolios?
 - Methods:
 - Data mining
 - Outcome:
 - Accurate projections of future outcome and events
- **Prescriptive Analytics 規定性 (optimization techniques 優化技術)**
 - It answers the question of what to do by providing information on optimal decisions based on the predicted future scenarios.
 - The key to is being able to use big data, contextual data and lots of computing power to produce answers in real time
 - Uses simulation and optimization to ask question
 - Combination of data, mathematical model
 - Modeling
 - Linear optimization, integer optimization
 - Recommending actions and its timing
 - Question:
 - What should be done about it
 - Methods: