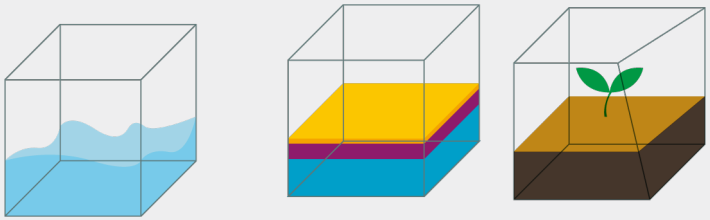
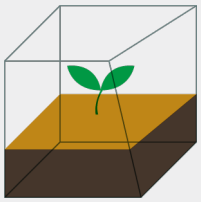
딥러닝을 이용한 수능 영어 풀기

LSTM





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프로젝트 설명

2021 대수능 영어 29번

29. 다음 글의 밑줄 친 부분 중, 어법상 틀린 것은? [3점]

Regulations covering scientific experiments on human subjects are strict. Subjects must give their informed, written consent, and experimenters must submit their proposed experiments to thorough examination by overseeing bodies. Scientists who experiment on themselves can, functionally if not legally, avoid the restrictions ① associated with experimenting on other people. They can also sidestep most of the ethical issues involved: nobody, presumably, is more aware of an experiment's potential hazards than the scientist who devised ② it. Nonetheless, experimenting on oneself remains ③ deeply problematic. One obvious drawback is the danger involved; knowing that it exists ④ does nothing to reduce it. A less obvious drawback is the limited range of data that the experiment can generate. Human anatomy and physiology vary, in small but significant ways, according to gender, age, lifestyle, and other factors. Experimental results derived from a single subject are, therefore, of limited value; there is no way to know ⑤ what the subject's responses are typical or atypical of the response of humans as a group.

* consent: 동의 ** anatomy: (해부학적) 구조
*** physiology: 생리적 현상

Q : 어떻게.. 푸시겠습니까?

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A : 문장 별로 확인하면서 문법이 맞는지 틀렸는지 확인 할겁니다.

프로젝트 설명, 데이터 전처리(labeling)

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해결 방법 : 컴퓨터에게 사람이 문제를 푸는 방식으로 풀게 하는 것

→ 보기가 있는 각 문장을 읽고 문장이 문법적으로 맞는지 틀렸는지 확인

문장	정답
1. Speculations about the meaning and purpose of prehistoric art rely heavily on analogies drawn with modern-day hunter-gatherer societies.	True
2. Such primitive societies, as Steven Mithen emphasizes in The Prehistory of the Modern Mind, tend to view man and beast, animal and plant, organic and inorganic spheres, as participants in an integrated, animated totality.	True
3. The dual expressions of this tendency are anthropomorphism (the practice of regarding animals as humans) and totemism (the practice of regarding humans as animals), both of which spread through the visual art and the mythology of primitive cultures.	True
4. When considered in this light, the visual preoccupation of early humans with the nonhuman creatures inhabited their world becomes profoundly meaningful.	False
5. In he practice of totemism, he has suggested, an unlettered humanity “broods upon itself and its place in nature.”	True

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→ 보기가 포함되어있지 않은 문장? True로 처리, 추가적인 데이터로 사용

문장	정답
6. Thus the natural world is conceptualized in terms of human social relations.	True
7. Among hunter-gatherers, animals are not only good to eat, they are also good to think about, as Claude Lévi-Strauss has observed.	True

