$$\delta = (a(k+1) - \alpha\hat{a})^2$$
$$a(k+1) = a(k) + y_k$$
$$\delta = ||a(k) - \alpha\hat{a}||^2 + 2(a(k) - \alpha\hat{a})^t y_k + ||y_k||^2$$
$$\delta \leq ||a(k) - \alpha\hat{a}||^2 - 2\alpha\hat{a}^t y_k + ||y_k||^2$$
$$\beta^2 = max_i y^2 \forall i$$
$$\Omega = min[\hat{a}y_k] \forall y_k \in datasamples$$
$$\delta \leq ||a(k) - \alpha\hat{a}||^2 - 2\alpha\Omega + \beta^2$$
$$\alpha = \beta^2/\Omega$$
$$\delta = ||a(k) - \alpha\hat{a}||^2 - \beta^2$$
$$(a(k+1) - \alpha\hat{a})^2 \leq (a(k+1) - \alpha\hat{a})^2 - \beta^2$$
$$k_0 = \frac{||a(1) - \alpha\hat{a}||^2}{\beta^2}$$