CONVOLUTION LAYER

The main purpose of a convolutional layer is to detect features or visual features in images such as edges, lines, color drops, etc. This is a very interesting property because, once it has learned a characteristic at a specific point in the image, it can recognize it later in any part of it. CNN's make use of filters (also known as kernels, feature detectors), to detect features, such as edges, are present throughout an image. A filter is just a matrix of values with height and width smaller than the input image , called weights, that are trained to detect specific features. The filter moves over each part of the image to check if the feature it is meant to detect is present. To provide a value representing how confident it is that a specific feature is present, the filter carries out a convolution operation, which is an element-wise product and sum between two matrices. The length by which the kernel slides is known as the stride length. When the feature is present in part of an image, the convolution operation between the filter and that part of the image results in a real number with a high value. If the feature is not present, the resulting value is low. The result of passing this filter over the entire image is an output matrix called feature maps or convolved features that stores the convolutions of this filter over various parts of the image.in convolution, the number of channels in the kernel must be the same as the number of channels in the input image. When we want to extract more than one feature from an image using convolution, we can use multiple kernels instead of using just one. In such a case, the size of all the kernels must be the same.