UDS UNIDAD DE DATA SCIENCE UNIVERSIDAD DE CONCEPCIÓN

Deep Learning

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Machine Learning

For an input x and some output y, it is possible to find a mapping from the input space to the output space using a function:

$$y = f(x) + \epsilon$$

In machine learning or statistical learning we try to find an approximated function $\hat{f}(x)$ using data. Neural networks are a machine learning models.

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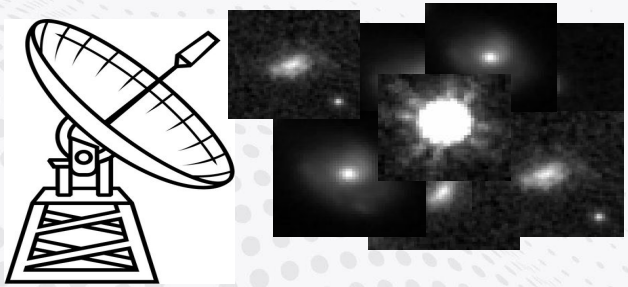
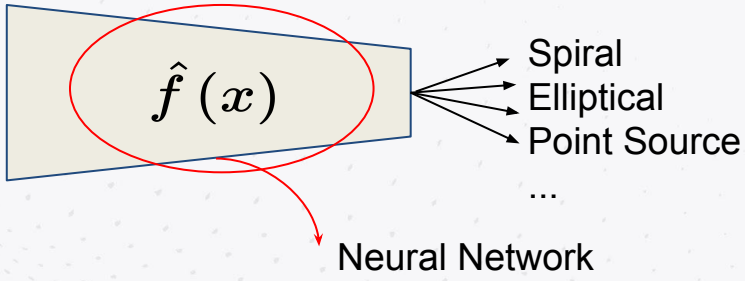
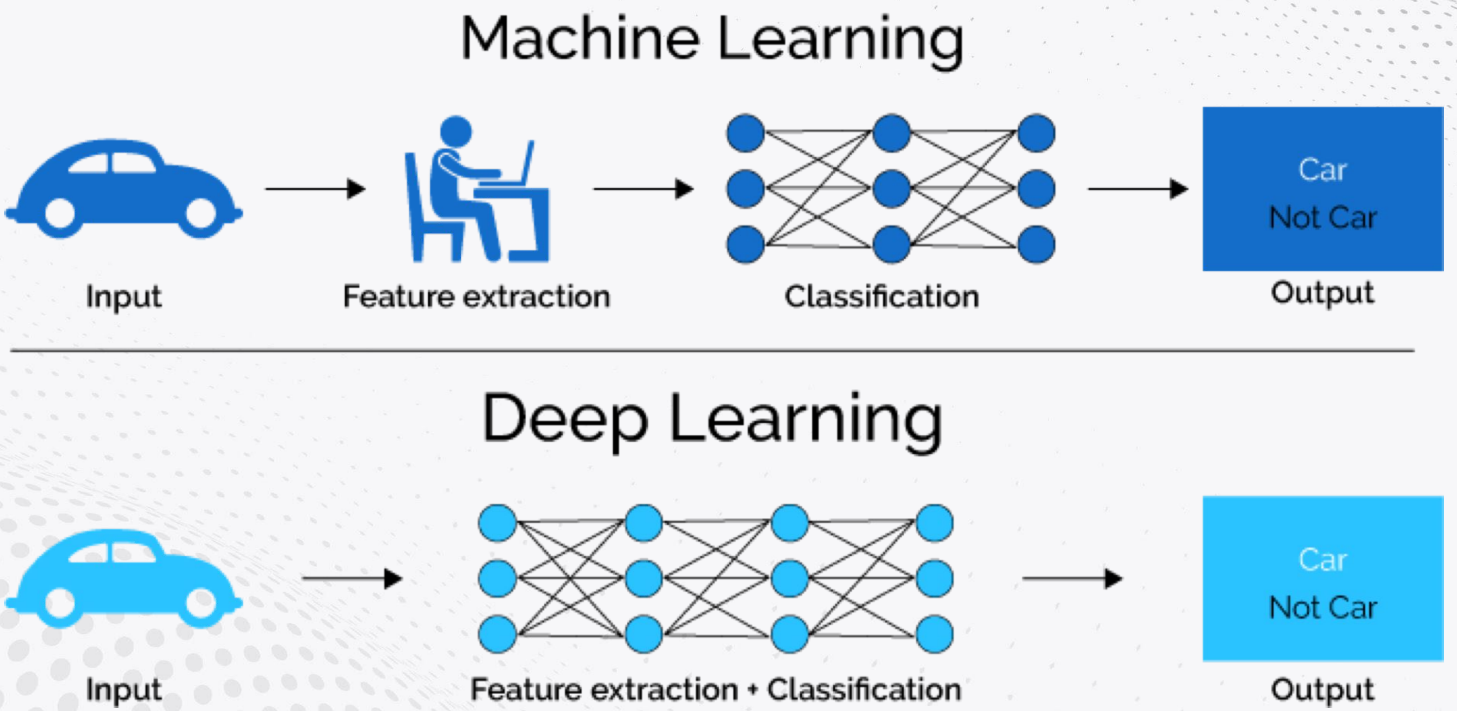
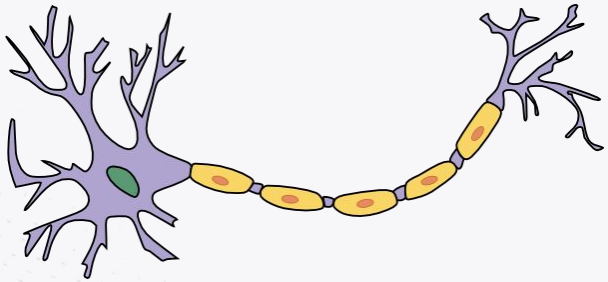


