

The background features abstract, overlapping geometric shapes in various shades of blue, primarily on the left and right sides, creating a modern, tech-oriented aesthetic.

Recurrent Neural Networks

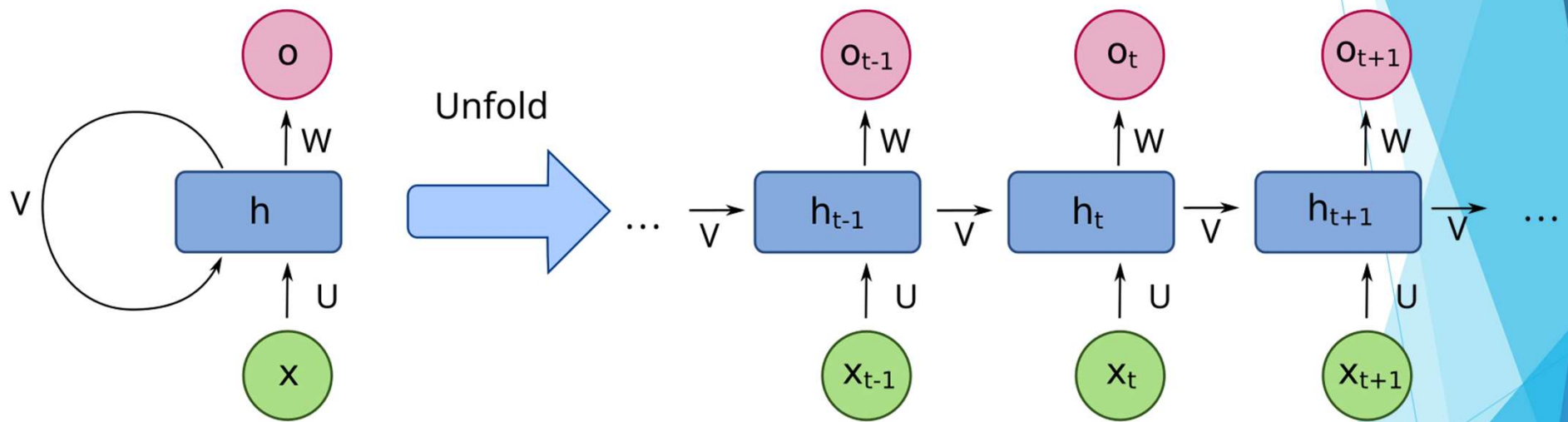
RNN

- ▶ A recurrent neural network (RNN) is a type of artificial neural network that processes sequential data, such as text, speech, or time series, across multiple time steps. RNNs are well-suited for tasks that require understanding context, such as natural language processing and speech recognition

RNN

- ▶ Here are some key features of RNNs:
- ▶ Feedback loops
 - ▶ RNNs use feedback loops to process data, which allows information to persist. This effect is often described as memory.
- ▶ Sequential connections
 - ▶ RNNs establish sequential connections between nodes in a unidirectional fashion. This allows previous outputs to be used as input for subsequent nodes.
- ▶ Mimics human data conversion
 - ▶ RNNs mimic how humans perform sequential data conversions. For example, an RNN can be trained to translate text from one language to another.
- ▶ Computational power
 - ▶ RNNs have high computational power and can accurately represent complex behaviors.

Structure



Limitations

- ▶ Some common problems with RNNs include:
 - ▶ Exploding gradients: The algorithm assigns too much importance to the weights.
 - ▶ Vanishing gradients: The values of a gradient are too small, causing the model to stop learning or take too long.
 - ▶ Complex training process: Processing data sequentially can make the training process tedious.
 - ▶ Difficulty with long sequences: RNNs have a harder time remembering past information as the sequence gets longer.

Other Types

- ▶ Some types of RNNs include:
- ▶ Gated Recurrent Unit (GRU)
 - ▶ Designed to address the vanishing gradient problem. GRU networks have two gates: a reset gate and an update gate.
- ▶ Long short-term memory (LSTM)
 - ▶ Introduced to address the vanishing gradient problem and long-term dependencies. LSTM networks have cells in the hidden layers that control the flow of information.

CNN vs RNN

- ▶ The main differences between CNNs and RNNs include the following: CNNs are commonly used to solve problems involving spatial data, such as images. RNNs are better suited to analyzing temporal and sequential data, such as text or videos. CNNs and RNNs have different architectures.

