





















in  $\mathbb{R}^n$  (where  $\mathbf{0}$  is the zero vector) and  $\mathbf{1}$  is the vector of all ones, then

$\mathbf{1}^T \mathbf{1} = n$ ,  $\mathbf{1}^T \mathbf{0} = 0$ ,  $\mathbf{0}^T \mathbf{0} = 0$ ,  $\mathbf{0}^T \mathbf{1} = 0$ ,  $\mathbf{1}^T \mathbf{1} = n$ ,  $\mathbf{1}^T \mathbf{0} = 0$ ,  $\mathbf{0}^T \mathbf{0} = 0$ ,  $\mathbf{0}^T \mathbf{1} = 0$ .

Let  $\mathbf{A}$  be a matrix in  $\mathbb{R}^n \times \mathbb{R}^n$ . Then  $\mathbf{A} \mathbf{1}$  is the vector of row sums of  $\mathbf{A}$ ,  $\mathbf{1}^T \mathbf{A}$  is the vector of column sums of  $\mathbf{A}$ ,  $\mathbf{A} \mathbf{0}$  is the zero vector,  $\mathbf{0}^T \mathbf{A}$  is the zero vector,  $\mathbf{A} \mathbf{0}$  is the zero vector,  $\mathbf{0}^T \mathbf{A}$  is the zero vector,  $\mathbf{A} \mathbf{1}$  is the vector of row sums of  $\mathbf{A}$ ,  $\mathbf{1}^T \mathbf{A}$  is the vector of column sums of  $\mathbf{A}$ .

Andrew G. C. and Tobias H. J. (2015) Learning for Performance Optimization.

Journal of Machine Learning Research and Theory.

DeLorme, K. (2015) CCSDA: A new type of generative adversarial network for image-to-image translation.

<https://arxiv.org/abs/1511.06434>