BAN 888: Implementing Analytics for Business

Business Analytics Capstone Project Description

The purpose of this capstone project is for students to explore business analytics problem solving by developing a business analytics solution to a real-world problem in a team setting. Each team selects a project and works through all elements of the business analytics body of knowledge.

The business analytics project is broken down into three parts:

1. **Part I:** business problem framing and analytics problem framing
2. **Part II:** data sourcing, cleaning and integration, methodology selection and analytics model building
3. **Part III:** analytics model solution deployment and lifecycle management

Project Team: You will work as a team in your Critical Thinking Group. Every member of the team will receive the same grade regardless of how much work you do or do not do.

Project Selection: Each team will select a real-world problem of interest, as long as it enables you to work through all elements of the business analytics body of knowledge. Consider a project from the workplace or a Kaggle analytic competition (https://www.kaggle.com/). If you cannot find a real-world project and/or cannot get any data, I have a ready-made "banking data set" that you could use. *Before finalizing your project, please contact me to make sure it is okay!!!* It might not be appropriate for a capstone project (too easy / too hard / or some other reason).

Project Collaboration: You may freely share anything and everything with other students in your Critical Thinking Group. However, you are not allowed to collaborate with students outside of your project team.

The CEO: The instructor will assume the role of the Chief Executive Officer (i.e., CEO). As CEO, I am only concerned with whether or not the project is successful or is just a waste of money. Trust me, if the CEO thinks you are wasting money then it is REALLY BAD. You may assume the following:

● The CEO knows only the bare minimum of descriptive, predictive and prescriptive analytics and quantitative modeling. Be prepared to answer questions on anything or everything!

● The CEO does not understand your project and can easily miss the point or get distracted by an irrelevant detail. It is your job to communicate effectively to make the CEO understand what you are doing and why you are doing it.

● The CEO likes to play golf with other CEOs, and they like to talk about the latest "analytic developments". Be ready to deal with the fallout.

- The CEO has no problem being adversarial and critical. It might be an unpleasant experience. Please do not take it personally. This is just part of the education process, and I assure you that you will encounter far worse in the real world.

Project Grading and Deliverables: Each part of the project is worth 300 points (i.e., 30% of your total course grade), which consists of both a report and presentation. You must submit all required documents when they are due or face the consequences of having a low grade. The CEO will judge (i.e., grade) your work. If the CEO believes you have not made progress or you have turned in poor work, then you can expect a low grade. Note that there is no pre-established grading rubric. The CEO will have no problem giving your team a "zero" if the work is of poor quality.

Business Analytics Capstone Project Deliverables
Part I: Business Problem Framing and Analytics Problem Framing   **Objectives:**   1. Thoroughly describe the business problem and demonstrate how the business problem is amenable to an analytics solution.   2. Show how you reformulated the business problem into an analytics problem with a potential analytics solution.   3. Demonstrate effective communication of the analytics project.   **Report:**   - This should be a 5- to 10-page document that accomplishes the first two listed objectives above. Moreover, the document should describe what you are trying to accomplish with this project. Be specific in listing the questions you expect to answer and the type of recommendations you expect to make.   - Describe how you foresee doing the analysis. This might include describing the sources of data, the analytic tools that could be used, and the types of models that might be created. Also, state the type of deliverables you plan to have on this project. If you have already done some preliminary analysis then maybe (in general terms) describe what you have already uncovered.   - Make this document clear and to the point. If the CEO reads this and ends up wondering what you are trying to do, then your project won't get funded. Let the CEO know exactly what you want to do and how it will help the organization.   - It is possible that as the project progresses, you might change your goals. If so, let the CEO know immediately. Surprises at the end of the project will not be welcome or appreciated. As the project progresses, the CEO might choose to expand upon your goals and ask for something that you didn't expect to deliver. It might not be fair. Deal with it.

Presentation:
- This should be a 5- to 10-minute PowerPoint presentation that accomplishes the third listed objective above.

- The purpose of the presentation is to amaze the CEO while describing the current progress of your project. The CEO has maybe read only some of your report, so you need to present your current results in a clear and engaging manner. We will do this in-class presentation via internet, which is 10 times harder than in person because you are now competing with Facebook, YouTube, and Angry Birds. The moment you start to bore the executives, they stop listening.

- Don't just transcribe your project into some slides. Torturing an executive with PowerPoint will be counter-productive. Be engaging and conversational. Think outside of the box if you can. Keep the CEO entertained, perhaps tell a story with the data. Whatever you like. Just be informative and entertaining. Be prepared to adapt. The CEO might take you off script. Expect the unexpected!

- The date of the in-class presentation will be announced during the course.

Part II: Data Sourcing, Cleaning and Integration, Methodology Selection and Analytics Model Building

Objectives:
1. Clearly demonstrate how you worked effectively with data to help identify potential relationships that will lead to refinement of the business and analytics problem.

2. Show how you identified and selected potential approaches for solving the business problem.

3. Show how you identified and built effective model structures to help solve the business problem.

4. Demonstrate effective communication of the analytics project.

Report:
- This should be a document that accomplishes the first three listed objectives above. *It needs to be exactly as long as it needs to be and not one page more*. This might be a lot of work, but the good news is that much of this work should be useable for the final report.

- You have been at this project for several weeks now. Your consulting team has been burning money at an alarming rate and the accountants are getting concerned. The CEO wants to make certain that you aren't just a bunch of "fly by night" business analytics professionals who are more concerned with billable hours than you are with delivering a final product.

