Context Matters: Unidirectional vs Bidirectional Processing

Unidirectional RNN →

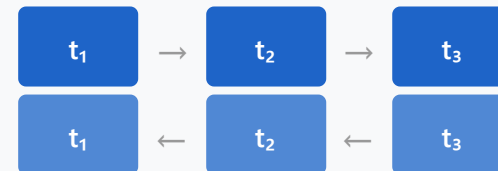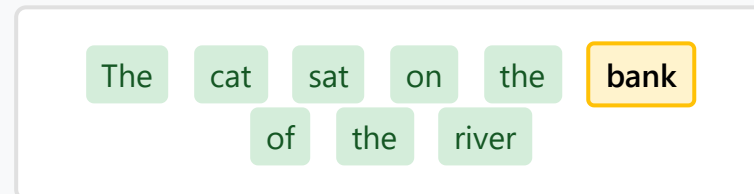| The | cat | sat | on | the | **bank** |

of   the   river

t₁ → t₂ → t₃ → ...
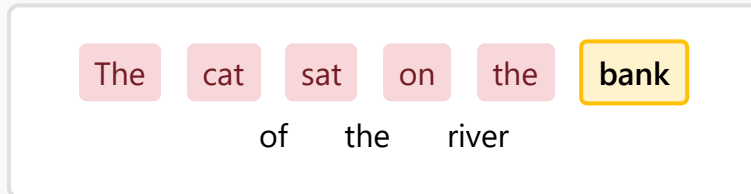
Limited Context

Only sees **past** words. At "bank", cannot see "river" yet.

✗ Cannot disambiguate without future context

✗ Incomplete understanding at each time step

Bidirectional RNN ⇄

| The | cat | sat | on | the | **bank** |

of   the   river

t₁ → t₂ → t₃

t₁ ← t₂ ← t₃

Full Context

Sees **both past and future** words. At "bank", also sees "river".

✓ Complete context for better disambiguation

✓ Richer representations at each time step

✗ Poor performance on tasks requiring full sentence context

✓ Superior for NER, POS tagging, sentiment analysis