

FIRST-ORDER PRIMAL-DUAL METHODS FOR NONSMOOTH NONCONVEX OPTIMISATION

TUOMO VALKONEN*

ABSTRACT

We provide an overview of our recent work on first-order primal-dual methods for nonsmooth nonconvex optimisation [1, 3]. This includes online methods for dynamic inverse problems [4] and novel developments seeking to improve their performance in PDE-constrained optimisation, where second-order and Gauss–Newton -type methods have been more efficient [2].

REFERENCES

- [1] C. Clason, S. Mazurenko, and T. Valkonen, Acceleration and global convergence of a first-order primal-dual method for nonconvex problems, *SIAM Journal on Optimization* 29 (2019), 933–963, doi:10.1137/18m1170194, arXiv:1802.03347.
- [2] J. Jauhiainen, P. Kuusela, A. Seppänen, and T. Valkonen, Relaxed Gauss–Newton methods with applications to electrical impedance tomography, *SIAM Journal on Imaging Sciences* 13 (2020), 1415–1445, doi:10.1137/20m1321711, arXiv:2002.08044.
- [3] T. Valkonen, First-order primal-dual methods for nonsmooth nonconvex optimisation, in *Handbook of Mathematical Models and Algorithms in Computer Vision and Imaging*, K. Chen, C. B. Schönlieb, X. C. Tai, and L. Younes (eds.), Springer, Cham, 2021, doi:10.1007/978-3-030-03009-4_93-1, arXiv:1910.00115.
- [4] T. Valkonen, Predictive online optimisation with applications to optical flow, *Journal of Mathematical Imaging and Vision* 63 (2021), 329–355, doi:10.1007/s10851-020-01000-4, arXiv:2002.03053.

* ESCUELA POLITÉCNICA NACIONAL, QUITO, ECUADOR AND UNIVERSITY OF HELSINKI, FINLAND, TUOMOV@IKI.FI