EBGN 525B Business Analytics Term Project Handout

You will be required to complete a term project for this course. You will work in groups of 4-5 students. Teams will be formed by the instructor and you will be notified about your team during the second week of the semester. If you would like to work with a specific student, please email the instructor by **08/29/2022**.

This term project requires **four** submissions throughout the semester:

Term Project Part 1 (45% of the overall term project grade):

- Define managerial question(s) for an organization. For example;
    - Where will the sales of a specific product for a company be in a couple years and what will be the optimal inventory control decisions according to these predicted sales?
    - What kind of customer profiles exist for our company and what would be some special offers for each customer profile?
    - How many new depots should our company open and what are their optimal locations? What are the optimal delivery strategies from these depots to our customers?

- At least **one** managerial question should be proposed that would be answered using descriptive analytics.

- At least **two** managerial questions should be proposed that would be answered using predictive analytics (i.e., supervised and/or unsupervised learning). One of the questions must require an implementation of the classification task.

- Based on your need, collect data. Your data should have some missing cells and/or outliers that would require some data cleaning process. If you have difficulties in finding a specific topic or data for your project, you can visit www.kaggle.com, UCI Machine Learning Repository, data.world or similar websites.

- Clean your data using the techniques that you have learned in this course.

- To answer your managerial question(s) that must be answered using descriptive and predictive analytics, implement related methodologies that you have learned in this course.

- For your managerial questions that are to be answered using supervised techniques, implement all methodologies discussed in this course to compare them and identify the best outcome.

- Submit a report (as a pdf file) that clearly provides:
    - A generic overview and a motivation section about your real-world scenario that (i) includes brief information/introduction about the subject matter, (ii) emphasizes the importance and need of your questions.

    - Methodology section (you can introduce as many sections or subsections as you want) that describes:

        - how you cleaned the data,
        - how you handled missing cells and why you chose to do that,

        - how you detected and handled outliers,
        - to answer each managerial question, what specific methodologies you used along with a discussion of why you chose those methodologies.
        - Please provide details as much as possible regarding your implementation.
    - A Computational Results section, that includes:
        - model results, their comparison (for multiple model implementations) for each managerial question,
        - your interpretation about the performance of the models,
        - explicit answers and their discussion to each of your managerial question based on your analysis.

- The report must be written using Times New Roman, font 12 with "1.5 lines" spacing. Your report must be a minimum 5 pages, excluding the appendix. You can add as many pages as you would like in the appendix.

- Please submit one zip file that includes: (i) the data file that you have analyzed, (ii) your report as a pdf file, (iii) one jupyter notebook file that includes all implementation.

- It is sufficient that one team member submits the assignment.

Term Project Part 2 (40% of the overall term project grade):

In the Term Project Part I, you have implemented descriptive and predictive analytics to answer some of your managerial questions. Now it is time to propose at least **one** managerial question that would be answered using optimization. Note that to answer optimization question(s), at least some output that you obtain from your descriptive and predictive analytics in Term Project Part I **must** be used. You must formulate optimization models to answer your managerial questions that require you to make optimal decisions.

- Continue the report that you submitted for Term Project Part I. Specifically add:
    - clear description of your problem for each of your managerial questions related to optimization,
    - complete introduction of your notation for your sets, parameters and variables,
    - complete optimization model (attaching AMPL files is not sufficient),
    - for each managerial question, discuss the optimal results of your model, interpret them and explicitly answer each of your questions according to your findings.

- Final report should include the following sections:
    - Abstract
    - Introduction and Motivation
    - Methodology
    - Computational Results
    - Conclusion

-. Your report must be a minimum 10 pages, excluding the appendix. You can add as many pages as you would like in the appendix.

- Please submit one zip file that includes: (i) the data file that you have analyzed, (ii) your report, (iii) one jupyter notebook file that includes all data analytics implementation, (iv) one jupyter file that includes the AMPL implementation, (v) all AMPL files including .mod and .dat files.

- It is sufficient that one team member submits the assignment.

Term Project Part 3 - Presentations (10% of the overall term project grade):

- Each group must record a 15-20 minutes presentation at the end of the semester based on their report. Teams can use Zoom to record their presentation. You do not need to turn on your camera while recording, if you do not prefer.

- Each team member must present.

- Presentations should be uploaded to Canvas, on "Term Project Part 3 – Presentations" page according to instructions that will be provided on the assignment page on Canvas.

- It is sufficient that one team member submits the assignment.

Term Project Part 4 - Discussions (5% of the overall term project grade):

- Each student should make at least one comment under each presentation posted. Each of your comments should be at least one complete sentence and should be meaningful and reflect that you watched the presentation.

Peer Evaluations:

- Students must evaluate each team member in their team **including themselves**. For example, if a student believes that everyone in the team contributed equally, that means each team member completed their responsibility 100%. Therefore, the student should assign 100 to each team member.

All assignments of the term project will be submitted on Canvas.

You are required to prepare this project on your own. Violations of academic honesty such as using materials from the internet without a reference or obtaining materials from previous years will not be tolerated.