

Statistics 406 Topic List

1. Behavior of the sample mean:
 - Central Limit Theorem (CLT) for *iid* data
 - Higher order moments
 - Effects of data transforms on the mean
 - Examples where the CLT does not apply
 - Behavior of the sample mean for correlated data
2. Introduction to the sampling distribution of a statistic:
 - Bias
 - Variance
 - MSE
 - Relative efficiency
3. Sampling variances for specific estimation problems:
 - Log odds ratio
 - Quantiles
 - Regression slope
 - Ratios of expected values
 - Means based on truncated, censored, and missing data
4. Confidence intervals:
 - Nominal and actual coverage probabilities
 - Effects of plugging in nuisance parameters
 - Bootstrap confidence intervals
5. Hypothesis testing:
 - Power and level
 - Contingency tables: χ^2 and Fisher's exact test
 - Rank-based tests for location differences
 - Permutation tests for location differences
6. Conditional probability

- Bayes' theorem
- Conditional expectation and variance
- Double expectation theorem and law of total variation

7. Prediction and classification performance:

- Prediction and classification methods
- Cross-validation
- Regularization

8. Correlation coefficients

- Sampling behavior and hypothesis tests
- Robust estimates
- Behavior with autocorrelated data

9. Cluster analysis

- Methods for identifying clusters
- Stability and significance

10. Extreme values

11. Multiple testing

- Bonferonni method
- False Discovery Rate (FDR)