Electronic Journal of Statistics
Vol. 9 (2015) 1738–1743
ISSN: 1935-7524
DOI: 10.1214/15-EJS990

Discussion of "Hypothesis testing by convex optimization"*

Fabienne Comte, Céline Duval and Valentine Genon-Catalot

Université Paris Descartes, MAP5, UMR CNRS 8145

MSC 2010 subject classifications: 62F03.
Keywords and phrases: Convex criterion, hypothesis testing, multiple hypothesis.

Received January 2015.

1. Introduction

We congratulate the authors for this very stimulating paper. Testing statistical composite hypotheses is a very difficult area of the mathematical statistics theory and optimal solutions are found in very seldom cases. It is precisely in this respect that the present paper brings a new insight and a powerful contribution. The optimality of solutions depends strongly on the criterion adopted for measuring the risk of a statistical procedure. In our opinion, the novelty here lies in the introduction of a new criterion different from the usual one (compare criterions (2.1) and (2.2) below). With this new criterion, a minimax optimal solution can be obtained for rather general classes of composite hypotheses and for a vast class of statistical models. This solution is nearly optimal with respect to the usual criterion. The more remarkable results are contained in Theorem 2.1 and Proposition 3.1 and are illustrated by numerous examples.

In what follows, we give some more precise details on the main results necessary to enlighten the strength and the limits of the new theory.

2. The main results

2.1. Theorem 2.1

In this paper, the authors consider a parametric experiment $(\Omega, (P_\mu)_{\mu \in \mathcal{M}})$ where the parameter set $\mathcal{M}$ is a convex open subset of $\mathbb{R}^m$. From one observation ω, it is required to build a test deciding between two composite hypotheses $H_X : \mu \in X$, $H_Y : \mu \in Y$ where X, Y are convex compact subsets of $\mathcal{M}$. Assumptions on the subsets X, Y are thus quite general and the problem is taken as symmetric (no distinction is done between the hypotheses such as choosing H_0 versus H_1). We come back to this point later on.

*Main article 10.1214/15-EJS1054.