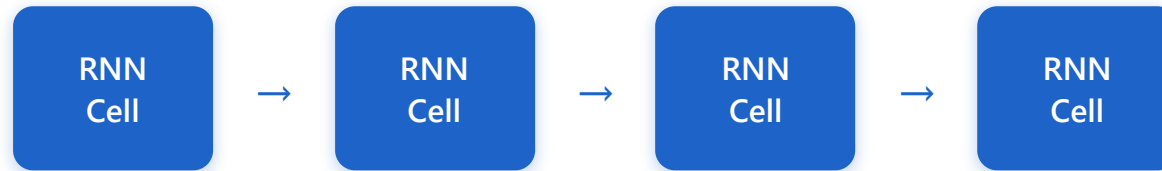



RNN-based Sequence Features

Recurrent Neural Networks process sequential data with temporal dependencies

Sequential Processing Architecture



 Hidden states maintain memory of previous inputs

RNN Variants

LSTM

Long Short-Term Memory

GRU

Gated Recurrent Unit

Bidirectional

Past + Future Context

✓ Address vanishing gradient problem



Model variable-length sequences naturally



Applications



Language Modeling



Speech Recognition



Time Series