Simulation Exercise – Presentation
Virtual Prep/Virtual Delivery
Selection & Assessment
Administrative & Corporate Services_Development Programs_Intern Analyst
Job Code - 102229
11/01/2023

Candidate instructions

As the next step in the selection process, you are being asked to prepare for and deliver a Presentation on a job-related topic. Review these instructions carefully and in full.

Presentation preparation:

- Review the **Detailed task description** section below.
- You will have **48 hours** to prepare for your Presentation.
- Be sure to keep track of your own time and plan accordingly.
- If you require an accommodation to complete this exercise, please contact your recruiter immediately.
- *Your work will NOT be evaluated for its compliance with company-specific policy.*

Presentation delivery:

- You will have **30 minutes** to deliver your presentation.
- You will deliver your presentation via video.
- Refer to the meeting invitation and/or the body of the email you received for additional Presentation delivery details.
- Be sure to keep track of your own time and plan accordingly.
- You may be asked to respond to questions during and/or at the conclusion of your Presentation.
- Any notes and/or supporting material (e.g., talking points) used to aid in the delivery of your presentation will be collected, but they will not be evaluated.

Submission requirements:

- Submit a copy of your Presentation materials to the Administrator by the specified deadline. If your Presentation materials are not received by the deadline, you will be removed from consideration. See the body of the email you received for detailed submission instructions.

Detailed task description

- This job simulation aims to assess your skills on data analysis, model development and interpretation, business analytics, and communication.
- You are required to:
    1. Analyze data
    2. Develop two models using alternative frameworks
    3. Select one of the models for use in a business process
    4. Document and present your methods and findings in the form of a written report and oral presentation
- This exercise serves as a preview of what Wells Fargo quants do on a day-to-day basis: developing and using models to inform business decisions while clearly and concisely communicating the results to different stakeholders.

Background:
Personal Loans are extended to customers for a variety of purposes, such as debt consolidation, home renovation, wedding expenses, education, or other large purchases. The money borrowed must be repaid, with interest, in regular installments

by a predefined date. Defaulting on a personal loan could cause significant damage to a customer's credit worthiness and result in loss of capital for the lender.

Setting:
You are working in the consumer lending modeling team of a hypothetical financial institution (XYZ) and are assigned to build a model for use in an automated credit approval process for personal loans. You are given Personal Loan performance data containing one binary response called 'Status' and a set of predictor variables from those Personal Loan accounts. Each record in the data represents a unique account.

There are two datasets:

1. Training data with 20,000 accounts for calibrating the models
2. Testing data with 5,000 accounts for evaluating the models. Additional information about the data is available in the data section.

Objectives:
You are expected to:

1. Conduct an exploratory analysis of the data, provide data summary, and make any necessary data pre-processing for modeling.
2. Fit a logistic regression (LR) model, assess its performance, and interpret the results.
3. Develop a machine learning (ML) model using one of the following algorithms:
    - Decision Trees
    - Gradient Boosting
    - Feedforward Neural Networks
4. Compare the results from the LR model and the ML model and make a recommendation of which one to use for approving applications for Personal Loan. Please clearly state your reasons.
5. Describe how you would use the selected model for credit approval and address the following business questions:
    - Suppose an application is rejected using your model, and the applicant asks for a reason. How would you explain the results to the customer?
    - Do female customers have lower approval rate in your model?
6. What additional data you would you collect to improve your model performance?

Deliverables and guidelines:

1. **Report saved as pdf file.** No more than 12 pages (font size 11 and spacing 1.2). Include all the important figures, tables, and discussion in the body of the report. A reference is needed if any published scholarly work and open-source software are quoted or referenced in your project. An appendix for additional figures/tables is optional but no more than 5 pages.

   The report should describe all important steps in data analysis, model development, model interpretation, and justification for your final model selection. Business questions should be addressed in a clear and logical structure. Conclusion and recommendation, if there are any, should also be effectively communicated.

2. **Code Submission.** You should use Python, R, or SAS. The code should contain all the related processes for data analysis, model estimation, and model performance evaluation with adequate annotation for review purposes. Please list the software packages and versions, if appropriate, in a readme file.

3. **Slides saved as pdf file.** No more than 12 slides that summarizes your results and conclusions. On Superday, you will be given a 30-minute go over these slides in front of an interview panel and answer related questions after the presentation. Your presentation is intended for an audience with diverse backgrounds. They can be the business managers with the credit decision knowledge, but not necessarily knowing all the technical details in your models.

Note: Textbooks, published papers, websites, and other open literature can be used as reference for this job simulation. Please ensure that the documents and codes that you submit are your own analysis and writing. If any published scholarly work and open-source software are quoted or referenced in your project beyond what is generally known, please include a list of references in the report.

Description of data:

Variable	Description
Mortgage	Total Home Mortgage Balance Amount
Card Utilization	Ratio of Credit Card balances to max limit
Card Balance	Overall Credit Card balances in current month
Card Balance_3m	Overall Credit Card balances in the last 3 months
Card Balance_6m	Overall Credit Card balances in the last 6 months
Card Balance_12m	Overall Credit Card balances in the last 12 months
Amount Past Due	Total Amount Past Due
Delinquency Status	Total number of trades ever derogatory including collections (excluding satisfied medical collections)
Credit Inquiry	Total number of inquiries made in current month
Open Trade*	Total number of open trades presently satisfactory reported in current month and trades are opened 12 months or older
Credit Inquiry_3m	Total number of inquiries made in the last 3 months
Open Trade_3m	Total number of open trades presently satisfactory reported in the last 3 months and trades are opened 12 months or older
Credit Inquiry_6m	Total number of inquiries made in the last 6 months
Open Trade_6m	Total number of open trades presently satisfactory reported in the last 6 months and trades are opened 12 months or older
Credit Inquiry_12m	Total number of inquiries made in the last 12 months
Open Trade_12m	Total number of open trades presently satisfactory reported in the last 12 months and trades are opened 12 months or older
Delinquency Status_3m	Total number of trades ever derogatory including collections (excluding satisfied medical collections) in the last 3 months

Variable	Description
Delinquency Status_6m	Total number of trades ever derogatory including collections (excluding satisfied medical collections) in the last 6 months
Delinquency Status_12m	Total number of trades ever derogatory including collections (excluding satisfied medical collections) in the last 12 months
DDA Balance_9m	Minimum DDA Balances with XYZ bank in last 9 months DDA stands for Demand Deposit Accounts such as checking and saving accounts
Gender	=1 if gender is Male
Race	=1 if race is White
Race Category	Race by category
Status	=1 Never delinquent or at most 29 consecutive days past due in the last 24 months

*Trade refers to specific credit account, such as credit card, loan, mortgage, or other credit-related agreement.