LSTM – Long Short Term Memory

CHAPTER 3

RNN의 단점인 장기 의존성 문제점(Long-Term Dependency Problem) 해결

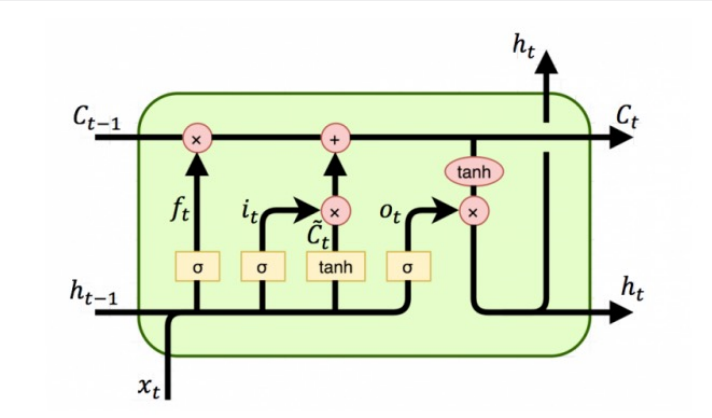
Long-Term Dependency Problem?
Gradient Vanishing Problem! (tanh)

Forget Gate Layer : 과거의 정보를 얼마나 취할 지 결정

Input Gate Layer : 새로운 정보가 Cell State에 저장될 지 결정

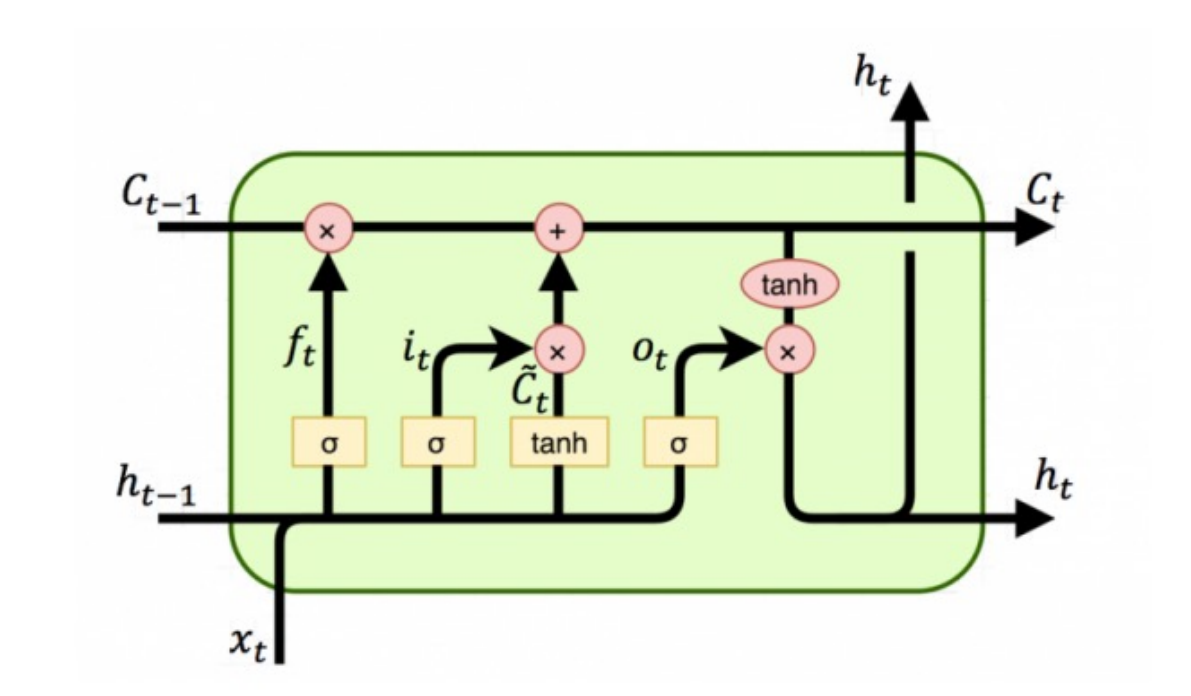
Output Gate Layer : 상태의 어느 부분을 출력으로 내보낼 지 결정

