

Sep 24, 2026.

RECAP: Linear Filtering



convolution

cross-correlation

image pyramids

Image derivatives

Gaussian

Laplacian

what is its
effect on
noise?



Increase noise



Gaussian Blur

Aside:

Filter:

1	2	3
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Impulse:

0	0	0	1	0	0	0
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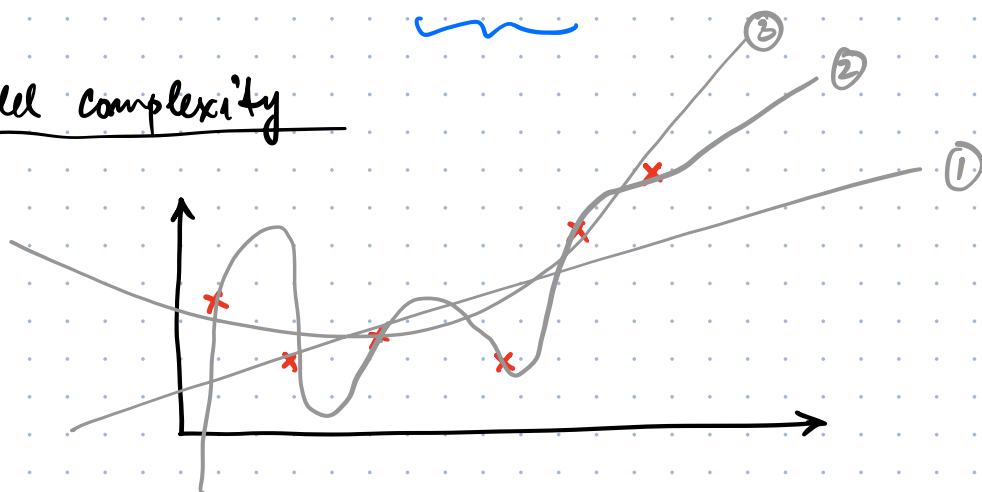
cc:

0	3	2	1			
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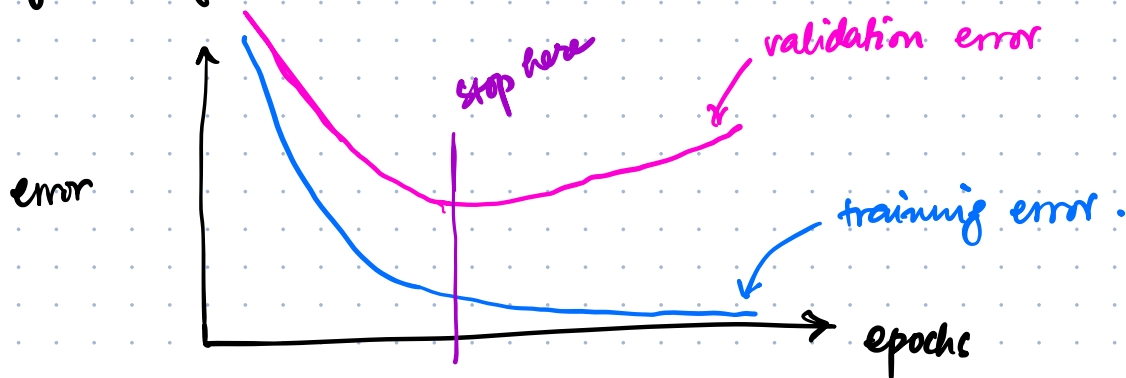
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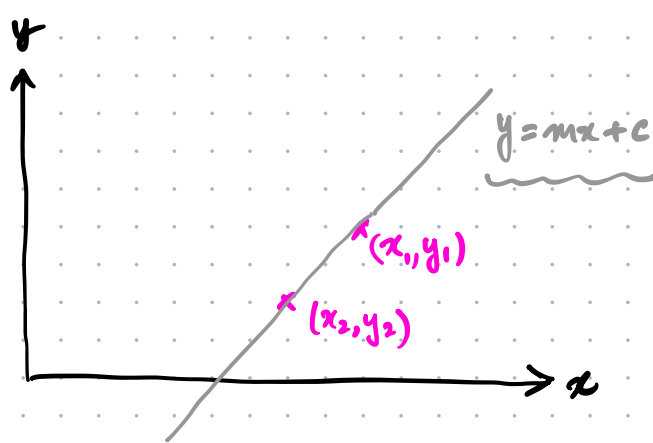
0	1	2	3			
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Model complexity



