

Basics of Neural Network Programming

Vectorization

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What is vectorization?

for i in ray
$$(n-x)$$
:
 $2+=\omega TiJ*x xTiJ$



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More vectorization examples

Neural network programming guideline

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$$U = AV$$

$$U_{i} = \sum_{j} \sum_{i} A_{i,j} V_{j}$$

$$U = np.zeros((n, i))$$

$$for i \dots \in ACiTiT * vCjT$$

$$uCiT + = ACiTTiT * vCjT$$

Vectors and matrix valued functions

Say you need to apply the exponential operation on every element of a matrix/vector.

$$v = \begin{bmatrix} v_1 \\ \vdots \\ v_n \end{bmatrix} \rightarrow u = \begin{bmatrix} e^{v_1} \\ e^{v_2} \end{bmatrix}$$

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$$u = \text{np. exp}(v) \leftarrow$$

$$u = \text{np. log}(v)$$

$$\text{np. abs}(v)$$

$$\text{np. havinum}(v, o)$$

Logistic regression derivatives

$$J = 0, \quad dw1 = 0, \quad dw2 = 0, \quad db = 0$$

$$\int for \ i = 1 \ to \ n:$$

$$Z^{(i)} = w^T x^{(i)} + b$$

$$a^{(i)} = \sigma(z^{(i)})$$

$$J + = -[y^{(i)} \log \hat{y}^{(i)} + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)})]$$

$$dz^{(i)} = a^{(i)}(1 - a^{(i)})$$

$$dw_1 + x_1^{(i)} dz^{(i)}$$

$$dw_2 + x_2^{(i)} dz^{(i)}$$

$$db + dz^{(i)}$$

$$J = J/m, \quad dw_1 = dw_1/m, \quad dw_2 = dw_2/m$$

$$db = db/m$$

$$d\omega / = m$$