SCM 651: Business Analytics

Week 8

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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

3 Homework #3
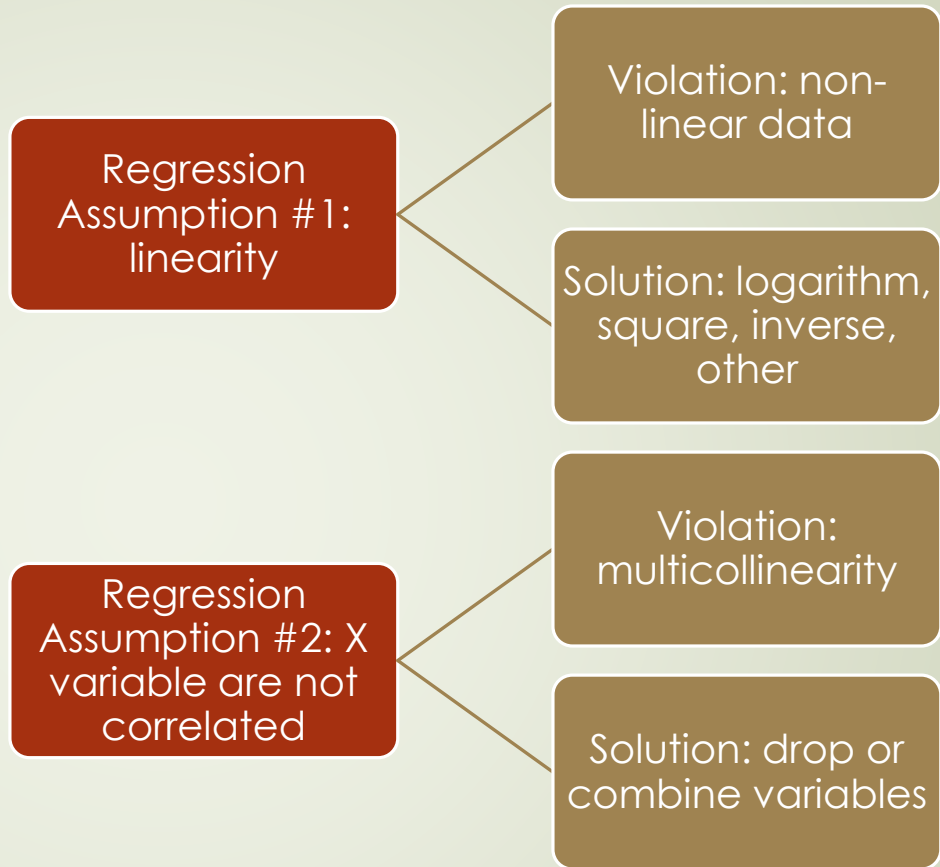
GRAPH, REGRESSION, CALCULATED SALES, REVENUE, PROFIT

CONSTRAINED OPTIMIZATION

DISCUSSION OF RISKS, OTHER DATA WHICH WOULD BE VALUABLE

4

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
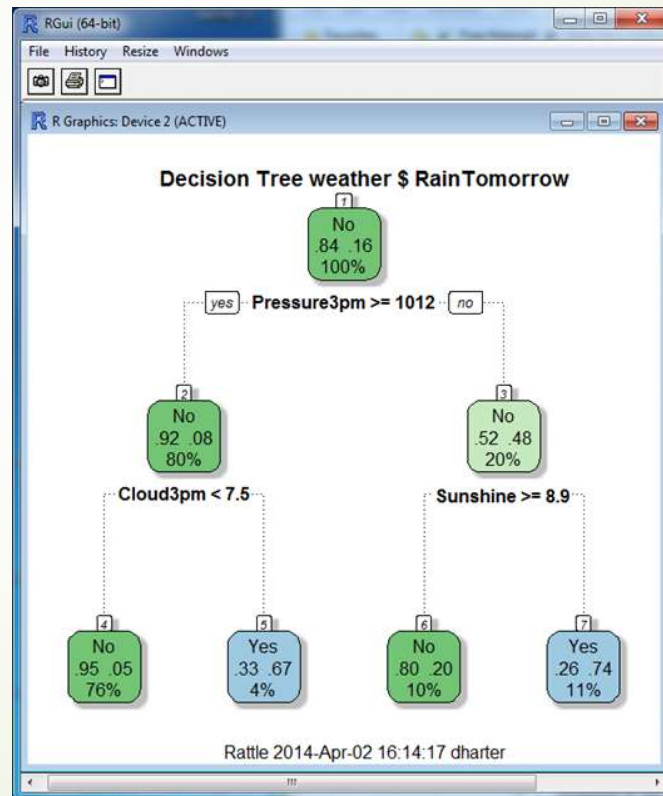 - Solution: drop outlier data points

