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Hessian valuations

A new class of continuous valuations on the space of convex functions on $\mathbb{R}^n$ is introduced. On smooth convex functions, they are defined for $i = 0, \dots, n$, by

$$u \mapsto \int_{\mathbb{R}^n} \zeta(u(x), x, \nabla u(x)) \, [\mathrm{D}^2 u(x)]_i dx$$

where $\zeta \in C(\mathbb{R} \times \mathbb{R}^n \times \mathbb{R}^n)$ and $[\mathrm{D}^2 u]_i$ is the i-th elementary symmetric function of the eigenvalues of the Hessian matrix, $\mathrm{D}^2 u$, of u. Under suitable assumptions on ζ, these valuations are shown to be invariant under translations and rotations on convex and coercive functions.

The results presented in this talk are obtained in collaboration with Monika Ludwig and Fabian Mussnig.