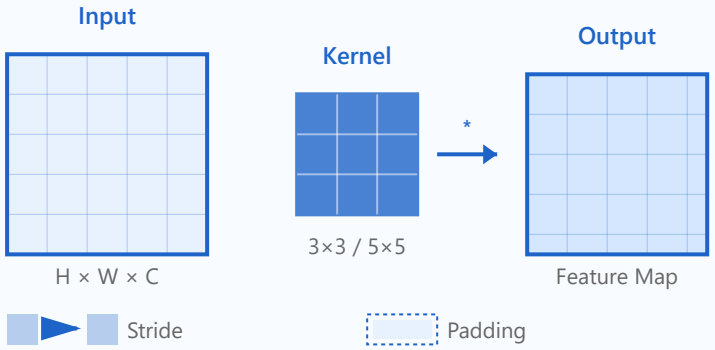
Convolution Operation

Convolution Process



Kernel/Filter Concepts

Small learnable matrices that slide across input to extract features. Common sizes: 3×3, 5×5, 7×7

Stride and Padding

Stride: step size of kernel movement. Padding: adding borders to preserve spatial dimensions

Feature Map Generation

Output of convolution operation. Each filter produces one feature map detecting specific patterns

Receptive Fields

Region of input that affects a particular feature. Grows with network depth and kernel size

Special Case: **1×1 Convolutions** - Channel-wise operations for dimensionality reduction and cross-channel learning