a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

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STAT 547, Empirical Likelihood
2021/2022, Term 2
Instructor: Jiahua Chen

Time and Place: ESB 1042 (Projected)

Description: Likelihood-based approaches have many good properties: under regularity conditions on the statistical model, the maximum likelihood estimator is asymptotically normal and has the lowest possible asymptotic covariance matrix; the likelihood ratio test generally has superior power and a convenient chi-squared limiting distribution. These statements are given, however, by implicitly assuming the user can come up with a defensible parametric model for the data and the problem. In many industries, users are reluctant to put forward a parametric model for various reasons. Can there be a nonparametric likelihood that possesses most of the nice properties of the parametric likelihood? The groundbreaking work of Owen (1988) on the empirical likelihood (EL) confirms this possibility. His initial developments focus on inferences on parameters that can be regarded as population means or regression parameters. Qin and Lawless (1994) greatly empower the EL by introducing estimating equations (EE) under this umbrella. Qin nearly single-handedly shows how to use EL-EE to solve a class of biased sampling problems in statistics. His work on Density Ratio Models motivates the development of the Long Term Monitoring test as part of the effort of the forestry product team in the department. This course aims to help students to understand the motivation, techniques and the conclusions contained in a series of research papers. Students may use this course as a step-stone to develop their own EL projects as well as employ the EL knowledge in other projects.

Prerequisites: Stat 460/560, Stat547 and Stat 305 are recommended.

Textbook/course material: Lecture notes together with related research papers will be posted on canvas.

References:

Art Owen (2001). Empirical Likelihood. Chapman and Hall.
Jing Qin (2017). Biased Sampling, Over-identified Parameter Problems and Beyond. ICSA Book Series in Statistics. Springer.

Website: Canvas will be used to post additional course information.

Evaluation: Five-assignment problems plus a mini-project in the form of a 10-page research report on related research papers. One may choose to write their own code in R to implement a method of their interest together with a read-me file.

Topics:

0. Preparation review of the literature.
1. Empirical likelihood for population means.
2. Empirical likelihood and estimating functions.
3. Empirical likelihood and biased sampling.
4. Empirical likelihood and its numerical problems.
5. Selected topics.