SCM 651: Business Analytics

WEEK 8

Agenda

Review of homework #3 (Regression and Optimization)

Overview of homework #4 (Logit, Probit, Neural networks: info in week 9 videos)

Review of hands-on exercises

Group discussion of articles

- What Businesses Can Learn from Sports Analytics
- Team GB: Using Analytics (and Intuition) to Improve Performance

Homework #3

1. Graph, regression, calculated sales, revenue, profit
2. Constrained optimization
3. Discussion of risks, other data which would be valuable

Homework #4

1. Logit and probit analysis (see week 9)
2. Moderating effects (week 7)
3. Final logit & probit models with interaction effects (moderating effects), prediction of outcome, sensitivity analysis
4. Neural network analysis
5. Neural network prediction model and sensitivity analysis (new material in handout in week 9)

Week 8 - Review

Regression Assumption #1: linearity

- Violation: non-linear data
- Solution: logarithm, square, inverse, other

Regression Assumption #2: X variable are not correlated

- Violation: multicollinearity
- Solution: drop or combine variables

Week 8 - Review

Regression Assumption #3a: errors are random with constant variance

- Violation: heteroscedasticity, or wedge shape to error terms in scatterplot
- Solution: logarithm, square, inverse, or Huber regression

Regression Assumption #3b: error terms are correlated

- Violation: serial correlation
- Solution: rho differencing

Regression Assumption #3c: outliers

- Violation: outlier influences slope of line
- Solution: drop outlier data points

Week 8 - Review

Benford's law

- Financially reported numbers tend to start with smaller digits

Decision trees

- Use entropy reduction to reduce the amount of error in the data to make a decision
- Identify the most important variables in making a decision
- Create a series of rules to make a decision

What Businesses Can Learn from Sports Analytics

- Describe the five key lessons of analytics in sports (give an example of each)

Article #1: What Businesses Can Learn from Sports Analytics

- Describe the five key lessons of analytics in sports (give an example of each)
  - **Align leadership at multiple levels**
    - Player acquisition, player payment, strategies for performance
  - **Focus on human dimension**
    - Individual-level game performance
    - Performance in context (plus/minus analysis)
  - **Exploit locational data**
    - NYY player acquisition based on homerun measurement
  - **Broader ecosystem (partnerships)**
    - Business operations, dynamic ticket pricing, digital strategy
  - **Support "analytic amateurs"**
    - Players becoming analytics specialists

Article #2: Team GB: Using Analytics (and Intuition) to Improve Performance

Team GB: Using Analytics (and Intuition) to Improve Performance

- What is the value of predicting team performance? (page 2)
- What is the biggest challenge? (page 2)
- What are some of the barriers? (page 3)
- Where is the power of the data? (page 5)

Article #2: Team GB: Using Analytics (and Intuition) to Improve Performance

Team GB: Using Analytics (and Intuition) to Improve Performance

- What is the value of predicting team performance? (page 2)
  - Priorities: GB only funds sports which are likely to produce medals
- What is the biggest challenge? (page 2)
  - Difficulty in collecting data – some sports are hard to collect
- What are some of the barriers? (page 3)
  - Elite coaches rely on experience, rather than data
- Where is the power of the data? (page 5)
  - Longitudinal data rather than snapshots

Upcoming assignments

1. Homework –

Homework #4 due before live session #10

Submissions instructions:

a) Each team member submits the same team documents in the 2SU site: MS Word homework assignment

b) One team member emails a copy of the team assignment (MS Word and Excel document) to lflee100@syr.edu noting both the team name and day/time of class

2. Hands-on: Week 9 online materials

Advanced R: Logit, Probit, Perceptrons, Neural Networks

Complete before our next live session