Language Modelling for Text Prediction

Devan Kuleindiren

Do you want to grab a _____

Do you want to grab a

drink	0.327
coffee	0.211
bite	0.190
spot	0.084
⋮	⋮

N-gram

N-gram

$$P(\text{sat}|\text{the cat}) = \frac{count(\text{the cat sat})}{\sum_w count(\text{the cat } w)}$$

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Backoff

$$P(\text{sat}|\cancel{\text{the}}\ \text{cat})$$

Recurse on an $(n-1)$-gram model.

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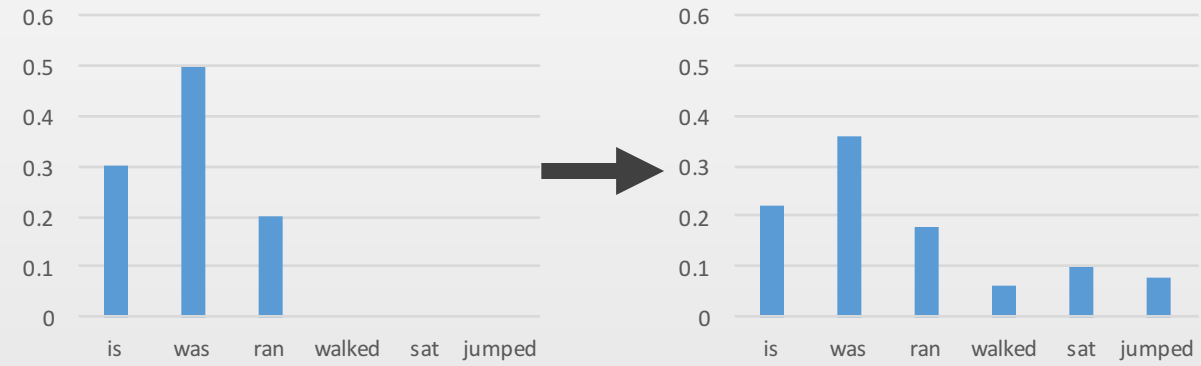
Recurse on an $(n-1)$-gram model.

Smoothing

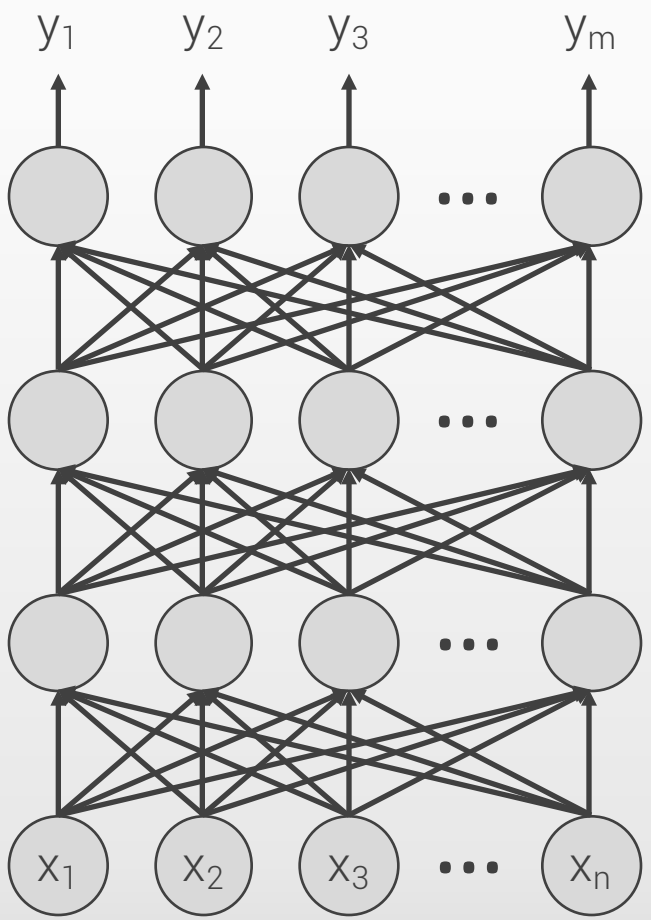


Some methods:

