

# A modular analysis of adaptive online (non-)convex optimization

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Recently, much work has been done on extending the scope of online learning and incremental stochastic optimization algorithms. In this talk, based on a new regret decomposition and a generalization of Bregman divergences, I will provide a self-contained, modular analysis of the two workhorses of online learning: (general) adaptive versions of Mirror Descent (MD) and the Follow-the-Regularized-Leader (FTRL) algorithms. The analysis is done with extra care so as not to introduce assumptions not needed in the proofs and allows to combine, in a straightforward way, different algorithmic ideas (e.g., adaptivity, optimism, implicit updates) and learning settings (e.g., strongly convex or composite objectives). This way we are able to reprove, refine and extend a large body of the literature, while keeping the proofs concise.

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