The Stacking Scheme

Team Proxima Centuari:
Danny, Kenny, James, Wenchang

March 6, 2018

Say we obtain the following results, using three different estimators:

Estimator	Estimated RMSE	Prediction
Method 1	ϵ_1	$\vec{y}_1$
Method 2	ϵ_2	$\vec{y}_2$
Method 3	ϵ_3	$\vec{y}_3$

Since a better performance is indicated by a lower estimated rmse ϵ_i, we form the following stacking scheme, which gives more weights to better forming estimators:

$$\begin{aligned} \vec{y}_{\text{Stacked}} &= \frac{1}{2s}\left[(s-\epsilon_1)\,\vec{y}_1 + (s-\epsilon_2)\,\vec{y}_2 + (s-\epsilon_3)\,\vec{y}_3\right], \\ s &= \epsilon_1 + \epsilon_2 + \epsilon_3 \end{aligned} \tag{1}$$

Check: suppose under the most rare but ideal situation [1] that

$$\vec{y}_1 = \vec{y}_2 = \vec{y}_3 = \vec{y}_{\text{Test}}$$

then by (1)

$$\begin{aligned} \vec{y}_{\text{Stacked}} &= \frac{1}{2s}\left(s-\epsilon_1+s-\epsilon_2+s-\epsilon_3\right)\vec{y}_{\text{Test}} \\ &= \frac{1}{2s}\left(3s-s\right)\vec{y}_{\text{Test}} \\ &= \vec{y}_{\text{Test}} \end{aligned}$$

which is the desired result.

[1] It is possible although improbable.