Update Cell State : Forget Gate와 Input gate에서 출력된 값들을
Cell state로 업데이트



LSTM

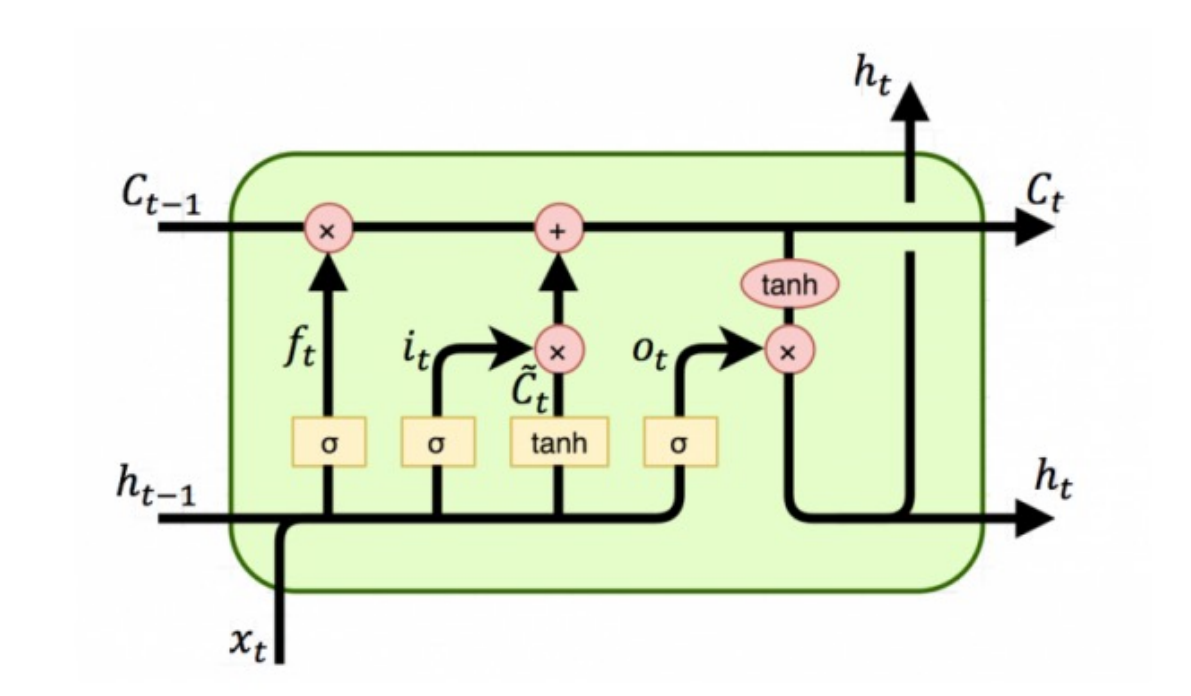
CHAPTER 3



Forget Gate	$f_t = \sigma\left(W_f \cdot [h_{t-1}, x_t] + b_f\right)$
Input Gate	$i_t = \sigma(W_i \cdot [h_{t-1}, x_t] + b_i)$
Output Gate	$O_t = \sigma(W_o \cdot [h_{t-1}, x_t] + b_0)$
	$\widetilde{C_t} = \tanh(W_c \cdot [h_{t-1}, x_t] + b_c)$
Cell State Update	$C_t = f_t \odot C_{t-1} + i_t \odot \widetilde{C_t}$
Hidden State Update	$h_t = O_t \odot tanh(C_t)$

