18   Generalized fiducial Inference: A Review

Jan Hannig (University of North Carolina)

R. A. Fisher, the father of modern statistics, proposed the idea of fiducial inference in the 1930's. While his proposal led to some interesting methods for quantifying uncertainty, other prominent statisticians of the time did not accept Fisher's approach because it went against the ideas of statistical inference of the time. Beginning around the year 2000, the authors and collaborators started to re-investigate the idea of fiducial inference and discovered that Fisher's approach, when properly generalized, would open doors to solve many important and difficult inference problems. They termed their generalization of Fisher's idea as generalized fiducial inference (GFI).

After more than a decade of investigations, the authors and collaborators have developed a unifying theory for GFI, and provided GFI solutions to many challenging practical problems in different fields of science and industry. Overall, they have demonstrated that GFI is a valid, useful, and promising approach for conducting statistical inference. The goal of this paper is to deliver a timely and concise introduction to GFI, to present some of the latest results, as well as to list some related open research problems. It is the authors' hope that their contributions to GFI will stimulate the growth and usage of this exciting approach for statistical inference.