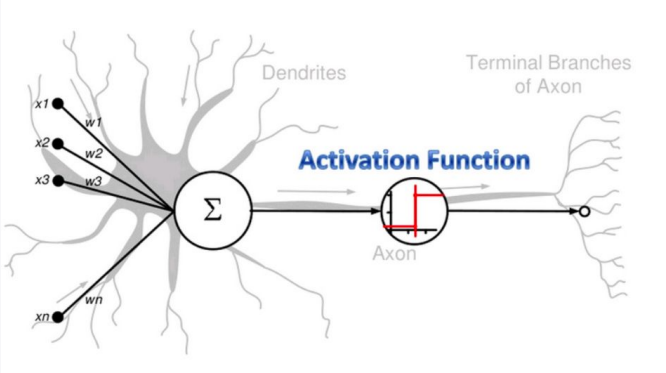


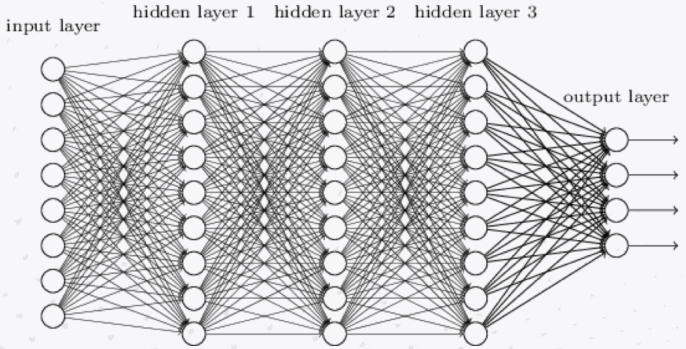
Machine Learning / Deep Learning



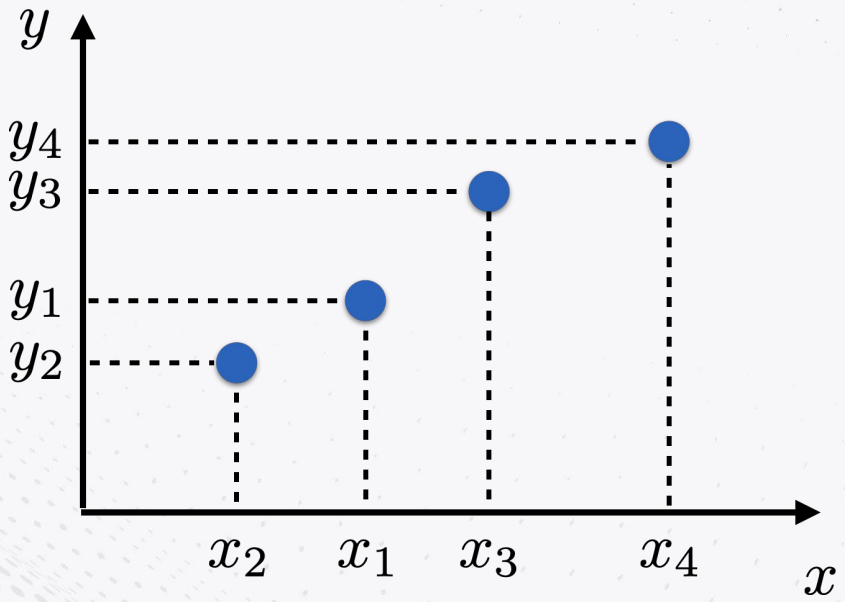
Neural Networks





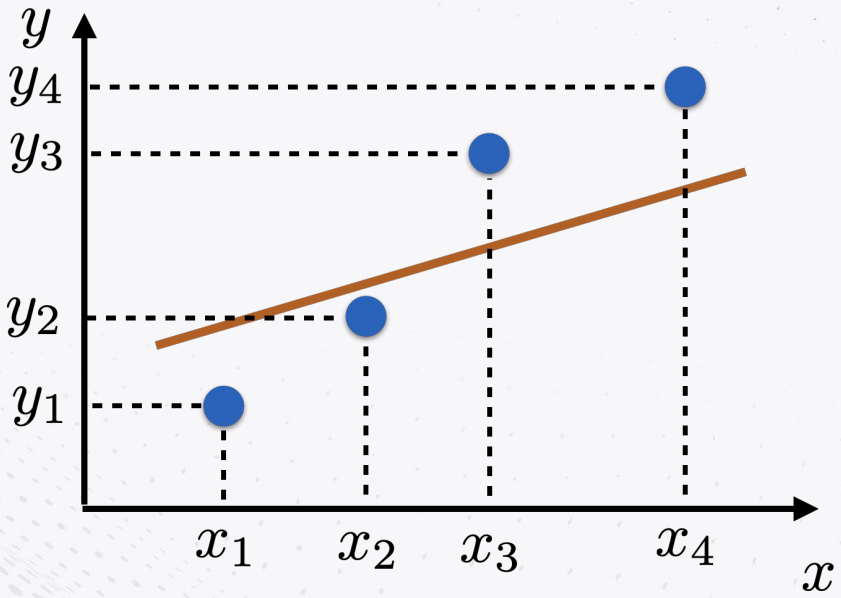


Cost Function



$$\mathcal{D} = \{(x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4)\}$$

Cost Function



$$\mathcal{L}_1 = (\hat{y}(x_1) - y_1)^2$$

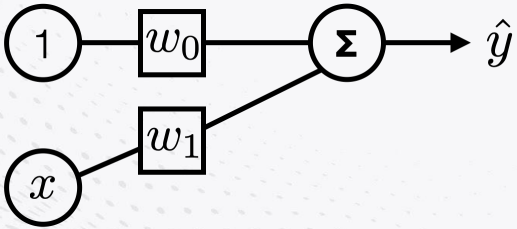
$$\mathcal{L}_2 = (\hat{y}(x_2) - y_2)^2$$

