

Seminar AGCO

Speaker: Cristóbal Guzmán, UC

Title: Stability of Stochastic Gradient Descent on Nonsmooth Convex Losses.

Abstract: Uniform stability is a notion of algorithmic stability that bounds the worst case change in the model output by the algorithm when a single data point in the dataset is replaced. An influential work of Hardt, Recht & Singer (ICML'16) provides strong upper bounds on the uniform stability of the stochastic gradient descent (SGD) algorithm on sufficiently smooth convex losses. These results led to important progress in understanding of the generalization properties of SGD and several applications to differentially private convex optimization for smooth losses.

Our work is the first to address uniform stability of SGD on nonsmooth convex losses. Specifically, we provide sharp upper and lower bounds for several forms of SGD and full-batch GD on arbitrary Lipschitz nonsmooth convex losses. Our lower bounds show that, in the nonsmooth case, (S)GD can be inherently less stable than in the smooth case. On the other hand, our upper bounds show that (S)GD is sufficiently stable for deriving new and useful bounds on generalization error. Most notably, we obtain the first dimension-independent generalization bounds for multi-pass SGD in the nonsmooth case. In addition, our bounds allow us to derive a new algorithm for differentially private nonsmooth stochastic convex optimization with optimal excess population risk. Our algorithm is simpler and more efficient than the best known algorithm for the nonsmooth case (Feldman, Koren & Talwar: STOC'20).

This is joint work with Raef Bassily, Vitaly Feldman & Kunal Talwar.

<https://zoom.us/j/99829713729?pwd=QUJ5VEw5R3RybmlOWHZWS0F4a3lMdz09>

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Miércoles 19 de Agosto, 14:30 hrs.