PhD Course on "Ranked Set Sampling"

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The Ph D course consists of nine seminars with presentations of the content of the Springer book: Lecture Notes in Statistics 176, "Ranked Set Sampling", Theory and Applications by Zehua Chen, Zhidong Bai, Bimal K. Sinha.

Description of Ranked Set Sampling (RSS)

A general description of Ranked Set Sampling (RSS) procedure is as follows: First consider N independent i.i.d. samples each of size k from the same population:

$$\begin{aligned}&(X_{11}, ..., X_{k1})\\ &....\\ &(X_{1N}, ..., X_{kN})\end{aligned}$$

Then the elements of each sample are ranked by some mechanism (ranked with respect to a variable of interest, for instance by judgement without actual measurement) such that $X_{[1]j}$ is "better"than $X_{[2]j}$ in $j'th$ sample. We get

$$\begin{aligned}&(X_{[1]1}, ..., X_{[k]1})\\ &...\\ &(X_{[1]N}, ..., X_{[k]N}).\end{aligned}$$

Now from each sample only one(!) variable with a predefined rank is measured exactly.

$$\begin{aligned}(X_{[1]1}, ..., X_{[k]1})\ \ rank\ r_1 \quad &: \quad X_{[r_1]1}\\ &\quad ...\\ (X_{[1]j}, ..., X_{[k]j})\ \ rank\ r_j \quad &: \quad X_{[r_j]j}\\ &\quad ...\\ (X_{[1]N}, ..., X_{[k]N})\ \ rank\ r_N \quad &: \quad X_{[r_N]N}\end{aligned}$$

Sort it with respect to the ranks. Because the original samples are i.i.d. we can

renumber the measurements. Then the ranked set sample can be presented as:

$$
\begin{aligned}
&X_{[1]1} \ldots X_{[1]n_1} \\
&\ldots \\
&X_{[r]1} \ldots X_{[r]n_r} \\
&\ldots \\
&X_{[k]1} \ldots X_{[k]n_k}
\end{aligned}
$$

with $\sum n_r = N$.

RSS is useful in situations, where sampling and ranking are easily carried out and cheaper than measuring.

Timetable

1. Seminar 4/5, 13.15 room 74118, Introduction, Chapter 2, Silvelyn Zwanzig
2. Seminar 6/5, 10.15 room 74118, Chapter 2, 3, Silvelyn Zwanzig
3. Seminar 11/5, 13.15 room NN , Chapter 3, Måns Thulin
4. Seminar 13/5, 15.15 room NN , Chapter 4, Saeid Amiri
5. Seminar 18/5, 13.15 room 74118, Chapter 4, Saeid Amiri
6. Seminar 20/5, 10.15 room 74118, Chapter 5, Måns Thulin
7. Seminar 24/5, 13.15 room 74118, Chapter 5, Måns Thulin
8. Seminar 27/5, 13.15 room 74118 (?), Chapter 6, Saeid Amiri