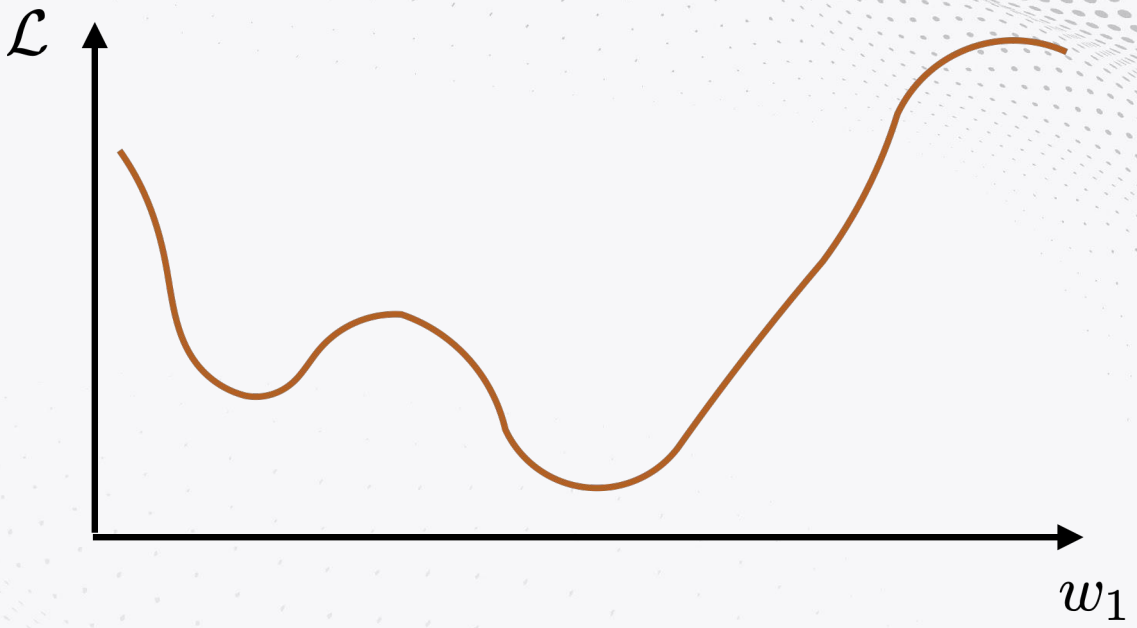
$$\mathcal{L}_3 = (\hat{y}(x_3) - y_3)^2$$

$$\mathcal{L}_4 = (\hat{y}(x_4) - y_4)^2$$

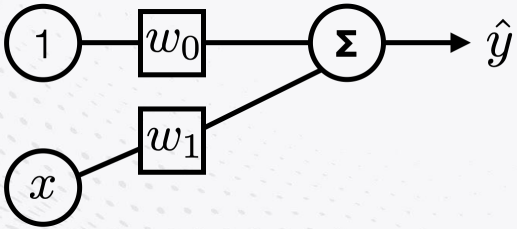
$$\mathcal{L} = \frac{1}{N}\left[(\hat{y}(x_1) - y_1)^2 + (\hat{y}(x_2) - y_2)^2 + \cdots + (\hat{y}(x_N) - y_N)^2)\right]$$

