NORTHWESTERN UNIVERSITY | SCHOOL OF PROFESSIONAL STUDIES

MSDS 498: Performance Monitoring Guide

Getting Started

In the first stage of this capstone project we worked on model development. We used some of the most sophisticated methods in predictive modeling to examine our problem and benchmark the performance of these methods. The second state of the capstone project is to document the production model. In practice production models are limited to generalized linear models since they are easy to implement across different platforms. We will adhere to this practice in the capstone project and define the production model as the logistic regression model from the model development stage.

Production models cannot be left in production unmonitored. Every production model needs to have a defined performance monitoring plan that outlines how the model will be monitored, i.e. a set of performance metrics that should be tracked and the tolerances which define acceptable model performance. This rigidly defined monitoring plan is used to define the operational status of our production model – Red, Amber, or Green, and the actions that need to be taken with each status – model redevelopment, a reduction in the monitoring period to one half of the standard duration, no action needed. In the performance monitoring guide we will provide a detailed and exact description of this monitoring plan and outline some additional heuristic model validations related to both model performance and model stability to be performed at each periodic model validation.

Note – All model documents should be self-contained. In this document we will re-present some material from the model development document, and in the model validation document we will re-present some material from the performance monitoring plan.

General Paper Guidelines

The general guidelines are as follows.

(1) The paper should follow the prescribed final paper format outlined in this guide.

(2) The paper should be well written. The formats are designed to help you with the overall paper structure. The remainder of the presentation is left to you.

(3) The term data is the plural of datum. We should write 'the data are', not 'the data is'.

(4) The body of the paper should be between five and ten pages, double spaced. The title page, the bibliography, and any relevant appendices do not count against the page count.

(5) Graphics and tables should be labeled so that they can be referenced. Typical labels are 'Figure 1' and 'Table 1'. Graphics and tables should also be large enough to be easily read and centered in the page.

(6) All papers should have page numbers on each page in the lower right hand corner.

General Grading Guidelines

Your final paper is worth a total of 150 points. Here is how those points will be broken down. Students are expected to follow the instructions for the paper format and content provided in this guide.

(1) The Production Model (50 points)

(2) Model Development Performance (50 points)

(3) Performance Monitoring Plan (50 points)

Final Paper Format

Here is an outline for the format of your model development documentation. Students are expected to follow this prescribed format. In addition all papers should contain a title page.

Title:

Model #101: Credit Card Default Model

Performance Monitoring Plan

1. The Production Model

- Provide a detailed overview of the production model. Borrow heavily from your model development guide. Provide a thorough description of the model.

- Remember that an overview of a GLM model typically includes a table of the model coefficients.

2. Model Development Performance

- Present the model performance on the train and test data sets for the production model for easy reference.

- Extend the model performance measures to include the ROC curves and the AUC statistics for the train and test data sets.

- Produce a lift chart (in table format) and compute the Kolmogorov-Smirnov (KS) statistic for the train and test data sets. Use twenty groups to produce your lift chart. These groups are called semi-deciles or half-deciles.

3. Performance Monitoring Plan

- The performance monitoring plan is based on defining a RAG (Red-Amber-Green) status. Create a table outlining the metric threshold for the KS statistic that determine each status. Decide if you want to use a percentage change or an absolute change in the KS statistic to define the performance status.

- The actions are defined as follows: Red – Model needs redevelopment; Amber – Model needs to be re-validated in three months; Green - Model is performing as expected. Model will be re-validated at the standard interval of six months. Display this information in a table.