1D Convolution

A convolution is a mathematical operation that takes two functions and produces another function. It's like sliding one function over another and checking how much they overlap. Imagine a waveform sliding across another waveform and you're measuring similarity at each shift.

Formula in Continuous Case:

$$(f * g)(t) = \int_{-\infty}^{\infty} f(\tau) g(t - \tau)\, d\tau$$

Formula in Discrete Case:

$$(f * g)[n] = \sum_{m=-\infty}^{\infty} f[m] g[n - m]$$