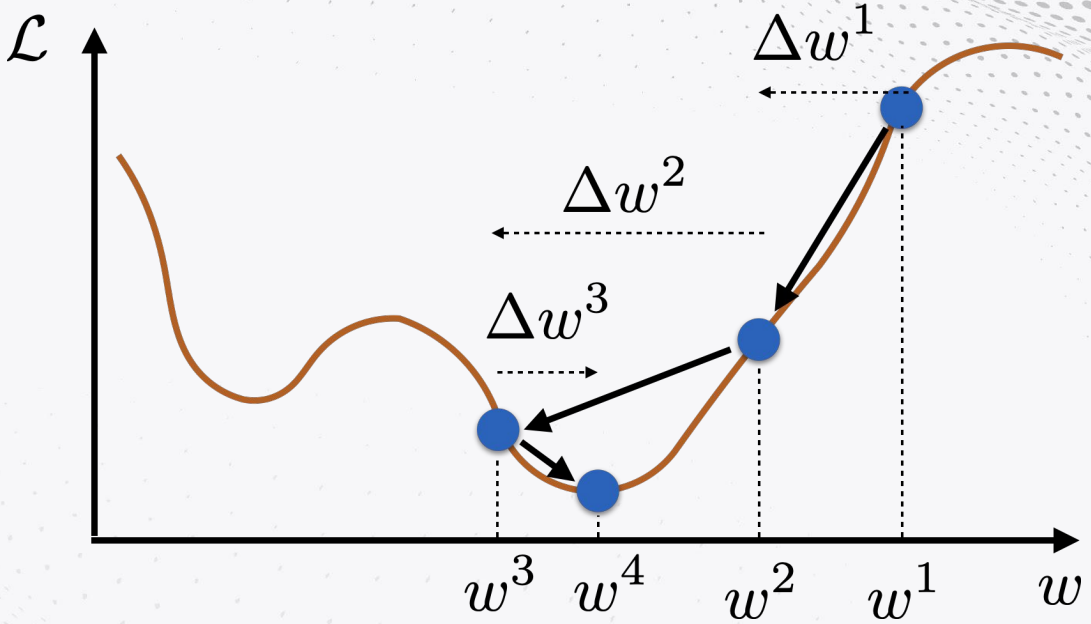
Optimization





Optimization





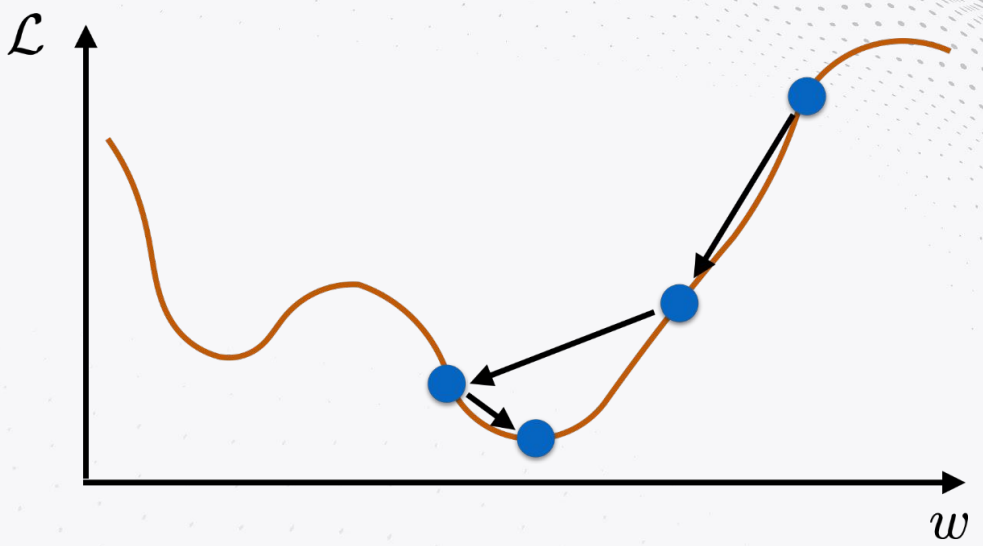
Optimization

