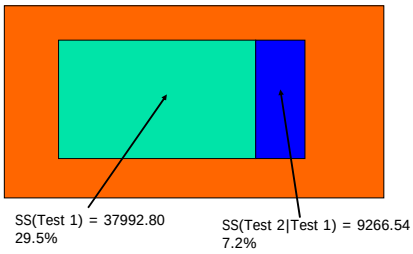
Stat 401 B – Lecture 16

Sums of Squares

- SS(C. Total) = 128647.74
- SS(Test 1) =37992.80
  - Test 1 explains 29.5%
- SS(Test 2|Test 1) = 9266.54
  - Test 2 adds 7.2%

Sums of Squares

SS(C. Total) = 128647.74



Sums of Squares

- SS(C. Total) = 128647.74
- SS(Test 2) =21467.35
  - Test 2 explains 16.7%
- SS(Test 1|Test 2) = 25791.99
  - Test 1 adds 20.0%

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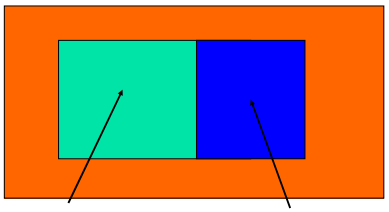
Sums of Squares

SS(C. Total) = 128647.74



SS(Test 1|Test 2) = 25791.99
20.0%

SS(Test 2) = 21467.35
16.7%

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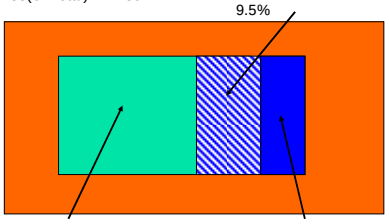
Sums of Squares

SS(C. Total) = 128647.74

SS(shared) = 12200.81
9.5%



SS(Test 1|Test 2) = 25791.99
20.0%

SS(Test 2|Test 1) = 9266.54
7.2%

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Summary – Test 2

- Test 2 is not linearly related to Evaluation.
  - t=2.05, P-value=0.0530
- Test 2 does not add significantly to the model that already contains Test 1.
  - t=1.51, P-value=0.1469

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Summary – Test 2

- Test 2 does not add significantly to the model that contains both Test 1 and Test 3.
  - t=1.36, P-value=0.1909
- Test 2 does add significantly to the model that already contains Test 1, Test 3 and Test 4.
  - t=3.57, P-value=0.0022

Possible Models

- With 4 explanatory variables there are $2^4 - 1 = 15$ possible models.
  - 4 – 1 variable models
  - 6 – 2 variable models
  - 4 – 3 variable models
  - 1 – 4 variable model

Which is "best"?

- A model must be useful.
- All variables must add significantly to the model.
- Among models that satisfy the above, choose the model with the highest R^2.

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1 – variable models

- Test 1 – useful, R^2 = 0.295
- Test 2 – not useful
- Test 3 – not useful
- Test 4 – useful, R^2 = 0.343

2 – variable models

- Test 1, Test 2 – useful, no
- Test 1, Test 3 – useful, yes, R^2 = 0.480
- Test 1, Test 4 – useful, yes, R^2 = 0.551
- Test 2, Test 3 – not useful
- Test 2, Test 4 – useful, yes, R^2 = 0.655
- Test 3, Test 4 – useful, no

3 – variable models

- Test 1, Test 2, Test 3 – useful, no
- Test 1, Test 2, Test 4 – useful, yes, R^2 = 0.739
- Test 1, Test 3, Test 4 –useful, yes, R^2 = 0.663
- Test 2, Test 3, Test 4 – useful, no

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4 – variable models

- Test 1, Test 2, Test 3, Test 4
- Useful.
- All variables add significantly.
- R^2 = 0.803

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Eligible Models

- Test 1 – R^2 = 0.295
- Test 4 – R^2 = 0.343
- Test 1, Test 3 – R^2 = 0.480
- Test 1, Test 4 – R^2 = 0.551
- Test 2, Test 4 – R^2 = 0.655
- Test 1, Test 2, Test 4 – R^2 = 0.739
- Test 1, Test 3, Test 4 – R^2 = 0.663
- Test 1, Test 2, Test 3, Test 4 – R^2 = 0.803

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The “best” model.

- The model that is useful, has all variables adding significantly and has the highest R^2 is the model that contains all four variables – Test 1, Test 2, Test 3, Test 4.

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