

Lambda_ratio

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2/28/2020

The learning rate

There are two learning rates in the gbex algorithm, one for σ , λ_σ , and one for γ , λ_γ . As both parameters influence each other in the algorithm we want to choose learning rates for both parameters in the right proportion, which we define to be the learning rate ratio $\lambda_{ratio} = \frac{\lambda_\gamma}{\lambda_\sigma}$. This ratio can be scaled by the learning rate size λ_{size} to obtain the learning rates for each parameter in the following way,

$$\lambda_{sigma} = \lambda_{size} \text{ and } \lambda_{gamma} = \frac{\lambda_{size}}{\lambda_{ratio}}.$$

Note that this would only require us to tune λ_{ratio} and choose λ_{size} sufficiently low such that the algorithm is able to find a stable minimum.

We consider the choice for 3 different simulation models, where we simulate $\mathbf{X} \in \mathbb{R}^{10}$ all independently uniform random variables on the interval $[-1, 1]$. The models are then given by,

Model 1 $Y \sim GPD(\sigma = 1 + \frac{X_1}{2}, \gamma = 0.4)$

Model 2 $Y \sim GPD(\sigma = 1 + \frac{X_1}{2}, \gamma = 0.4 + \frac{X_1}{10})$

Model 3 $Y \sim GPD(\sigma = 1 + \frac{X_1}{2}, \gamma = 0.4 + \frac{X_1}{5})$

The motivation for these models is to investigate the optimal

By means of simulation we compare 3 different simulation models and test how the optimal λ_{ratio} is chosen. We consider the following 3 models