- Add one
- Katz
- Absolute discounting
- Kneser-Ney
- Modified Kneser-Ney

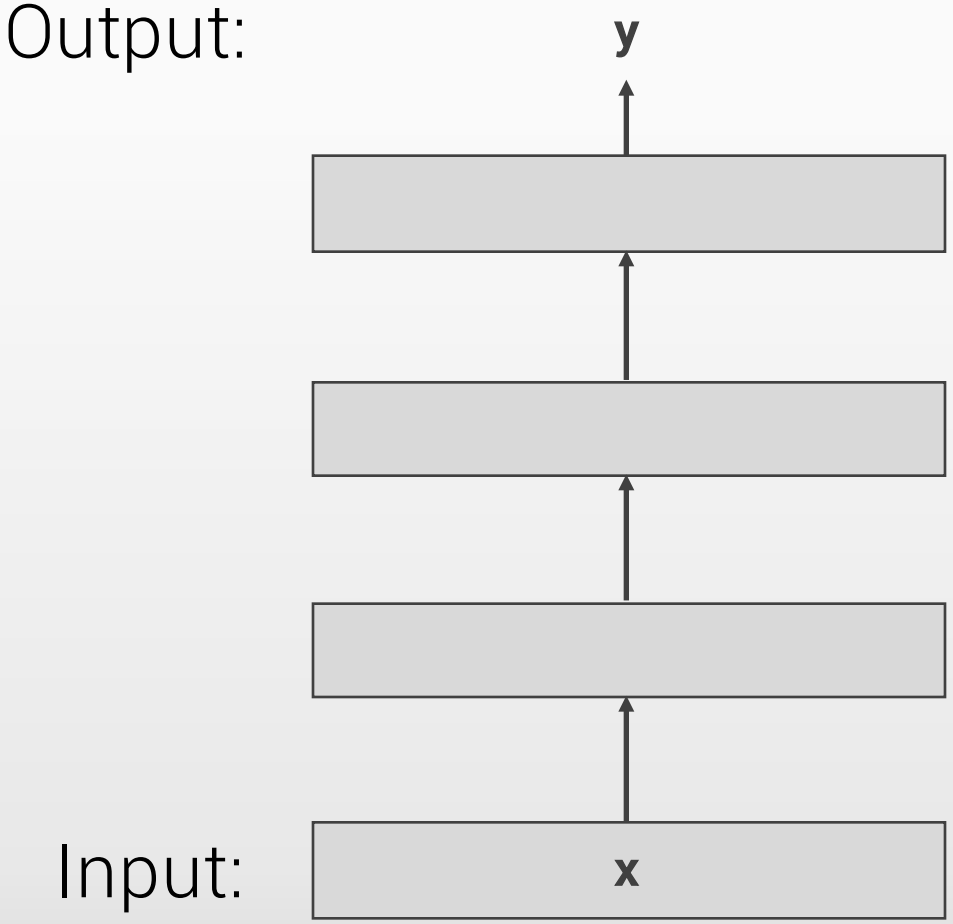
Neural Networks

Output:

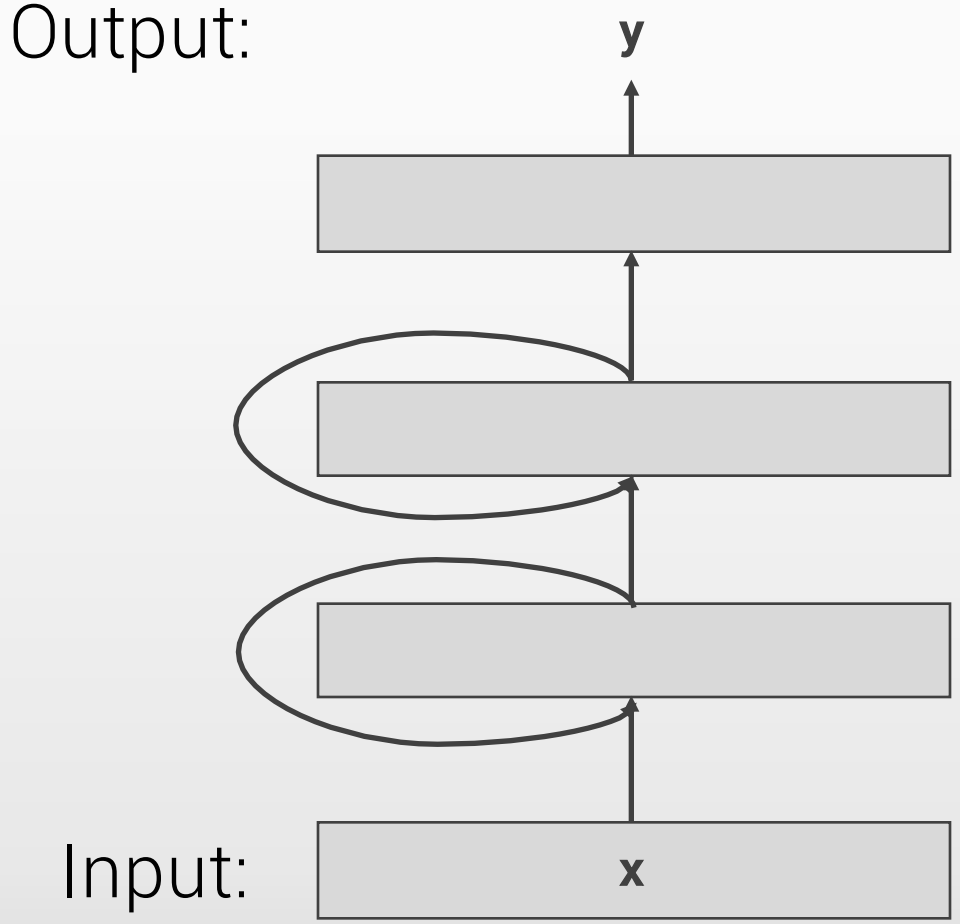


Input:

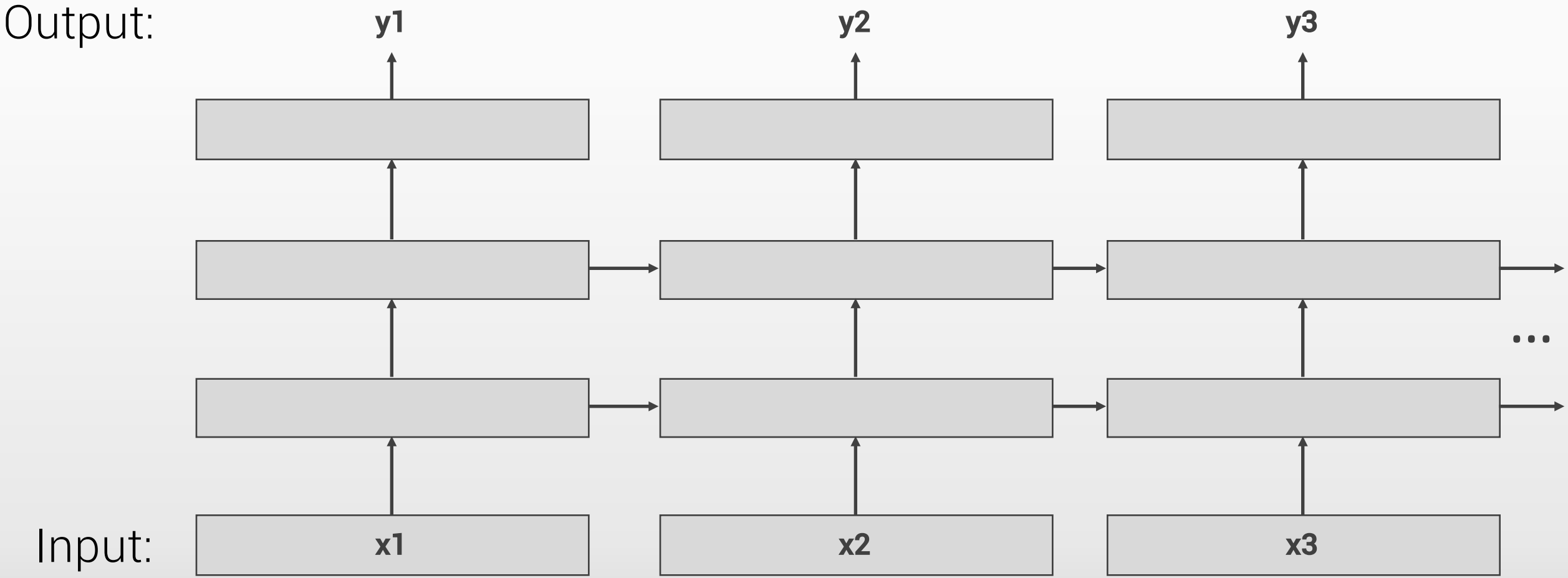
Neural Networks



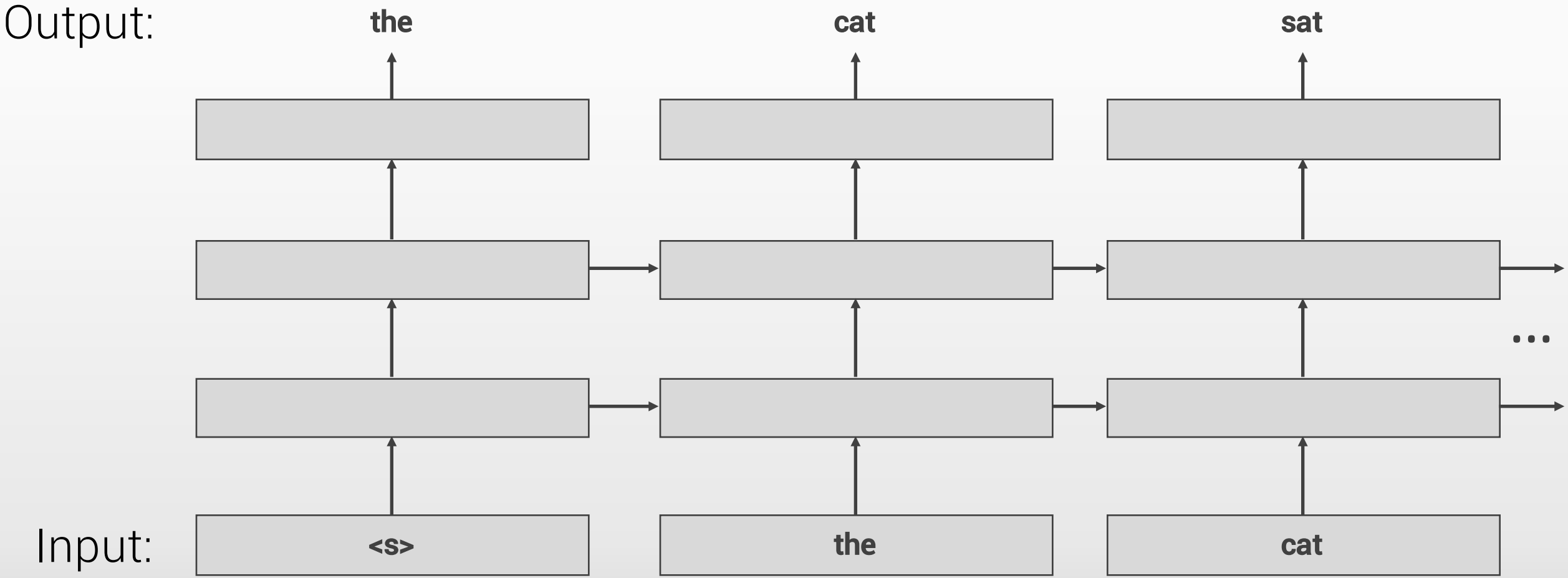
