1 Mean Absolute Error (MAE)

1.1 Notation

Let:

- i denote the row index,
- $f(i)$ denote the FishID corresponding to row i,
- N denote the total number of rows ($N = 750$),
- N_k denote the number of rows for fish k ($N_k = 50$).

Predicted measurements for row i:

$$L_i,\ W_i,\ P_i,\ A_i$$

Ground-truth measurements for fish k:

$$L_k^{\text{truth}},\ W_k^{\text{truth}},\ P_k^{\text{truth}},\ A_k^{\text{truth}}.$$

1.2 Per-row Absolute Error

For each row i, the absolute error with respect to its fish $f(i)$ is:

$$AE_i^{(L)} = \left| L_i - L_{f(i)}^{\text{truth}} \right|$$

$$AE_i^{(W)} = \left| W_i - W_{f(i)}^{\text{truth}} \right|$$

$$AE_i^{(P)} = \left| P_i - P_{f(i)}^{\text{truth}} \right|$$

$$AE_i^{(A)} = \left| A_i - A_{f(i)}^{\text{truth}} \right|$$

1.3 Overall MAE (Across All Rows)

For N total rows:

$$MAE^{(L)} = \frac{1}{N} \sum_{i=1}^{N} \left| L_i - L_{f(i)}^{\text{truth}} \right|$$

$$MAE^{(W)} = \frac{1}{N} \sum_{i=1}^{N} \left| W_i - W_{f(i)}^{\text{truth}} \right|$$

$$MAE^{(P)} = \frac{1}{N} \sum_{i=1}^{N} \left| P_i - P_{f(i)}^{\text{truth}} \right|$$

$$MAE^{(A)} = \frac{1}{N} \sum_{i=1}^{N} \left| A_i - A_{f(i)}^{\text{truth}} \right|$$

1.4 Per-fish MAE

For a given fish k with N_k rows:

$$MAE_k^{(L)} = \frac{1}{N_k} \sum_{i:\, f(i)=k} \left| L_i - L_k^{\text{truth}} \right|$$

$$MAE_k^{(W)} = \frac{1}{N_k} \sum_{i:\, f(i)=k} \left| W_i - W_k^{\text{truth}} \right|$$

$$MAE_k^{(P)} = \frac{1}{N_k} \sum_{i:\, f(i)=k} \left| P_i - P_k^{\text{truth}} \right|$$

$$MAE_k^{(A)} = \frac{1}{N_k} \sum_{i:\, f(i)=k} \left| A_i - A_k^{\text{truth}} \right|$$

1.5 Units

- $MAE^{(L)}, MAE^{(W)}, MAE^{(P)}$ are measured in centimeters (cm),
- $MAE^{(A)}$ is measured in square centimeters (cm^2).