NATIONAL UNIVERSITY OF SINGAPORE
NUS Business School
Department of Decision Sciences

DSC2008 Business Analytics—Data and Decisions

Lecturer: A/P Quek Ser Aik

Session: Semester I, 2016/2017

Objectives

"Most companies today have plenty of data. However, creating intelligence and gleaning real insights from this data is what continues to elude organizations."—*Competing on Analytics: The New Science of Winning.*

Business decisions are often made under uncertainty. In the modern business environment, technological advances facilitate the collection of huge amounts of data which can potentially improve the decision-making process. Successful businesses make use of Business Analytics and Business Intelligence, which are fundamentally based on quantitative statistical methods and optimization procedures, to identify patterns and trends in their data which eventually lead to insightful projections and realistic predictions.

This module relates to DSC1007 Business Analytics -- Models and Decisions (Business Analytics I). It introduces students to the fundamental concepts of statistical inference such as parameter estimation and hypothesis testing, as well as to statistical tools useful in business analytics, such as regression analysis and time series analysis. This continues the theme of delivering hands-on experience in modules focusing on analytics and operations.

This module was co-designed, and is co-taught, by the Department of Decision Sciences in the NUS Business School and the Department of Statistics and Applied Probability in the Faculty of Science, to draw upon the relevant expertise from the two departments.

The module provides all BBA students with a common statistical grounding for Business Analytics, upon which specialization may be built depending on each student's chosen major.

In keeping with the principles of Rigor and Relevance of Business Analytics I, students are expected to acquire the following knowledge and abilities.

Rigor

Building on the foundations of probability from Business Analytics – Models and Decisions, this module covers fundamental concepts underpinning the following business analytic tools:

1. Data summarization: pivot table;
2. Statistical inference: sampling distributions, confidence intervals and hypothesis testing;
3. Regression analysis: linear and multiple regression, regression diagnostics and model building;
4. Time series analysis: smoothing, regression-based models, ARIMA models and forecasting;
5. Clustering and marketing segmentation: K-means method.

Emphasis will be made on how, what and why certain tools are useful and, and what their ramifications would be when used in practice.

Relevance

Module content makes use of examples that are based on current events and timely business topics. Adopting the Plan/Do/Report problem-solving approach, worked examples show students how to clearly define the business decision to be made and *plan* which method to use, *do* the business analysis with data-based numerical evidence and with the help of illuminating graphical displays, and finally *report* their findings and recommendations to the decision maker. This approach is reinforced using case-study projects involving real data in which students investigate a business-related question or make a business decision. This module also makes active use of the Excel spreadsheet and the SAS software.

Students will be equipped with the ability to "tell a story" and provide insights based on (big) data given to them (e.g. during their internships).

Prerequisites

None.

Module Outline

Describing data (Week 1-2)
Data type
Data statistics
Description
Sampling
Data distributions
Standard distributions

Sampling distributions
Confidence Interval
Central Limit Theorem

Inferring from Data (Week 2-3)
Testing hypothesis
Comparing distributions
Goodness-of-fit
Homogeneity
Comparing averages
    1 sample
    2 samples
Multiple samples
Analysis of Variance
Relating variables
Correlation

Predicting beyond Data (Week 4-6)
Simple regression
Multiple regression
Variables selection
Missing values
Outliers
Transformations
Logistic regression

Time Series Analysis (Week 7-11)
Multiple-regression-based time series models
Smoothing methods
Simple moving average
Weighted moving average
Single exponential smoothing
Holt-Winters exponential smoothing
Autoregressive Integrated Moving Average models

Cluster Analysis (Week 11-12)
Distance measure
Hierarchical cluster analysis
K-means method