“Innovative” Instruction for Business Analytics

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Outline

Impact of analytic emphasis on courses
  More content
  More students
  More diverse students

Leverage technology
  Inside the classroom
  Outside the classroom
Business Analytics

What is Business Analytics?

Depends on who you ask…

   Marketing
   Accounting
   Management
   …

Business Analytics differs from Stat

   Greater emphasis on business context
   Communication
Business Context

Analysis must have realistic context

Problem has to be well motivated
For example, regression analysis should begin with a question rather than with several anonymous columns in a spreadsheet

Solution needs to communicate an answer
“The confidence interval for the slope is [-2.8 to -2.0]” isn’t enough.

Technical skills remain necessary
Identify the appropriate statistical technique
Choose between paired or two-sample comparison, for example.

Do the calculations correctly
Increasingly the domain of software
Consequence

More to teach

Business application + Statistical analysis

Often in less time

Two-semester courses are less common

And to bigger classes

Analytics now a very popular major (STEM)

Three sections @ 120 each, one TA

How to manage this?
Approach

Business context

Lecture starts with business question
Defer details of context to the textbook

Example

Hard problem: Regression with logs, elasticity
Varying background of students is a problem.
Some have little Econ, see linear demand curves.
Few appreciate logs.

Connect to obvious problem: optimal price
Elasticity used to set optimal price

Along the way: relate logs to percentages
“Variation on log scale is relative variation” “Diff of logs ≈ Pct diff”
Role of Technology

After problem introduction...

Reinforce, expand discussion at “blackboard”

Slide deck is too passive, for both me and my students
Research shows writing important for retention
Works with large room much better than whiteboard
Save and post after class
Role of Technology

After the blackboard discussion…

“Real time” data analysis

Open data file, perform analysis, make choices interactively
Exploit interactive modern software
Role of Technology

After the computing and review of slides...

Collaborative quizzes
Grade attendance so they help each other
Short, less than 10 minutes total
Immediate feedback to them — and to me (Canvas summary statistics)

Quiz Instructions
Answer the following four questions. Collaboration is encouraged, so talk with your classmates. All of the questions concern the following regression analysis, so read this part first.

Rather than regress prices of used cars on the ages of the cars as done in class on Monday, a data analyst instead regressed prices of these cars on the mileages of the cars, obtaining the following results.

The fitted least squares line is

\[ \text{Estimated price} = 39,000 - 0.24 \text{ Mileage} \]

with \( r^2 = 0.37 \)  with \( \sigma_e = 4,500 \)

Results in real time

<table>
<thead>
<tr>
<th>Question 1</th>
<th>1 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>The correlation between miles driven and price is approximately</td>
<td></td>
</tr>
<tr>
<td>-0.37</td>
<td></td>
</tr>
<tr>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>-0.6</td>
<td></td>
</tr>
</tbody>
</table>

The correlation between miles driven and price is approximately

-0.37 respondents 3 %
-0.6 respondents 79 %
0.6 respondents 13 %
0.37 respondents 5 %

Attempts: 300 out of 300
Role of Technology

Inside the classroom

Team quizzes, collaborative
Grade attendance so they help each other
Short, 10 minutes total
Immediate feedback to them and to me (Canvas summary statistics)

“Interactive” iPad discussion
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“Real time” data analysis
Open data file, perform analysis, make choices interactively
Exploit interactive modern software

Slide deck as a review
End class by reviewing slides
Defer details, tangential comments
Role of Technology

Supplements outside the classroom

Software movies
Desktop recordings show “how to do it”
Allows classroom session to move without need to show every detail
Role of Technology

Supplements outside the classroom

Piazza collaborative e-mail

Students can answer questions

Answer the question once, not many many times
Role of Technology

Supplements outside the classroom

Online, randomized assignments (MyLab)

Give them multiple attempts

Requires students to use software

<table>
<thead>
<tr>
<th>Order</th>
<th>Ch.</th>
<th>Assignment Name</th>
<th>Category</th>
<th>Assigned</th>
<th>Start</th>
<th>Due</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2-4, 7-9, 12, 13</td>
<td>Background review</td>
<td></td>
<td>✓</td>
<td>01/03/11</td>
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<tr>
<td>2</td>
<td>14-17</td>
<td>Confidence intervals and tests</td>
<td></td>
<td>✓</td>
<td>01/10/11</td>
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<tr>
<td>3</td>
<td>18, 19</td>
<td>Association and linear patterns</td>
<td></td>
<td>✓</td>
<td>01/17/11</td>
<td></td>
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<tr>
<td>4</td>
<td>19, 20</td>
<td>Fitting lines and logs, residuals</td>
<td></td>
<td>✓</td>
<td>01/21/11</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>20, 21</td>
<td>Simple regression model</td>
<td></td>
<td>✓</td>
<td>02/15/11</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>21, 22</td>
<td>Inference in the SRM</td>
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<td>✓</td>
<td>02/15/11</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>23</td>
<td>Multiple regression</td>
<td></td>
<td>✓</td>
<td>02/15/11</td>
<td></td>
</tr>
</tbody>
</table>

Suppose the accompanying data represent the number of cans of pet food sold and the selling price. Complete Click the icon to view the data table.

(a) Transform the price and volume data using natural logs and then using base 10 logs. Then plot the natural base 10 log of volume on the base 10 log of price. What’s the difference in your plots?

Choose the correct scatterplot using the natural logarithms.

Choose the correct scatterplot using the base 10 logarithms.
Role of Technology

Supplements outside the classroom

BlueJeans online office hours

Schedule help sessions in evening, fewer scheduling conflicts
Many can participate without crowding
Like Skype, but easy for students to use

https://bluejeans.com/2158983114
Role of Technology

Outside the classroom

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Summary

BA brings challenges handling expanded content and increased enrollment

Adjusting the “usual” course

Motivate stat methods with business problems

Exploit technology where possible

In the classroom…

Interactive data analysis, iPad blackboard, collaborative quizzes

Outside the classroom…

Piazza email, Bluejeans shared office hours, software movies
Randomized assignments

How’d it go?

I’ll tell you when its done!