Psych 216A: Statistics and data analysis in MATLAB

Lecture 6: Model reliability

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Error bars on model parameters via bootstrapping

True model
\( y = 0.5x + 2 \)

Model to be fitted
\( y = ax + b \)

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Model to be fitted
\( y = ax + b \)
Correlated regressors yield correlated errors

Model:
\[ y = w_1 x_1 + w_2 x_2 \]

- \( x_1 \) and \( x_2 \) uncorrelated

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Distinction between accuracy and reliability

![Diagram showing the distinction between accuracy and reliability with data points and fitted models.]

- **Accurate**:
  - Reliable
  - Inaccurate

- **Unreliable**:
  - (not common)
Bootstrapping and cross-validation applies to all models

- Linear: \( y = ax + b \)
- Linearized: \( y = ax^2 + bx + c \)

Use bootstrapping to estimate model reliability

Use cross-validation to estimate model accuracy

- Parametric nonlinear: \( y = ax^n \)
- Nonparametric nonlinear (Nearest-neighbor)

Cross-validated \( R^2 \) values:
- \( y = ax + b \)
- \( y = ax^2 + bx + c \)
- \( y = ax^n \) (Nearest-neighbor)