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Week 8 - Review

Benford's law

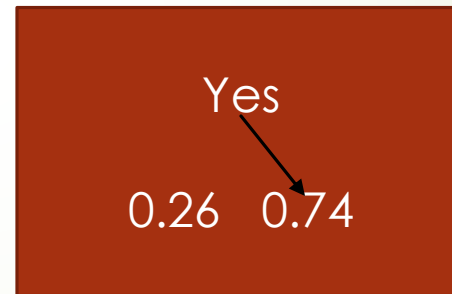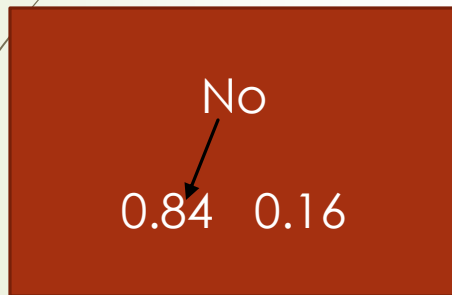- Financially reported numbers tend to start with smaller digits

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
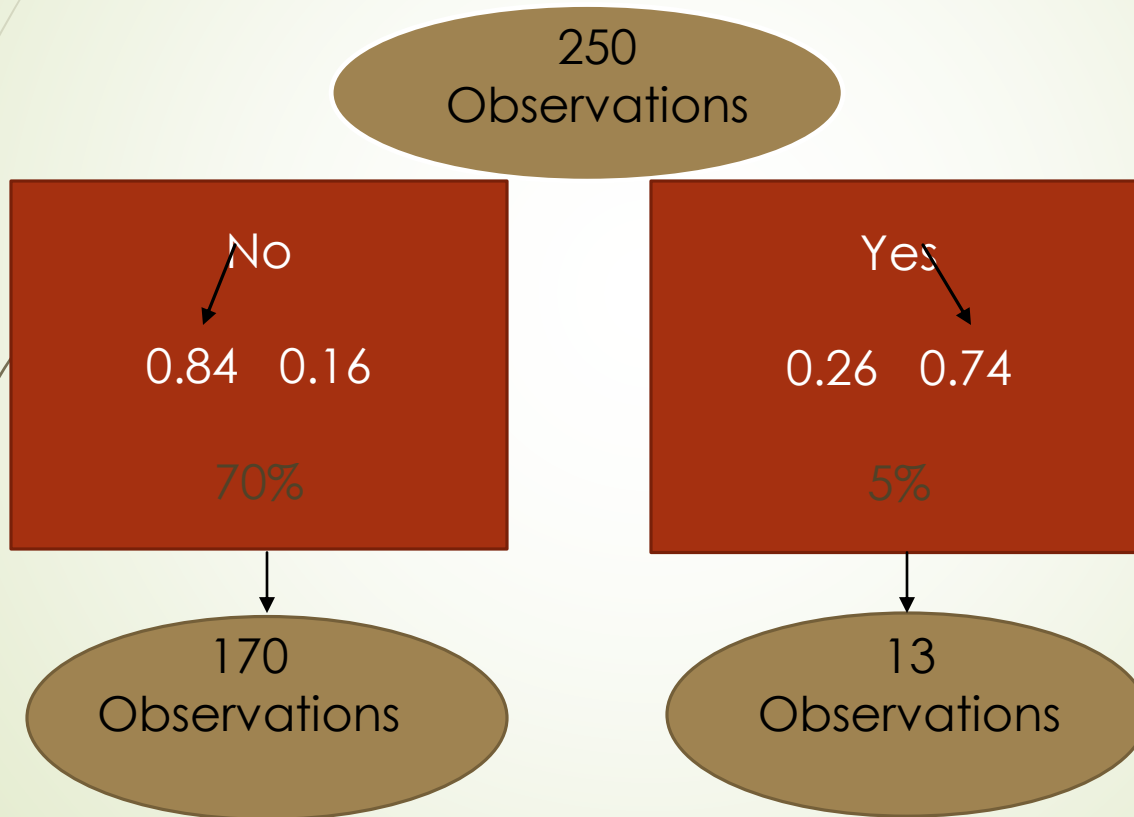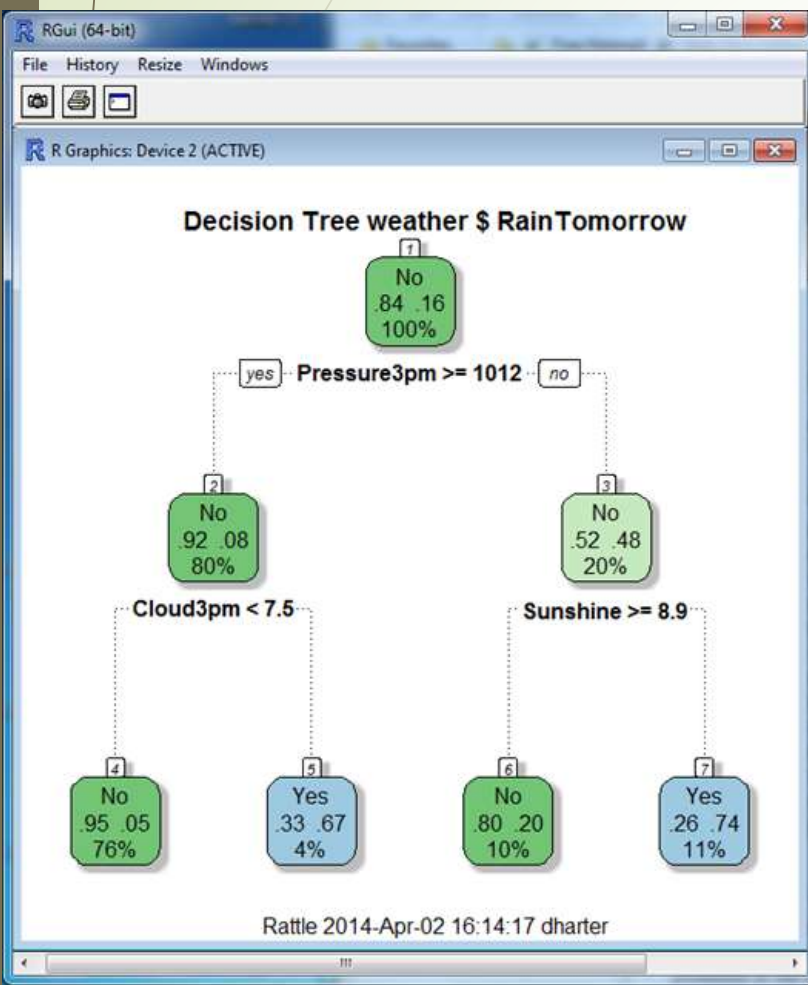
Decision Tree - How to read

Decision Tree

No	Yes
0.84 0.16	0.26 0.74

Decision Tree

250
Observations

No

0.84   0.16

70%

Yes

0.26   0.74

5%

170
Observations

13
Observations

Decision Tree weather $ RainTomorrow

No
.84 .16
100%

yes — Pressure3pm >= 1012 — no

No
.92 .08
80%

No
.52 .48
20%

Cloud3pm < 7.5

Sunshine >= 8.9

No
.95 .05
76%

Yes
.33 .67
4%

No
.80 .20
10%

Yes
.26 .74
11%

Rattle 2014-Apr-02 16:14:17 dharter

84% Chance of No Rain (250 Obs)

92% chance of No Rain if Pressure>=1012 (200 Obs)

52% chance of No Rain if Pressure<1012 (50 Obs)

95% chance No Rain if Pressure>=1012 and Cloud<7.5 (190 Obs)

67% chance Rain if Pressure>=1012 and Cloud>7.5

80% chance No Rain if Pressure<1012 and Sun>8.9 (25 Obs)

74% chance Rain if Pressure<1012 and Sun<8.9 (10 Obs)

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)

Business Analytics

Article #1: What Businesses Can Learn from Sports Analytics

- 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

- 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