$$w^{t+1} = w^t + \Delta w^t$$

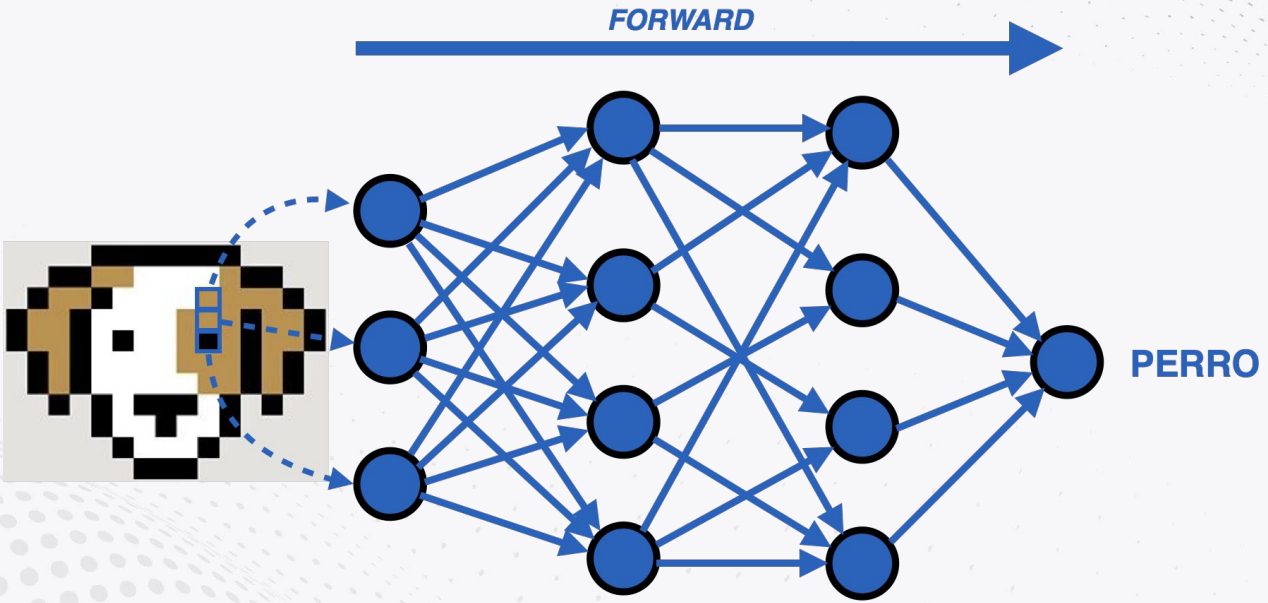
$$\Delta w^t \propto -\frac{d\mathcal{L}}{dw}$$

