A review of the book "Functional analysis and applied optimization in Banach spaces - Applications to non-convex variational problems" by Fabio Botelho, Springer, Cham, Switzerland, 2014.

The book is about the use of convex duality to relax and approximate numerically the solutions to infinite-dimensional non-convex variational problems arising in mathematical physics. It follows the route paved extensively in the landmark book [I. Ekeland, R. Temam. Convex analysis and variational problems. Elsevier-North Holland, Amsterdam, 1976] re-edited in 1999 by SIAM.

The book is structured into three parts: I) basic functional analysis; II) variational convex analysis; III) applications. In parts I and II are gathered standard results found in many authoritative references on functional analysis, convex analysis and calculus of variations. A few novelties are scattered here and there, for example section 11.3 contains an alternative proof of a Lagrange duality theorem in Banach space. But otherwise the first 317 pages, i.e. more of the half of the book, are taken from original textbook references, duly cited.

Part III is a collection of applications and examples of the use of convex duality for infinite-dimensional non-convex optimization problems. Most of the 12 chapters found there are stand-alone material, more or less self-contained. Some of them are just copied from the author's own journal publications, also duly cited, some others are co-written with other authors. One may regret that there is almost no connection between these individual chapters, and more generally, between part III and the introductory parts I and II.

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