

Generic Learning to Optimize Library

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Abstract

The abstract

1 Configuration

1.1 Random

1. Choose a random point \vec{x}
2. Evaluate \vec{x} in function

1.2 Meta Random

1. Choose n random points
2. Choose random H_f (init: all zeroes) (complete: random)
3. Evaluate all \vec{x} points with H_f in Metamodel
4. Select Best Point \vec{x} (random value)
5. Evaluate \vec{x} in function

1.3 Meta Gagne

1. Choose n random points
2. Choose (50% lowest and 50% random) H_f (init: all zeroes) (complete: random)
3. Evaluate all \vec{x} points with H_f in Metamodel
4. Select Best Point \vec{x} (lowest value)
5. Evaluate \vec{x} in function
6. Update your history

1.4 Meta Gagne Train nbEpoch batchSize

1. Choose n random points
2. Choose (50% lowest and 50% random) H_f (init: all zeroes) (complete: random)
3. Evaluate all \vec{x} points with H_f in Metamodel
4. Select Best Point \vec{x} (lowest value)
5. Evaluate \vec{x} in function
6. Update your history
7. If done: train your model

2 Models

3 Visualization

- $\gamma = \min_{t=1}^T y_t$
- y^* = minimal value of the function
- y_T = last evaluation
- n = number of optimizations
- μ_y = mean of n evaluations
- σ_y = standard deviation of n evaluations
- z = z-value for Confidence Intervals

3.1 Single Optimization

3.1.1 Simple Regret

$$|y^* - y_T|$$

3.1.2 Best Regret

$$|y^* - \gamma|$$

3.1.3 Cumulative Regret

$$\sum_{t=1}^T |y^* - y_t|$$

3.1.4 Best Cumulative Regret

$$\sum_{t=1}^T |y^* - \gamma|$$

3.1.5 Normalized Cumulative Regret

$$\sum_{t=1}^T \frac{|y^* - y_t|}{y^*}$$

3.1.6 Best Normalized Cumulative Regret

$$\sum_{t=1}^T \frac{|y^* - \gamma|}{y^*}$$

3.2 Confidence Interval Optimization

3.2.1 Simple Regret

$$\left| y^* - \mu_{y_t} \pm \frac{z \times \sigma_{y_t}}{\sqrt{n}} \right|$$

3.2.2 Best Regret

$$\left| y^* - \mu_{\gamma} \pm \frac{z \times \sigma_{\gamma}}{\sqrt{n}} \right|$$

3.2.3 Cumulative Regret

$$\sum_{t=1}^T \left| y^* - \mu_{y_t} \pm \frac{z \times \sigma_{y_t}}{\sqrt{n}} \right|$$

3.2.4 Best Cumulative Regret

$$\sum_{t=1}^T \left| y^* - \mu_{\gamma} \pm \frac{z \times \sigma_{\gamma}}{\sqrt{n}} \right|$$

3.2.5 Normalized Cumulative Regret

$$\sum_{t=1}^T \frac{\left| y^* - \mu_{y_t} \pm \frac{z \times \sigma_{y_t}}{\sqrt{n}} \right|}{y^*}$$

3.2.6 Best Normalized Cumulative Regret

$$\sum_{t=1}^T \frac{\left| y^* - \mu_{\gamma} \pm \frac{z \times \sigma_{\gamma}}{\sqrt{n}} \right|}{y^*}$$