LSTM

CHAPTER 3



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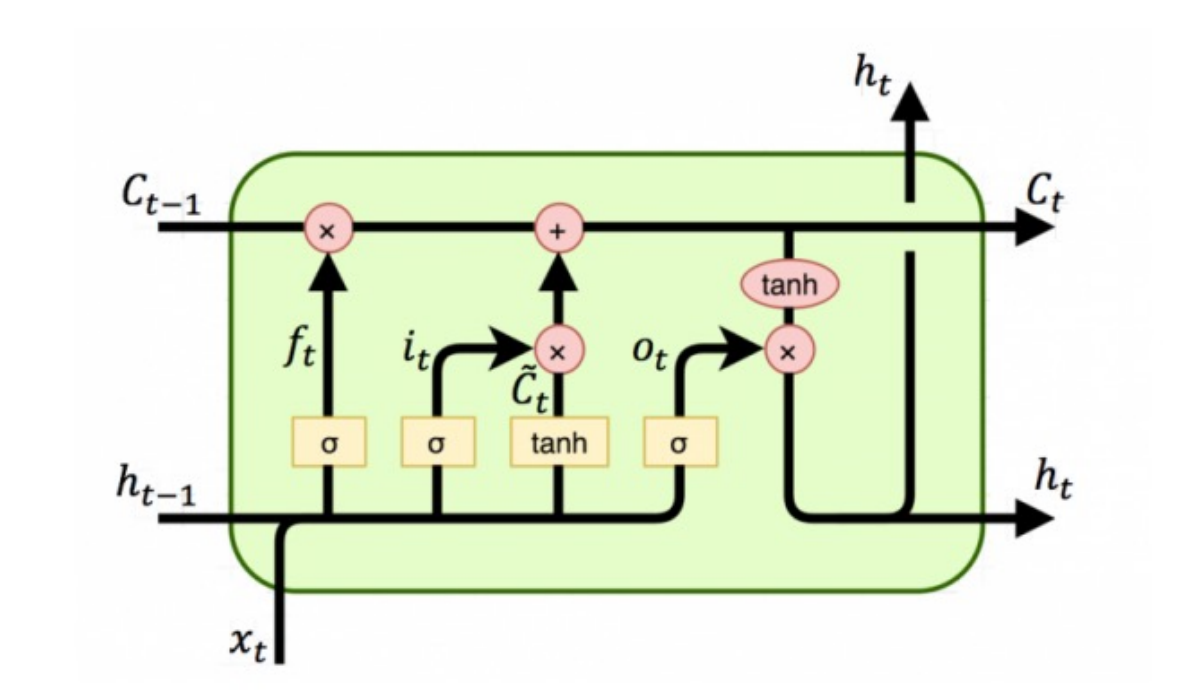
	$\tilde{C}_t = \tanh(W_c \cdot [h_{t-1}, x_t] + b_c)$
Cell State Update	$C_t = f_t \odot C_{t-1} + i_t \odot \tilde{C}_t$
Hidden State Update	$h_t = O_t \odot tanh(C_t)$

f_t : Forget Gate → $f_t \odot C_{t-1}$: 과거의 정보를 얼마나 기억할지?
Old Cell의 정보를 얼마나 포함시켜 줄 지?