Recurrent Neural Networks



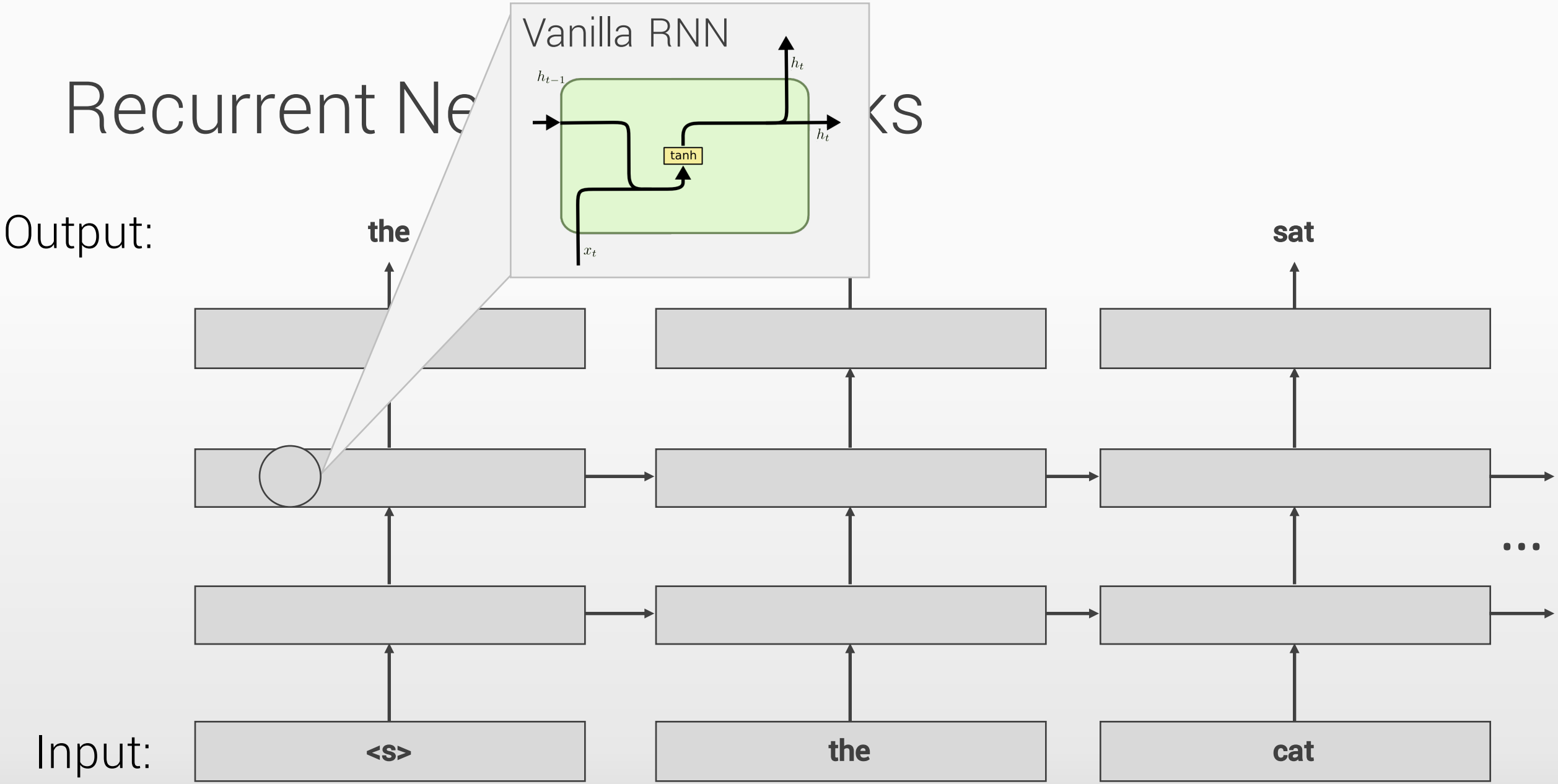
Recurrent Neural Networks



