

Exploiting Easy Data in Online Optimization

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“Easy”¹

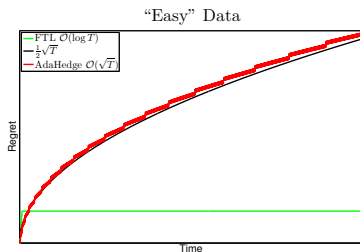


“Hard”²

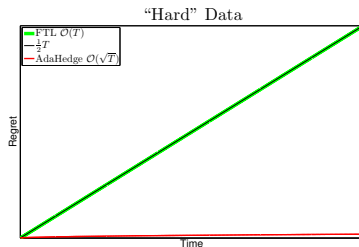


¹Beginning Child Player, education.byu.edu

²Magnus Carlsen, dailymail.co.uk



(e.g. FTL, aggressive OGD, UCB)



(e.g. Hedge, conservative OGD, Exp3)

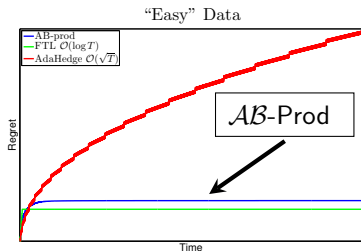
Are **SIMULTANEOUS** regret guarantees possible?

Special-purpose solutions exist for

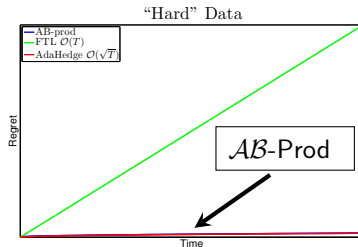
- Prediction with expert advice [De Rooij et al., 2014]
- Online convex optimization [Bartlett et al., 2008]
- Multi-armed bandits [Seldin and Slivkins, 2014]

$\underbrace{A}_{\text{Worst-case guarantees}} \underbrace{B}_{\text{Exploits loss structure}}\text{-Prod}$

Simultaneously **GUARANTEES**



$$\mathcal{R}_T \leq \mathcal{R}_T(\mathcal{B}) + 2 \log 2$$



$$\mathcal{R}_T \leq \mathcal{R}_T(\mathcal{A}) + 2\sqrt{T \log T}$$

- ✓ General-purpose, Interpretable, Simple
- ✓ Competitive with special-purpose solutions
- ✓ Solves COLT'14 open problem