LSTM

CHAPTER 3



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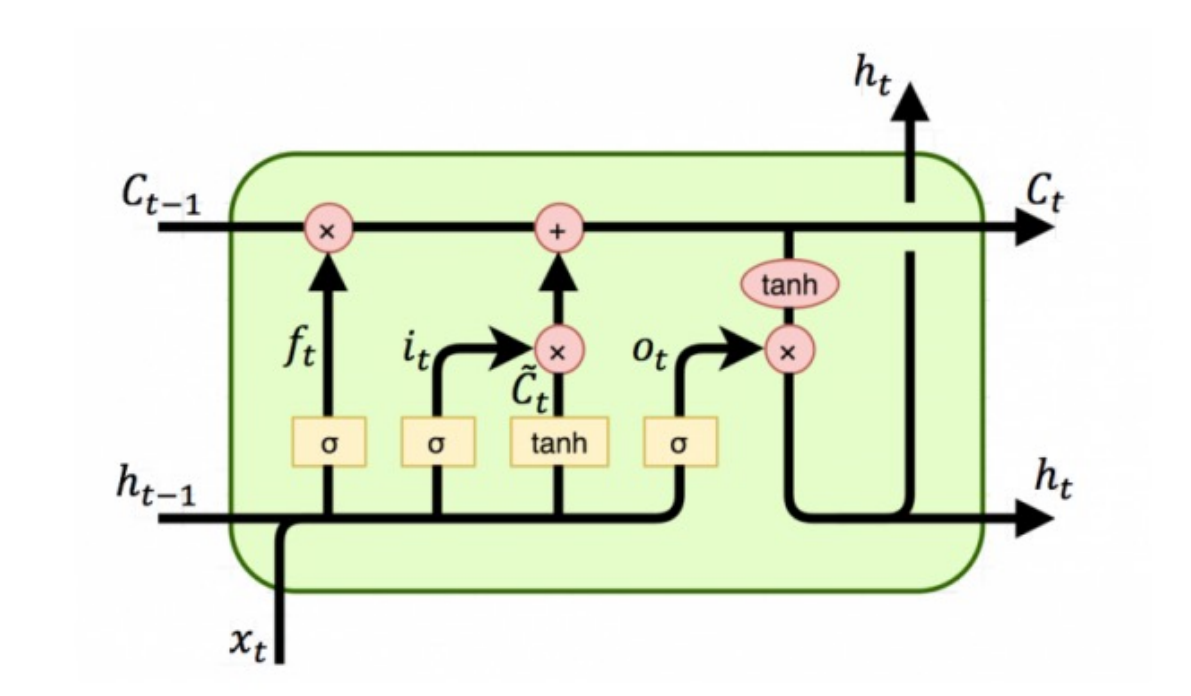
Cell State Update	$C_t = f_t \odot C_{t-1} + i_t \odot \widetilde{C}_t$
Hidden State Update	$h_t = O_t \odot tanh(C_t)$

i_t : input Gate → $i_t \odot \widetilde{C}_t$: 현재의 정보를 얼마나 저장할지?
Current Cell의 정보를 얼마나 포함시켜 줄 지?

LSTM

CHAPTER 3



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Cell State Update	$C_t = f_t \odot C_{t-1} + i_t \odot \widetilde{C_t}$
Hidden State Update	$h_t = O_t \odot tanh(C_t)$

$f_t \odot C_{t-1} + i_t \odot \widetilde{C_t}$: 과거의 정보를 얼마나 잊고, 현재의 정보를 얼마나 기억할 지

LSTM

CHAPTER 3

RNN BPTT(Back Propagation Through Time)

Let $E_t = -y_t \log \hat{y}_t$

$$\frac{\partial E_N}{\partial W} = \sum_{t=1}^{T} \frac{\partial E_N}{\partial \hat{y}_3} \frac{\partial \hat{y}_3}{\partial h_3} \left(\prod_{i=t}^{T-1} \frac{\partial h_{i+1}}{\partial h_i} \right) \frac{\partial h_t}{\partial W}$$

$$h_t = O_t \odot tanh(C_t) \qquad \frac{\partial h_{i+1}}{\partial h_i} \leq 1$$

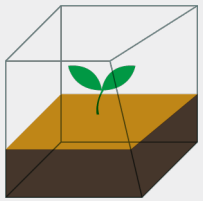
LSTM BPTT

$$\frac{\partial c_t}{\partial W_f} = \sum_{i=1}^{t} \frac{\partial c_i}{\partial W_f} \prod_{j=i}^{t-1} \frac{\partial c_{j+1}}{\partial c_j} \cong \sum_{i=1}^{t} \frac{\partial c_i}{\partial W_f} \prod_{j=i}^{t-1} f_{j+1}$$

$$C_t = f_t \odot C_{t-1} + i_t \odot \widetilde{C}_t$$
$$f_t = \sigma\left(W_f \cdot [h_{t-1}, x_t] + b_f\right)$$

긴 sequence의 Time Dependency Problem은 해결, 하지만 층을 깊게 쌓을 때의 Gradient vanishing은 해결하지 못함 → Residual Connenction

Q&A



THANK YOU.