Math for ML

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Contents

1 Differential Forms

Most of these are taken from the Matrix Cookbook.

$$\frac{\partial \mathbf{x}^T \mathbf{a}}{\partial \mathbf{x}} = \frac{\partial \mathbf{a}^T \mathbf{x}}{\partial \mathbf{x}} = \mathbf{a} \tag{1}$$

$$\frac{\partial \mathbf{a}^T \mathbf{X} \mathbf{b}}{\partial \mathbf{X}} = \mathbf{a}\mathbf{b}^T \tag{2}$$

2 Probability Basics

2.1 Multivariate Gaussian Distribution

$$f(\mathbf{x}) = \frac{1}{(2\pi)^{D/2}\boldsymbol{\Sigma}^{1/2}} \exp\left(\frac{1}{2}(\mathbf{x}-\boldsymbol{\mu})^T \boldsymbol{\Sigma}(\mathbf{x}-\boldsymbol{\mu})\right) \tag{3}$$

2.2 Bayesian Probability

3 Information Theory

4 Linear Regression

5 References

Bishop, Murphy, Matrix Cookbook