ISE/OR 560 Project Report Guidelines

Reports are due on Friday, Dec. 6th at 11:59pm

Lenovo is concerned with predicting customer and improving customer satisfaction. They would like to be able to understand those factors that are driving customer satisfaction based on the discussions customers have on the web regarding their products and the feedback they receive from customers via the Net Promoter Score (NPS) survey. They currently collect sentiment scores based on third party analysis of weekly web scrapping to understand the customer's view of a product. However, Lenovo uses customers' responses to the NPS survey as their primary measurement of customer satisfaction (surveys are sent to customer in the first 30 days of their purchase but it takes time to collect them and get enough responses to be relevant). Unfortunately, feedback from the NSP survey results arrives rather late (~ six months after product release) in the product life cycle, so Lenovo would ideally like to be able to predict NPS score based on the customer sentiment. Their hope is that they can use this information to tell them what their customers care about and inform timely response to customer concerns. When customers use laptops, telemetry data are sent to Microsoft. Telemetry is an automated communications process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring. Telemetry data starts the moment a machine is powered on. These data are live PC Diagnostics including the following Performance Metrics: Battery Life, Wireless Connectivity, and Reliability (Crashes). Current telemetry data is a 28-day view of system performance. Lenovo wants to explore how they can leverage telemetry data to take action on issues and understand sentiment and NPS. Lenovo has provided data for several consumer and commercial products over a eighteen month to two-year period for the sentiment scores with the corresponding raw customer comments and the NPS survey responses. In addition, Lenovo has provided battery life, wireless connectivity and reliability data. You have been charged by Lenovo with four major tasks:

(i) Utilizing predictive analytics methods (such as regression) to predict customer satisfaction using customer sentiment data. Exploring alternative metrics of measure for quantifying customer satisfaction in addition to pNPS and sentiment based on your analysis of the data.

(ii) Developing a stochastic model of the evolution of sentiment and satisfaction. You are asked to use the provided data to explain the evolution of customer's perceptions of various Lenovo products following release over time and describe the "natural history model" of this process.

(iii) Identify important factors that influence customer satisfaction and how these factors evolve over time (e.g., what factors are important to the customer immediately after release or when they receive the product compared to after they have had the product for three to six months).

(iv) Finding optimal rules for intervening to influence customer satisfaction based on learnings from sentiment.

Your analysis *must* use the three customer focused datasets and your analyses (as described above) to answer the following questions:

1. How can Lenovo use CID sentiment/stars data to predict pNPS survey scores?
2. How does Telemetry data influence pNPS Survey Scores? How does Telemetry data influence sentiment/stars data?

3. Can you predict the pNPS score from CID sentiment data and the influence of telemetry data? Your model will be tested on the following products:
    1. Yoga C930 (NOT Yoga Book C930)
    2. Ideapad 330s
    3. Yoga 730
    4. Legion Y730
    5. Bonus – T490
4. What should Lenovo focus on to improve pNPS? What should Lenovo focus on to improve Total pNPS for all products? What should Lenovo focus on to improve pNPS for the bottom 3 Customer and bottom 3 Commercial products?
5. What impact do the product stars have on the analysis?
6. Do you recommend any changes to Lenovo's data collection methods?
7. Anything else you discover…

REPORT GUIDELINES:

Develop an *eight-page* (excluding appendices and executive summary) report for the client that describes your recommendations and justifies/supports them. Your report should be written professionally (do not use casual language – for example: do not use contractions, e.g., "can't" should be "cannot"). Reports should be in Times New Roman font (12 point), 1.5 spacing, and 0.75in margins. Plan to embed critical figures and tables in the text and use the appendices for supplemental information.

Figures/Tables: Figures should be labeled, numbered and have descriptive captions (Figure caption should be at the bottom of the figure). Similarly, tables should be labeled and numbered with a descriptive caption (Table heading belong at the top of the table). All figures and tables must be referenced within the text.

Reports should include:

1. Executive Summary: One-page executive summary that highlights your objectives, recommendation, methods, and key findings. This should be written to your clients: Ms. Amber Williams, Data Analytics Engineer, and other members of the Lenovo leadership team.

2. Introduction: Briefly describe the context, the problem and the aspects of the problem your recommendations will address and why you felt it was most important to address these particular aspects of the problem. Describe: what your project will focus on and how you will go about addressing the concerns raised by our Lenovo clients. Define the questions your analysis will answer and your project goals and objectives.

3. Methodology: Describe the methods used to model and analyze the data. Include key modeling assumptions and justify. Use Figures and/or Tables to illustrate model and summarize model assumptions.

4. Results: Discuss the results of your statistical and Markovian analyses. Explain your results and summarize your key findings from your analysis. You may use an appendix to include additional supporting analyses. You must reference the appropriate sections of the appendix in the corresponding areas of the report. Figures and Tables should be used to summarize key results and illustrate key findings.

5. Recommendations: Present recommendations and link them to your supporting key findings and analytical results. Present data driven analysis to support all of your recommendations. Explain all recommendations and findings in the context of Lenovo's problem – what are the implications of your findings for Lenovo. For example, it is not sufficient to say "the Markov chain is ergodic so steady state probabilities can be calculated" by itself this has no meaning – particularly to the client.

6. Summary/Conclusions: Briefly summarize the key take-aways from your analysis. Include a brief discussion of limitations. In this section you should recap the important elements of your report – what are the key findings you want the client to take-away from your work.

7. Appendix: Include supporting analysis. Sections of the appendix should be *appropriately labeled* **and** *referenced in the text (use specific references, e.g., Appendix A)*. The appendix is not a dumping ground, anything in the appendix should be labeled appropriately so that it is self-explanatory and can stand alone.