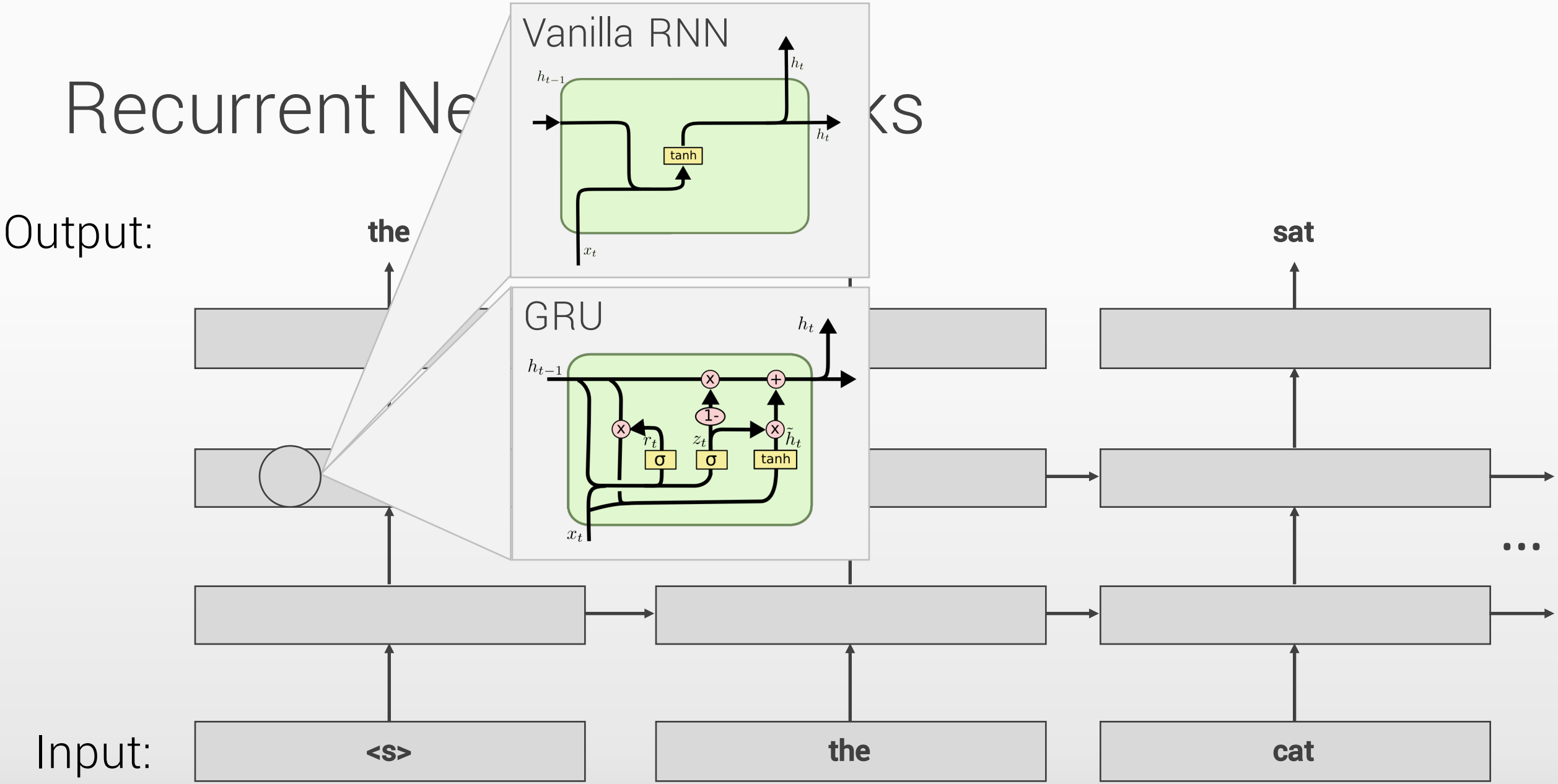
Recurrent Neural Networks



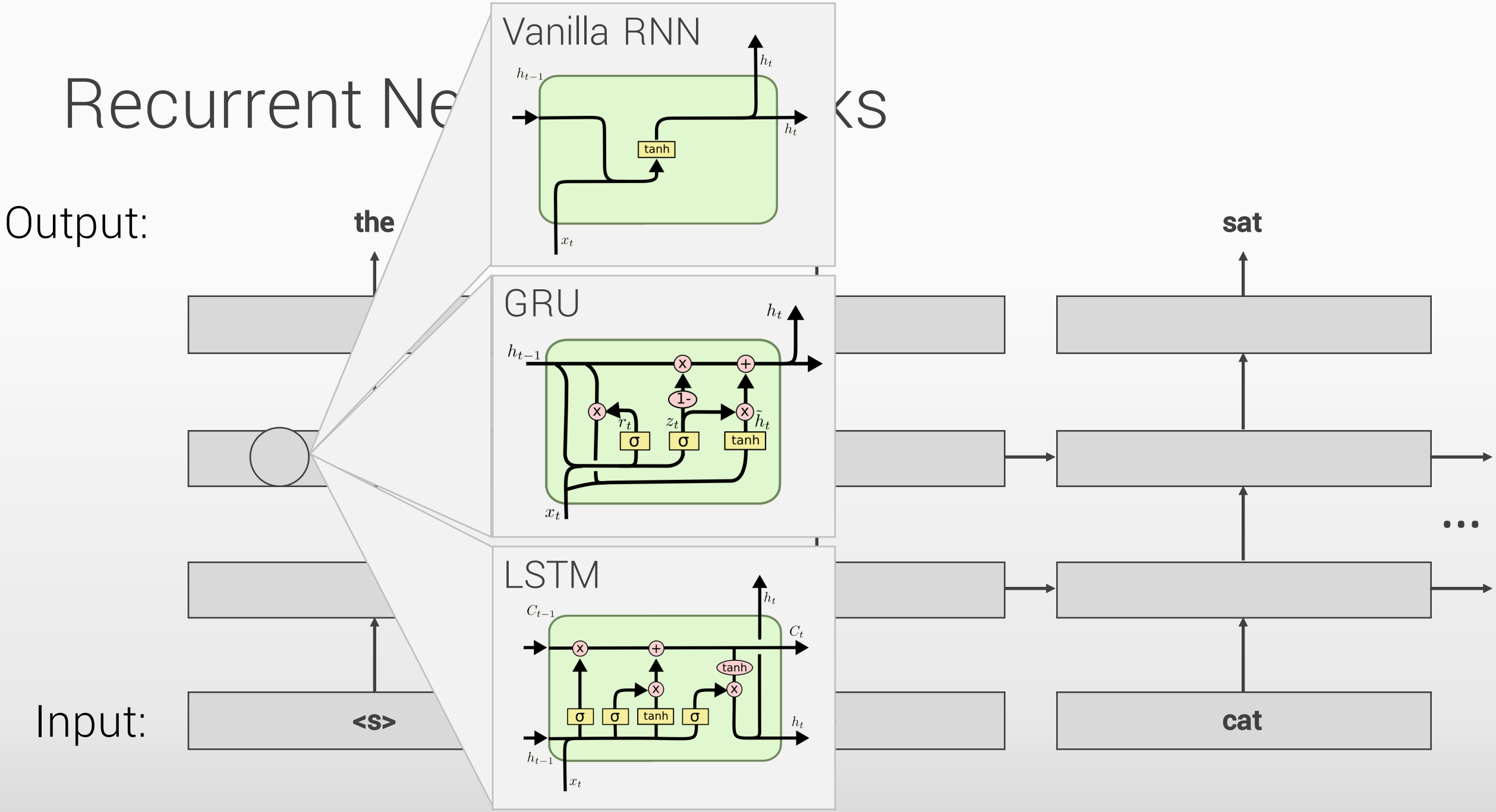
Recurrent Ne ks



Recurrent Ne ks

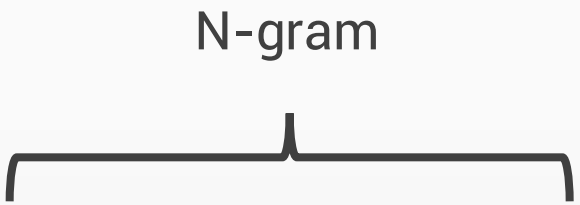


Recurrent Ne ks



What have I built?

