Annual Business Analytics Competition Spring 2022

In a competitive business world, companies are seeking students with both technical insight and business acumen to lead the charge to the future. To help students prepare for this competitive marketplace, the Saunders College of Business presents the Business Analytics Competition, Spring 2022 that aims to bring together students from diverse backgrounds and skill levels to solve complex and meaningful business problems. This year, the competition is open to all students (not just RIT students) to foster a broader collaborative learning experience.

Scenario

Small Capital Bank (SCB) is a novel loan company headquartered in New York City. SCB loans are made available to almost anyone in small amounts, and can help those who otherwise would be unable to secure a loan from a more conventional bank. SCB has asked your team to advise them on three specific objectives:

1. Given the 2017-2018 loan portfolio, how well is SCB loan portfolio performing in regards to profitability? Which factors seem to be most associated with loan default and profitability?
2. Given the 2019 loan application data, create a decision rule for accepting/rejecting loan applications to maximize profit while avoiding systematic bias.
   a. The loan profitability calculations for SCB are described in the Appendix.
   b. When considering loan profitability for 2019 loan applications, students should think of innovative ways to estimate when a borrower will stop paying a loan (and subsequently becoming default). Some suggestion are:
      ● Using the 2017-2018 data to calculate the average time to default of a loan
      ● Using the 2019 probability of default rate to calculate the profitability of a loan
3. Finally, SCB is concerned that its current loan acceptance rules have created unintended patterns, and therefore systematic bias. This may be in regard to borrowers due to their demographics (e.g., location, age, gender, marital status) or economic status (e.g., income class, home ownership). Thus, SCB is evaluating whether the current rules should be adjusted to avoid those unintended patterns while still maximizing market share and profitability.
Data

SCB have provided the following:
1. A dataset with information for all SCB’s loans in 2017 and 2018 (“2022-dataset1.csv”)
2. A dataset with information for SCB’s loan applications in 2019 (“2022-dataset2.csv”)
3. A data dictionary for all datasets (“2022-Data-Dictionary.xlsx”)

Deliverables

Your team is asked to complete two deliverables:
1. Create a prediction model for loan defaults using the 2017-2018 dataset and predict the loan default probability for 2019 loan applicants (i.e., whether a given loan applicant will default or not). The prediction results will be uploaded to the Kaggle site for automatic evaluation.
2. Provide a summary report of no more than four pages (single spaced A4 size with 1" margin; excluding associated figures, visualizations, or tables) that communicates the answers to the two questions stated above by SCB. The report should contain the following elements:
   a. A cover page with names and school information of team members and contact information for the team leader. The cover page is not counted toward the page limit.
   b. An executive summary of key findings and recommendations
   c. A data preparation section that outlines the handling of data as well as providing details of any additional data used
   d. A data analysis section that reports the techniques and methodologies used by the team
   e. A results section that explains the findings and provides interpretations and recommendations for SCB’s Board of Directors.
   f. An appendix section that contains any details the team wishes to clarify (e.g., visualizations, tables). The appendix section is excluded from the page limit.

All accompanying analysis files should be submitted together with the report (e.g., Tableau files, R/Python codes, Excel files, etc.).

Eligibility Criteria

1. Students can form teams of up to five students to participate in the competition.
2. The competition is open to both undergraduate and graduate students. Ph.D. students are not eligible for this competition.
3. Non-RIT students are welcome to participate. However, non-RIT students must create a RIT Guest account in RIT MyCourses site to submit their solution.
4. Participating students must currently enroll in an academic program at a university/college.
Procedures to Participate

1. Interested students should gain access the datasets and challenge in the competition website (https://saunders.rit.edu/business-analytics-student-competition)

2. Students who are interested in submitting a solution to the competition need to request access to the competition course shell “Business Analytics Competition @ RIT” (https://mycourses.rit.edu/d2l/home/914331). To gain access to the course shell, please send an email request to Prof. Bui (qnbbbu@rit.edu) or Prof. Perotti (vjpbbu@rit.edu).
   a. Non-RIT students who want to submit a solution need to create a guest account to RIT MyCourses system. Please send a request to Prof. Bui (qnbbbu@rit.edu)

3. Students should form their own teams. Each team should have no more than five members.

4. There will be a workshop on March 23 @ 10am EDT, 2022 in which students will have the opportunity to ask questions and discuss their preliminary findings with some mentors.

5. Participating teams can submit their prediction model to Kaggle and summary reports to the MyCourses course shell. The deadline for submission is April 6, 2022 at 11:59pm EDT. Teams can submit as many times as they wish, but only the last submission will be used for evaluation. Late submissions will not be considered.
   a. Link to Kaggle submission site: https://www.kaggle.com/t/7e965e6b69c74c3f835836f7c3471e83

6. Names, school information, and contacts of team members should be included in the cover page of the submission. The main contact student for the team should be noted in the list. If not, the submitting student will be assumed as the main contact student.

7. The discussion board in MyCourses course shell will serve as a forum for questions and answers that students may have during the course of the competition. Students are encouraged to check the discussion board and post their questions there.

8. The evaluation of students’ submissions will be done by April 12, 2022. The top four to six teams will be invited to make their presentations on April 22 @ 10am EDT, 2022. Each team will be given 15-20 minutes to present their findings to a panel of industry practitioners. The panel will select the top three teams as the prize winners for this competition.

Evaluation Criteria

In the first round (Kaggle model + report), each submission will be judged by a panel of instructors. The panel will assess the quality of each submission on the following dimensions:

1. **Technical accuracy and sophistication** - Does the technical work build confidence in the insights and recommendations?

2. **Business logic and implied reasoning** - Do the findings demonstrate an understanding of how the data contributes to the business decisions?
3. **Report coherency, narrative flow, and professionalism** - Does the summary report clearly communicate both the technical and business thinking to persuade an audience of BAC executives?

In the second round, the top four to six teams are invited to refine their understanding of SCB’s problems and will make presentations on **April 22, 2022**. Each team will be given 15-20 minutes to present their findings to a panel of industry practitioners. The panel will use the following judging criteria:

1. Business logic/reasoning
2. Integration of oral and visual presentation elements
3. Quality of presentation/communication
4. Professionalism and persuasiveness
5. Responsiveness

### Appendix: SCB Loan Profitability Calculations

SCB uses the following formula to measure loan profitability:

\[
\text{Loan Profitability} = \frac{\sum \text{Loan Collect} - \sum \text{Loan Loss}}{\text{Loan Amount}}
\]

For example, assume a loan of $100,000 with 24 months term at 10% interest rate. Using a loan calculator ([https://calculator.me/loan/](https://calculator.me/loan/)) will show that:

- The total amount will be collected from the loan (principal and interest) is $110,747.82. Thus, if the loan is successfully collected, the loan profitability will be:
  \[
  \text{Loan Profitability} = \frac{110,747.82}{100,000} = 1.11
  \]

- If the loan borrower stops paying after the 22nd payment, and assuming that the lender will occur a $500 collection fee, the loan profitability will be:
  \[
  \text{Loan Profitability} = \frac{(\text{amount received after 22nd payment}) - (\text{remaining principal} + \text{collection fee})}{100,000}
  \]
  \[
  = \frac{(110,747.82 - 9,114.95) - (9,114.95 + 500)}{100,000}
  = 0.92
  \]

In the context of SCB company:

\[
\text{Loan Profitability} = \frac{\text{loan total payment} + \text{loan late fee to date} - \text{loan remaining principal} - \text{collection fee}}{\text{loan amnt}}
\]

In general, a loan profitability greater than 1 is preferable, while loans with profitability less than 1 indicates potential performance issues.