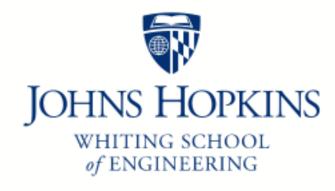
# Johns Hopkins Engineering 625.464 Computational Statistics

Jackknife Methods

Module 8 Lecture 8C



## Jackknife Methods

Suppose we have a random sample 1, ..., In which we use to compute a statistic T as on estimator of some parameter Dof the population from which the Yi were drawn.

We would like to know characteristics of the distribution of the estimator T of D.

- expected value - variance - bia ?

B. T.

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### Jackknife Estimators

If we had enough time we could generate S samples  $Y^{(i)}, Y^{(s)}$  and compute  $T^{(i)}$  for each.

The Jackknife Sample Testimates O and is based on Ji..., Yn 71, ..., Yn In the Jacknife Method we partition the into r groups of size K. n = KrConsider removing the jth group from the Sample i computing the new estimator T(-j) from the remaining r-1 groups

L) n-K

### The Jackknife

#### Comments on the Jackknifed T

$$(2) \quad \forall (\tau) = \tau + (\tau - 1) \quad \forall (3)$$

(3) In most applications 
$$K=1$$
  $\frac{1}{2}$   $K=1$ .

## Jackknife Variance Estimate

Basic idea: Although pseudovalues Tr are not independent, we treat them as if they were and use Var (J(T)) to estimate Var(T). We estimate V(T) with the sample vanance of the moan of the To  $\sqrt{T} = \frac{1}{2} \left( \frac{T'-J(T)}{r(r-1)} \right)$ 

## Comments on Jackknife Variance Estimate

(σ) V(T)<sub>T</sub> estimates V(T) (1) If t= the mean of \five K=1, then V(T) j is the standard variance rst. 1) Thou are other ways to obtain est variance & MC studies have shown that V(T) T is often conservative. 3) Another variant of V(T) j is sometimes used \( \frac{1}{3} (T; \frac{1}{3} - T)^2 \) \( \frac{1}{3} (T) \)

#### The Delete-k Jackknife

Consider the Jackknife estimator of the variance of the sample median. If we leave out only one observation at a time the median of the reduced sample will always be one of two values.