Modelli MPHero

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1 SVR-style models

Data:

- a feature space J

- a set I of points $x^i = (x^i_1 \dots x^i_{|J|})$, and corresponding response values y^i

- a violation cost C

- a confidence region parameter ϵ

- a target number of features to select k_0

Variables:

- hyperplane slopes $w = (w_1 \dots w_{|J|})$ and intercept z values

- feature binary selection decisions f_j (1 if feature j is selected, 0 otherwise)

Optimize:

$$\min \frac{1}{2} \sum_{j \in J} w_j^2 + C \cdot \sum_{i \in I} p_i^+ + p_i^- \tag{1}$$

$$\text{s.t. } (\sum_{j \in J} w_j \cdot x_j^i) + z - y^i \leq \epsilon + p_i^+ \qquad \forall i \in I \tag{2}$$

$$-(\sum_{j \in J} w_j \cdot x_j^i) - z + y^i \leq \epsilon + p_i^- \qquad \forall i \in I \tag{3}$$

$$w_j \leq f_j W_j^U \qquad \forall j \in J \tag{4}$$

$$w_j \geq f_j W_j^L \qquad \forall j \in J \tag{5}$$

$$\sum_{j \in J} f_j \leq k_0 \tag{6}$$

$$p_i^+ \geq 0, p_i^- \geq 0 \qquad \forall i \in I \tag{7}$$

$$f_j \in \{0, 1\} \qquad \forall j \in J \tag{8}$$

Where p_i^+, p_i^- are measurement errors on point i.