- This document will present your initial findings and give the CEO a status of the project. Let the CEO know if you are on schedule or if there needs to be a change in the scope of the work. If there are changes, then you will need to get the CEO's approval. If you promised "the moon" but you cannot deliver, you now have some explaining to do. This is the time for explaining and convincing the CEO to allow a change in scope. If the CEO does not agree, the remaining weeks might prove to be unpleasant. The following are some parts of the report that you might want to include.

- Problem Statement: What is the purpose of this project? This should be short and clear. There should be no doubt in the mind of the CEO as to what you are trying to do. As the analysis proceeds, the problem statement may change. It is important to keep the CEO aware of these changes because CEO's typically do not like surprises.

- Description of Data: Briefly describe the data that was used in this analysis. The CEO will want to know if the data is reliable. Where did the data come from? What is the format? How many records are there? How many fields are there?

- Overview of the Data: Do some preliminary analysis of the data. Are there any variables with outliers or missing values? Are there any variables that might be removed for some reason such as regulatory reasons, too many values missing, or some other reason. Just do some preliminary exploration of the data. What tools were used to accomplish this overview?

- Description of Transformation of Data: What type of data transformation, if any, was done to the data to handle outliers? How were missing values handled? What was done to categorical data? Were new variables derived? What tools were used to accomplish this overview?

- Analysis of Data: Do graphical analysis of the data, statistical analysis, build predictive models, build prescriptive models, etc. Do whatever is necessary to find answers. Document this step well enough that the CEO is confident that your recommendations are valid, and that others would be able to repeat your results (or perhaps try other approaches based on your findings). Discuss your methodology selection and model building in detail. Analyze your findings. What tools were used to accomplish this overview?

- Preliminary Conclusions: By this point, you will should have some ideas and conclusions. This is where you need to let the CEO know that the money has been well spent. Was did you learn from your model(s)? Did the models make sense? For example, did the guy who likes to drive drunk have a safer driving record than the guy who doesn't drive drunk? If it's counter intuitive, point that out. Is there a reasonable explanation for this? If not, then what?

- Project Status: Is the project "on track" or is it falling behind schedule. If you are falling behind, this is a good time to get "buy in" from the CEO to allow you to change the scope of the project. Remember, just because you want to change the project, doesn't mean that you will be allowed to change the project. The CEO has been writing checks for several weeks now and has expectations.

Presentation:
- This should be a 10- to 15-minute PowerPoint presentation that accomplishes the fourth listed objective above.

- As before, the purpose of the presentation is to amaze the CEO while describing the current progress of your project.

- Remember, be engaging and conversational in order to keep the CEO entertained!

- The date of the in-class presentation will be announced during the course.

Part III: Analytics Model Solution Deployment and Lifecycle Management

Objectives:
1. Provide detailed plans on how you would deploy the selected model to help solve the business problem.

2. Discuss how you will manage the model life cycle to evaluate business benefit of the model over time.

3. Demonstrate effective communication of the analytics project.

Report:
- This should be a document that accomplishes the first two listed objectives above. *Again, it needs to be exactly as long as it needs to be. No more and no less.* If it is too long, the CEO will be suspicious that poor work is being hidden in a large document. If it is too short, the CEO will wonder what you did for the past months.

- This will be the final report that is turned in with the problem statement, analysis, graphs, recommendations, detailed plans for model deployment, discussion of model life cycle management, and everything else. In truth, it is unlikely that the CEO will read much (or any) of this. The CEO will definitely read the Executive Summary and if something catches the CEO's attention, then the CEO will then refer to this document for more information. It is impossible to know ahead of time what will catch the interest of the CEO, so to whole document needs to be done with the utmost care. The report should include the sections listed below.

- Executive Summary: This should be no more than 5 pages that describes the whole project. In the real world, the CEO is not going to read your report. Instead, the CEO will read the Executive Summary. This is the most important document because you

must give a brief summary of the problem, your approach, your conclusion, and your recommendation. Be concise because the time of executives is valuable and the moment you start to ramble, they stop reading. If you do a good job here, the CEO will be intrigued and then refer back to your original report to the parts that are most interesting. If you do a poor job here, then your project will get shelved (no matter how good it was!).

- Problem Statement: This should be the same as in the second project report, but should incorporate any changes in scope that have been permitted.

- Description of Data: This should be the same as in the second project report document, but should incorporate any new information.

- Overview of the Data: This should be the same as in the second project report document, but should incorporate any new information.

- Description of Transformation of Data: This should be the same as in the second project report document, but should incorporate any new information.

- Analysis of Data: This should be the same as in the second project report document, but should incorporate any new information.

- Conclusions: What did you learn from your model(s)? Did the models make sense? If it's counter intuitive, point that out. Is there a reasonable explanation for this? If not, then what? Be detailed in your final conclusions.

- Recommendation: You have just spent the past months extracting INFORMATION out of DATA. Now tell the CEO of the company how to turn your INFORMATION into ACTION so that it can make BETTER DECISIONS. Make this short and to the point. Be sure to provide detailed plans for both model deployment and model life cycle management.

- Appendix: Provide the references you used, include your models (code, spreadsheets, etc.), and any other miscellaneous things that the CEO should know.

Presentation:
- This should be no longer than a 10-minute PowerPoint presentation that accomplishes the third listed objective above. Remember, be engaging and conversational! The PowerPoint presentation should be no more than 5 slides in length!

- Please discuss the following: 1) What was the problem? 2) What did you do and how did you analyze it?, 3) What did you learn?, 4) What do you recommend?, and 5) What are the next steps for model deployment and model life cycle management?

- You must find a perfect blend of simplicity and complexity so that the boss looks good when explaining the project to the Board of Directors!

- The date of the final in-class presentation will be announced during the course.