Untitled

Algorithm 1 Gradient Boosting Algorithm

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1. Initialize: $f_0(x) = \arg\min_\gamma \sum_{i=1}^{N} L(y_i, \gamma)$.
2. For $m = 1$ to M:
   (a) For $1, 2, ..., N$ compute "pseudo-residuals":

   $$r_{im} = - \left[\frac{\partial L(y_i, f(x_i))}{\partial f(x_i)} \right]_{f=f_{m-1}(x)}$$

   (b) Fit a regression tree to the targets r_{im} giving terminal regions $R_{jm}, j = 1, 2, ...J_m$
   (c) For $j = 1, 2, ..., J_m$ compute:

   $$\gamma_{jm} = \arg\min_\gamma \sum_{xi \in R_{jm}} L\left(y_i, f_{m-1}(x_i) + \gamma\right).$$

   (d) Update $f_m(x) = F_{m-1}(x) + \sum_{j=1}^{J_m} \gamma_{jm} I(x \in R_{jm})$
3. Output $\hat{f}(x) = f_m(x)$