Recurrent Neural Networks

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RNNs: Used on Sequence Data

- Autocompletion: Predicting the next word in a sentence
- Text to Speech
- Timeseries
    - Stock prices
    - Weather
    - Fantasy sports

Keras TimeseriesGenerator

	Volume	Open	Close	Target
2019-01-01	1,000,000	$150.00	$155.00	0
2019-01-02	2,000,000	$160.00	$165.00	1
2019-01-03	3,000,000	$155.00	$160.00	0
2019-01-04	4,000,000	$180.00	$185.00	1
2019-01-05	5,000,000	$175.00	$180.00	0
2019-01-06	6,000,000	$170.00	$175.00	0

Keras TimeseriesGenerator: Length = 3

	Volume	Open	Close	Target
2019-01-01	1,000,000	$150.00	$155.00	0
2019-01-02	2,000,000	$160.00	$165.00	1
2019-01-03	3,000,000	$155.00	$160.00	0
2019-01-04	4,000,000	$180.00	$185.00	1
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2019-01-05	5,000,000	$175.00	$180.00	0
2019-01-06	6,000,000	$170.00	$175.00	0

Keras TimeseriesGenerator: Length = 4

	Volume	Open	Close	Target
2019-01-01	1,000,000	$150.00	$155.00	0
2019-01-02	2,000,000	$160.00	$165.00	1
2019-01-03	3,000,000	$155.00	$160.00	0
2019-01-04	4,000,000	$180.00	$185.00	1
2019-01-05	5,000,000	$175.00	$180.00	0
2019-01-06	6,000,000	$170.00	$175.00	0

RNN Architecture

	Volume	Open	Close
2019-01-01	1,000,000	$150.00	$155.00
2019-01-02	2,000,000	$160.00	$165.00
2019-01-03	3,000,000	$155.00	$160.00

RNN Architecture: Unfolded

	Volume	Open	Close
2019-01-01	1,000,000	$150.00	$155.00
2019-01-02	2,000,000	$160.00	$165.00
2019-01-03	3,000,000	$155.00	$160.00

The problem with RNNs: Vanishing Gradients

	Volume	Open	Close
2019-01-01	1,000,000	$150.00	$155.00
...	...	...	...
2019-12-31	3,000,000	$155.00	$160.00

The solution: LSTMs (and more recently GRUs)