IS5126 – Hands-On With Business Analytics (HowBA)
AY 2014-2015, Semester 2

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Office Hours: Mondays, 5:30-6:30pm, or by appointment
Lecture Meeting: Mondays, 6:30pm-8:30pm
Lecture Location: LT15

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Optional Lectures: TBA

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Course Description and Objectives

This module will be very time consuming!

Data is becoming more readily available due to the rapid progress of IT. Led by fact-based decision-making process, many companies across sundry industries are looking to use their vastly growing trough of data as their competitive advantage. For example, retailers use transactional data to build customer behavior model, target promotions, and increase sales with recommendation engines; airline industries forecast market demand and fuel prices to maximize margins; and online advertisers engage in real-time bids for banner ads based on user browsing behavior.

Business analytics is the use of data to support business decisions. This module aims to give students a practical, hands-on experience with the tools and techniques used in business analytics, especially dealing with Big Data analytics. The approach will be breadth rather than depth. Students will get experience with the full “data pipeline” including data collection, preparation and transformation, web-mining, clustering and segmentation, predictive modeling, social network analysis, and other advance topics. We will be using Python, SQL, and R.

The course will focus on the correct interpretation and use of data. We will cover the technical definitions of segmentations, correlations, predictions and causation and how it can be used in business settings.

The focus of the module is to help students with a final project of their own design. The project will be done in groups of no more than four students, and will be the large portion of their grade. The project should demonstrate a novel and exciting use of data with a clear value proposition to a target audience. Students will demonstrate that they can achieve their own by using the appropriate tools and methods. The projects should be suitable as a potential startup in the analytics
Students will get the opportunity to present their final project at the school-wide SoC Term Project Showcase (STePS) in front of industry leaders, VCs, professors, colleagues and friends.

Students will get the most from the module through discussions with other students, the TA and the instructor.

In addition to the final project, students will engage in two guided projects to help build their skill sets. The guided projects will also be done in the same group of four students.

Cases will be used to motivate the topic and help students ask the right questions.

The teaching assistant (TA) will also be providing optional tutorials on programming and other technical areas to help students who may need it. These are not graded, and are there for your benefit. The TA can also help debug issues or provide useful experience and suggestions.

**Targeted Students**

This module will bridge both “hard” and “soft” disciplines. Students with technical training in programming, databases, and mathematics will gain from understanding how their skills are valuable and what questions are of interest to managers. Students with “soft” background will gain practical and technical skills required to address their questions. Students should come with a desire to learn something new.

If you have questions, please contact the instructor, disptq@nus.edu.sg

**Readings**

The material for the module comes from a variety of sources such that a single textbook cannot cover it all. Although there are no required textbooks, the following are suggested references:


(recommended): R: R manuals, http://cran.r-project.org/manuals.html


NUS library


Various HBS cases.

**Deliverables and Grading**

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Weight</th>
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<tr>
<td>1) Two guided mini projects</td>
<td>40%</td>
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<tr>
<td>2) Final Team project</td>
<td>50%</td>
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<tr>
<td>3) One case write up</td>
<td>5%</td>
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<tr>
<td>4) Class participation</td>
<td>5%</td>
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**Deliverable Details**

Submit all material to IVLE in PDF format (preferred), otherwise Word document. Students must form teams of four (4) for the semester, and deliver one submission per team. It is highly recommended to form a *balanced* team of technical and “soft” team members as different parts of the module will make use of both sets of skills. Prior experience has shown teams which are *unbalanced* will struggle in the module overall. After each guided project and the final project, students will be asked to perform peer evaluations on each other.

1) Two guided mini-projects (2 x 20%)

The objective of these projects will be to expose students to the tools and techniques in business analytics. Students with technical background should team up with those with more managerial experience to learn from each other. Assignments will be available several weeks before the due date. Each team is to make one submission on IVLE.
2) Final team project (50%)

The final team project will be a “data mashup.” Teams of up to four members with identify at least two datasets, perform analysis, address plausible questions, and present their final work on at the SoC Term Project Showcase (STePS) during reading week. Students will have the opportunity to showcase their work in front of industry leaders, entrepreneurs, professors, colleagues and friends. Past projects have resulted in venture capitalists and startup interest!

The project should showcase a novel and creative use of data. The group should use the proper technique with the correct interpretation. The project should have a clear target audience and a well-defined value proposition.

