

CNN for Sequences

1D Convolutions scan across temporal dimension for sequence processing



Local Pattern Detection

Weight sharing across positions



Growing Receptive Field

Expands with network depth



Parallel Computation

Efficient processing



Hierarchical Features

Captures multi-scale patterns

✓ Applications

- Text classification
- Audio processing
- Time series analysis

⚠ Limitations

- Fixed receptive field
- No explicit memory mechanism

Trend Calculation Example with CNN

Time Series Data: Stock Price Trend Detection

Input Sequence (5-day prices):

100

→

102

→

105

→

103

→

107

Step 1: 1D Convolution

Filter size: 3, Stride: 1

$$[100, 102, 105] \times [0.5, 0.3, 0.2] = 101.1$$

$$[102, 105, 103] \times [0.5, 0.3, 0.2] = 103.1$$

$$[105, 103, 107] \times [0.5, 0.3, 0.2] = 104.3$$

Step 2: Activation Function (ReLU)

$$101.1 \rightarrow 101.1$$

$$103.1 \rightarrow 103.1$$

$$104.3 \rightarrow 104.3 \nearrow$$

Trend Analysis Result



Upward Trend Detected

Confidence: 85%

 *Through consecutive convolutional layers, short-term, mid-term, and long-term trends can be captured simultaneously*