$$w^{t+1} = w^t - \eta \frac{d\mathcal{L}}{dw}\Big|_{w^t}$$

learning rate



Backpropagation



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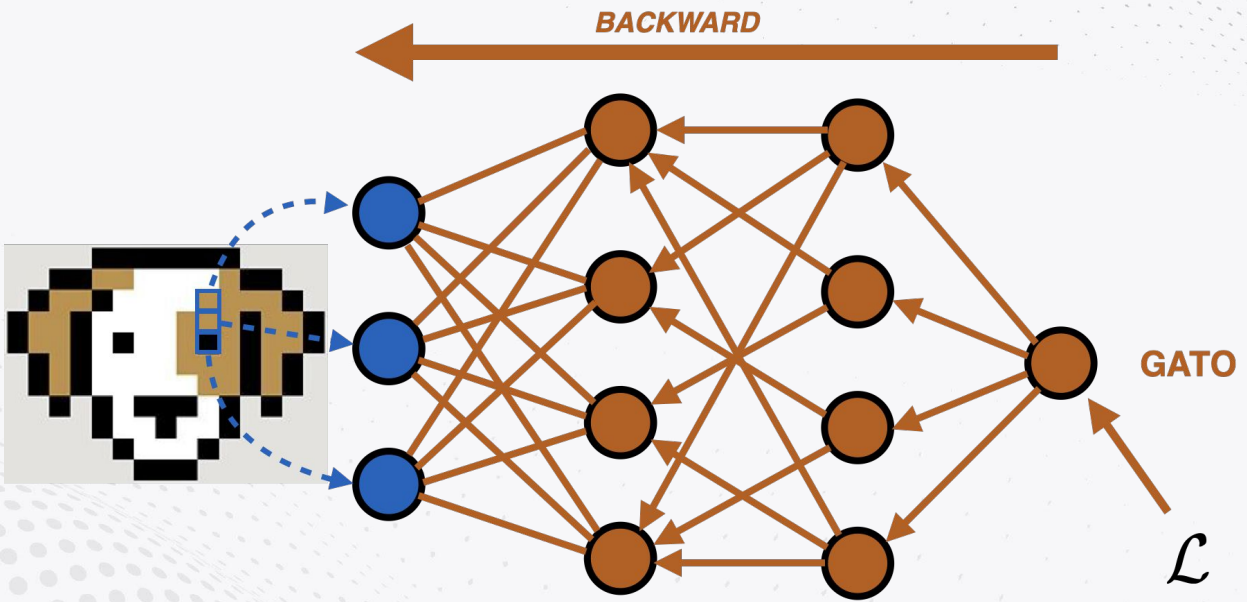
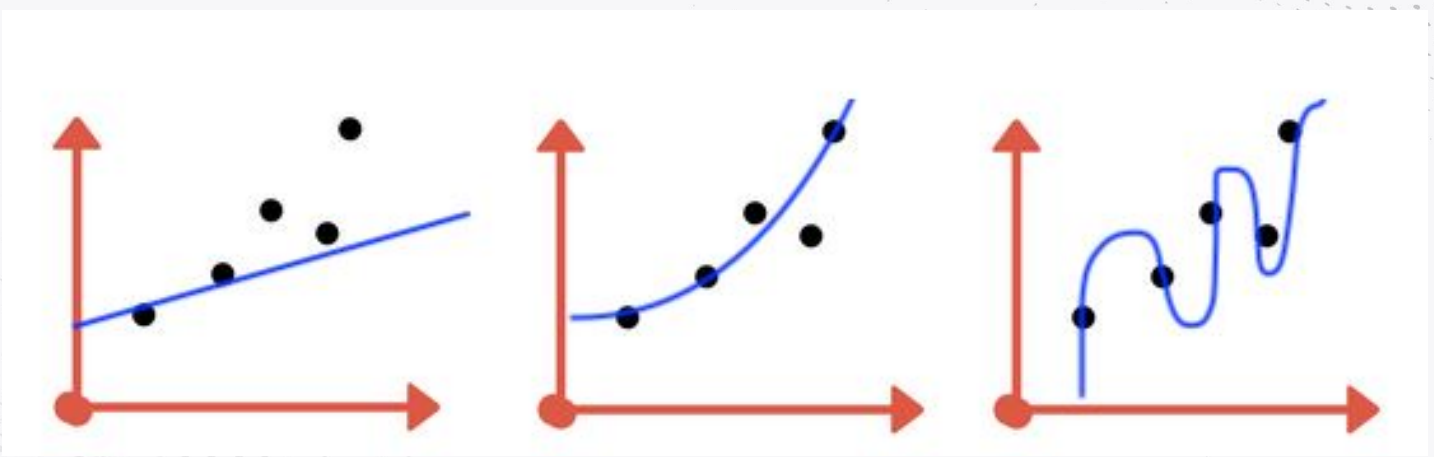
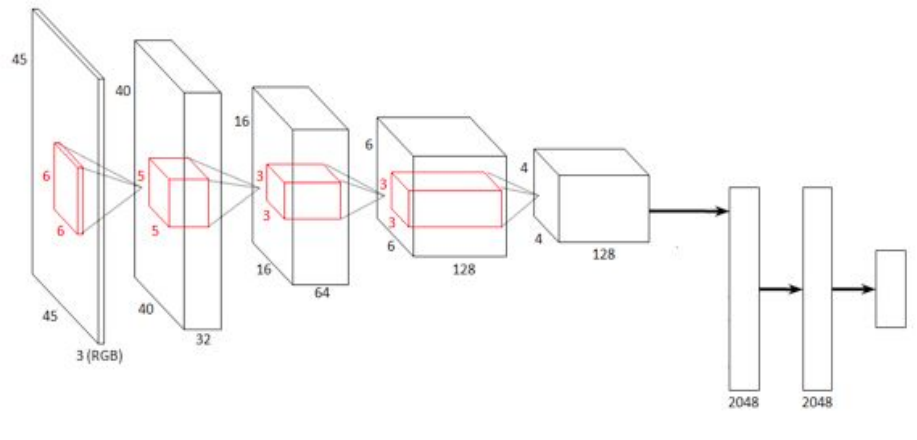