Progress



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Progress

N-gram

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RNN

Vanilla RNN

Gated Recurrent Unit

Long Short-Term Memory

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RNN

Vanilla RNN

Gated Recurrent Unit

Long Short-Term Memory

Benchmark

- Perplexity
- Average keys saved
- Guessing entropy
- Physical memory usage
- Prediction speed

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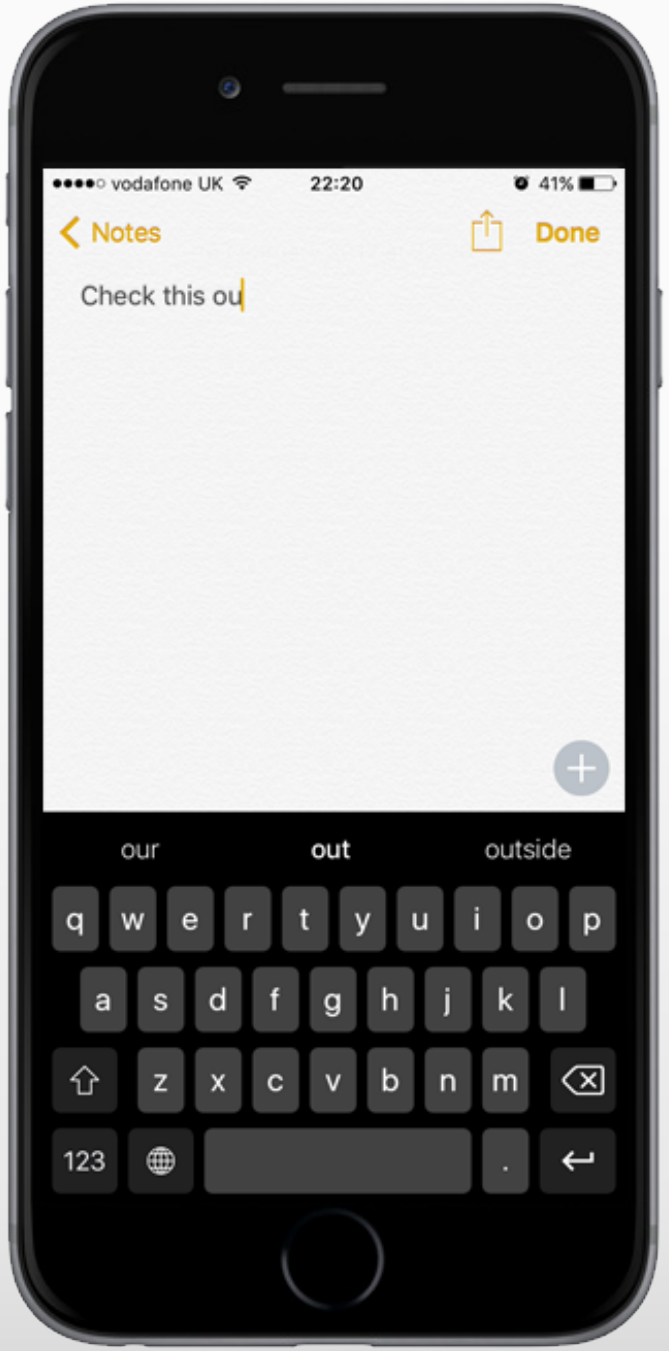

What's left?

What's Left

The weather is nice

What's Left

The whether is ____

Thanks for listening!

3-gram + Kneser-Ney smoothing

the meaning of life is threatened to veto the bill.

LSTM

the meaning of life is that the new york times isn't the only way to be the first time to be a major part of the problem.