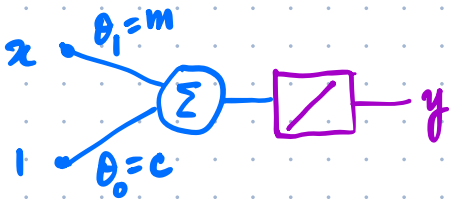
Early Stopping:





$$y = [x \ 1] \begin{bmatrix} m \\ c \end{bmatrix} \rightarrow \text{Solve}$$

$$= [m \ c] \begin{bmatrix} x \\ 1 \end{bmatrix}$$

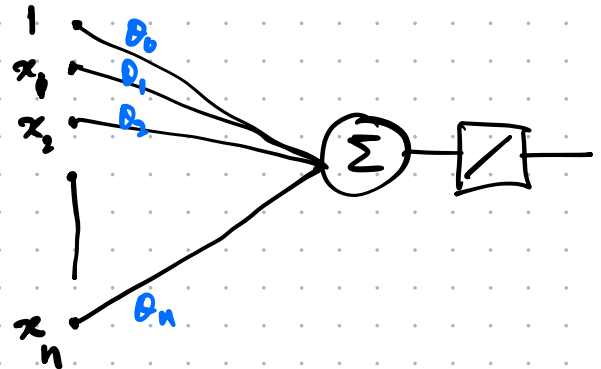


$$f(x; \theta_0, \theta_1) \rightarrow y$$

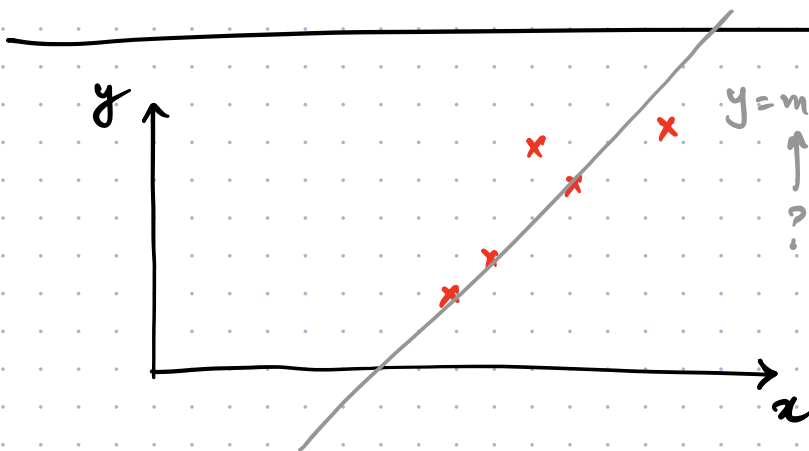
$$\begin{cases} y_1 = mx_1 + c \\ y_2 = mx_2 + c \end{cases}$$

$\uparrow \quad \uparrow$
 $? \quad ?$

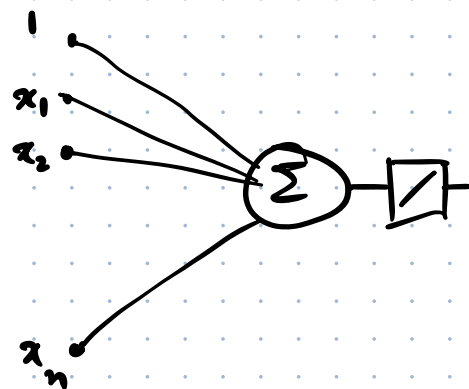
Solve this system of linear eq. for m and c .



$$f(\vec{x}; \theta_0, \theta_1, \dots, \theta_n) \rightarrow y$$



MSE



$$E = \sum_j (y_j - (mx_j + c))^2 / m$$

for m data points j

