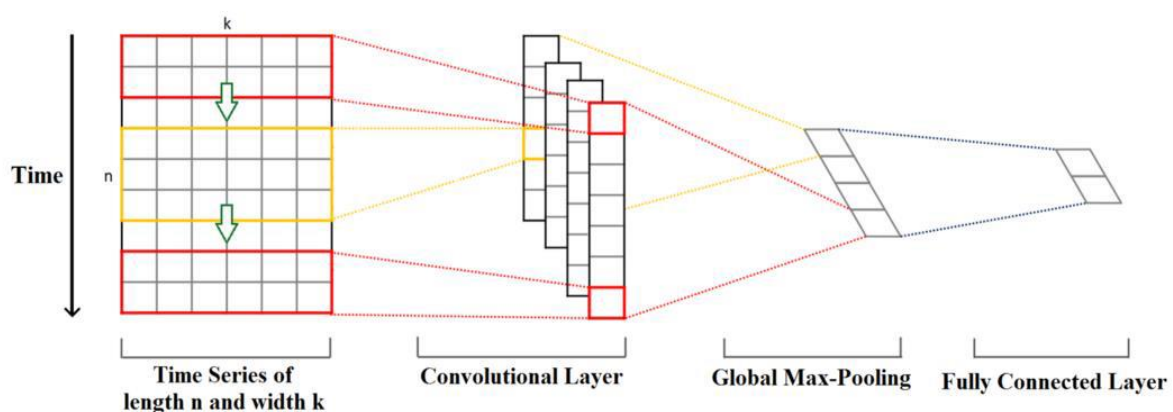


**Write a report on how to use Convolution and Pooling on 1D data for time series. Explain the process with the help of model design.**

Imagine a time series of length  $n$  and width  $k$ . The length is the number of timesteps, and the width is the number of variables in a multivariate time series. For example, for electroencephalography it is the number of channels (nodes on the head of a person), and for a weather time series, it can be such variables as temperature, pressure, humidity, etc.

The convolution kernels always have the same width as the time series, while their length can be varied. This way, the kernel moves in one direction from the beginning of a time series towards its end, performing convolution. It does not move to the left or to the right as it does when the usual 2-D convolution is applied to images.



#### 1-D Convolution for Time Series

The elements of the kernel get multiplied by the corresponding elements of the time series that they cover at a given point. Then the results of the multiplication are added together and a nonlinear activation function is applied to the value. The resulting value becomes an