Overfitting



Convolutional Neural Networks



INPUT IMAGE

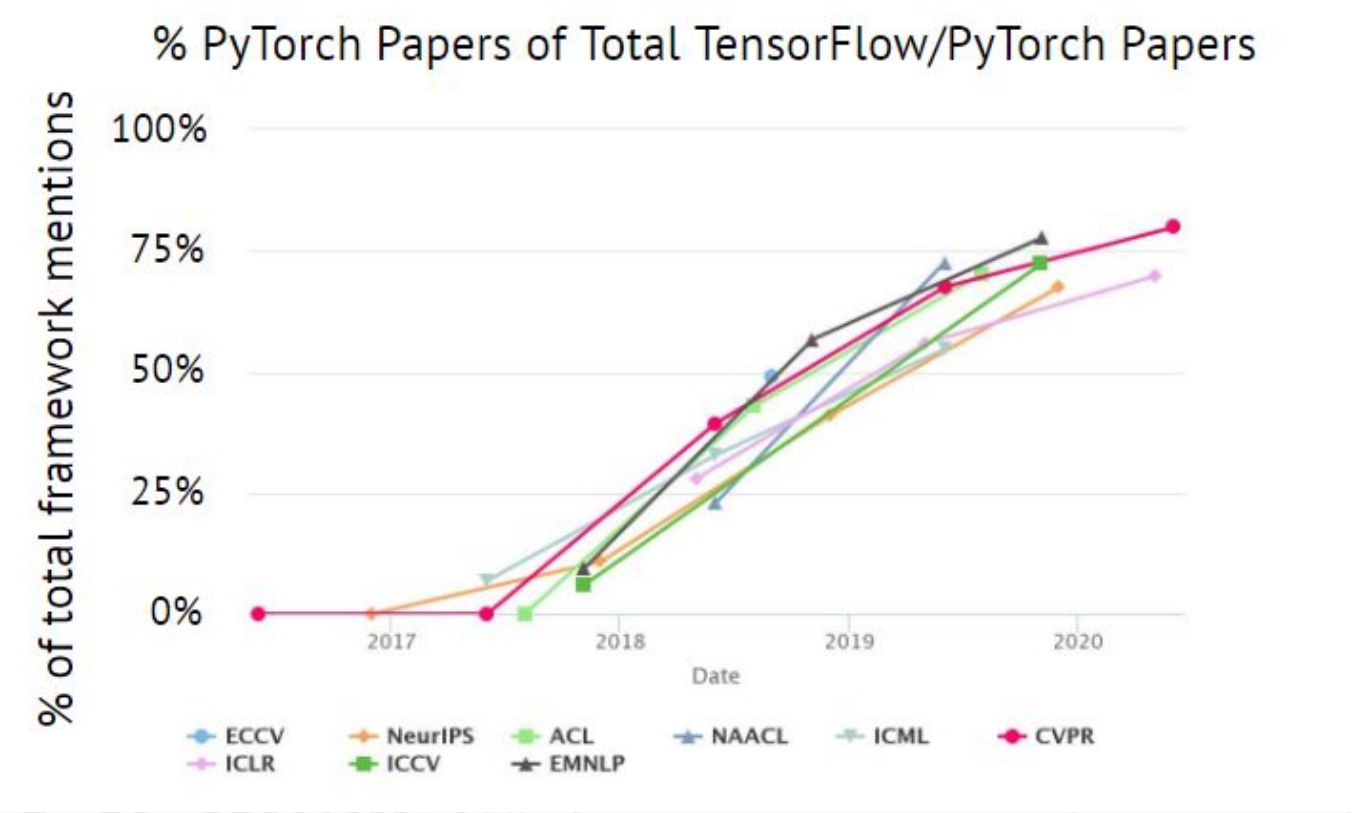
18	54	51	239	244	188
55	121	75	78	95	88
35	24	204	113	109	221
3	154	104	235	25	130
15	253	225	159	78	233
68	85	180	214	245	0

WEIGHT

1	0	1
0	1	0
1	0	1

429

Pytorch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