

Lecture 33: Sufficiency and Rao-Blackwell

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Sufficient statistics

Question: Given an unbiased estimator, can I improve its variance?

- ▶ Answering this requires us to introduce a new concept:
sufficient statistics

Definition (sufficient statistic):

Example

Suppose $X_1, \dots, X_n \stackrel{iid}{\sim} \text{Poisson}(\lambda)$

Example

Suppose $X_1, \dots, X_n \stackrel{iid}{\sim} \text{Bernoulli}(p)$

Rao-Blackwell

Example

Suppose $X_1, \dots, X_n \stackrel{iid}{\sim} \text{Poisson}(\lambda)$

Factorization theorem