A proposal writeup will be due Mar 2. The final write up will be due on Apr. 24. Examples will be discussed in class, and the instructor will also suggest a list of potential sources.

The details and deliverables are as follows:

1. All groups will be required to do a “project pitch” on Feb. 16 to get feedback on potential ideas and directions. The project pitch should not be longer than 2 minutes, and allow for 1 minutes of comments and questions. This will not be graded, but is there to help you get ideas and inspiration, as well as inspire others on their own projects.

2. A maximum two-page (single space) project proposal write-up will be due on Mar. 2. It should be a single file with the filename groupXX_proposal.docx, where XX is your group number. It should include the following:
   a. What is the problem or question?
   b. Who is the consumer of the data and analytics?
   c. Identify at least two sufficiently “large” data sets (eg. Excel can not handle it), which one must be crawled from the web. If no web crawling is involved, at least three data sets must be used.
   d. The method of analysis to be used

3. Present your work in class starting Apr. 6

4. Present at STePS during reading week starting Apr. 20 (details TBA).

5. The final write-up is due Apr. 24 as a single zip file with the filename groupXX_Final_project.zip, where XX is your two digit group number.
   a. Although there is no page limit, brevity and succinctness is the goal. As a guideline, students can aim for 15 pages double spaced.
   b. The write-up should be similar to the proposal, but include more details about the method used, conclusions from the analysis, actionable business recommendations, and the value of the results.
   c. Your data sets, unless it is proprietary
   d. It should include all source code such that the results are reproducible from the raw dataset.
   e. Source code should be provided in the appendix, and does not count towards your page limits.
   f. Your poster and presentation slides.
Your project will be assessed on 1) the novelty and value of your application (30%), 2) the attention to details on the data collection, methods, and tools (30%), 3) on your interpretation and conclusions (20%), and 4) the quality of the presentation and write-up (20%).

The projects are also meant to be fun and for you to try something which you may not have the chance else where to do. You have the complete liberty and freedom to choose the project. That said, experience shows that there are a few topics to avoid due to it’s technical difficulties, that it is a cliche or overly done, or the interpretation is difficult. These include:
   a) stocks and finance forecasting.
   b) demand and media sales using publicly available data (eg. Sales of movies, music, albums, etc…)
   c) real-estate/property-price/COE forecasting
   d) In general, any time-series with a single metric over time

3) Case write-ups (5%)

We will be discussing four cases in class to motivate the methods in business analytics. Every student is expected to read and participate in the discussion of every case. Each group can choose any one case to write 1-2 page (at least 11 point size font, double spaced) about one specific and new opportunity for the company to benefit from business analytics. The write-up should be submitted by 6pm the day before class discussion (on Sunday) in digital format. You will also be asked to present write-ups in class for 10 minutes. Please send include your powerpoint slides in the submission. All documents should be in a single zip file with the filename groupXX_caseY.zip.
   • Describe one specific opportunity for analytics, and how it is strategically beneficial
   • Describe the relevant data. Be specific about the variable names, and example rows (perhaps in Excel tables)
   • Explain the analysis to be done
   • Discuss the possible conclusions and how it can be actionable to the firm
   • Write ups will be assessed on originality, value of the proposition, attention to detail, and the plausibility of the idea

4) Class participation

Students are expected to engage in class discussion, especially during sessions with cases. The discussion is critical in the learning process. Not only does it help you to learn to listen to others and to think on your toes, but it also helps everyone to learn as a group. Since cases describe real-world complex situations where there may be no single best solution, every student can contribute his or her perspective by drawing on their rich experience and diverse backgrounds. Verbal and presentation skills are also critical to every business analyst to express, explain, and distill complex situations.

Discussions will be conducted in a constructive and open manner.
To get credit for class participation, please write your name on an index card, and a brief description of your comment to be turned in to the instructor after the session.

Class Policies and Ground Rules

Academic integrity and plagiarism: Academic integrity is a critical value of the university community. Academic integrity policies and descriptions of unacceptable prohibited student behaviors in class are listed in http://www.comp.nus.edu.sg/undergraduates/plagiarism.html.

Individual and group-level plagiarism of submitted class assignments are strictly not tolerated and will be referred to the university for further disciplinary actions. All case assignments and project submissions will be submitted by the lecturer for plagiarism checks using www.turnitin.com. See http://www.cit.nus.edu.sg/plagiarism-prevention for more details.