Formula Practice

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1 Inline math

My favorite math symbol is the nabla ∇ since its used in gradient descent $\theta_{t+1} = \theta_t - \eta \nabla \mathcal{L}$ which can helps us find the minimum of a function $\underset{\theta}{argmin}\, \mathbb{E}\left[\mathcal{L}(\hat{y}, y)\right]$. It is also used for the hessian of a function which is the transpose of the Jacobian of the gradient $\nabla^2 \mathcal{L} = \mathbf{J}(\nabla \mathcal{L})^\top$.

What is $\mathcal{L}$? It is a loss function indicating, for example, how far off some model $\mathcal{M}$ is from predicting correct outputs given some reference dataset $\mathcal{D}$. $\mathcal{D} = \{(x_i, y_i)\}_i^N$ consists of the inputs $\mathbf{x}$ and outputs $\mathbf{y}$. The $\mathcal{L}$ function might then be the squared error $\mathcal{L}(\hat{y}, y) = (\hat{y} - y)^2$ if $y \in \mathbb{R}$ where $\hat{y} = \mathcal{M}(x)$ the models prediction.

2 Practice with math blocks

My favorite distribution to draw samples from is the Gaussian or Normal distribution (eq. 1) parameterized by the mean μ and variance σ.
The univariate case is:

$$
\begin{aligned}
f(x) &= \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} && (1) \\
&= \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right) && (2)
\end{aligned}
$$