

CS 224N assignment3

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1. Part I Question (a):
 - i. Because the β_1 is close to 1, so the new value of m is similar to the old one. Therefore, the using m stops the updates from varying as much and this low variance could solve the gradient fluctuation problem and accelerate the rate of convergence.
 - ii. The v accumulate the variance of gradient so the parameters whose gradient is rare change could get large updates. This could control the learning rate adaptively, and could get away from saddle point.
2. Part I Question (b):
 - i. $E_{p_{drop}}[h_{drop}]_i = E[\gamma d \cdot h]_i = \gamma E[d]_i \cdot E[h]_i = \gamma E[d]_i \cdot h_i = h_i$
So the γ should equal to $E[d]_i$, therefore $\gamma = E[d]_i = \frac{1}{1-p_{drop}}$
 - ii. We use the dropout to get more sub-network in training, and during evaluation, we want to get the ensemble model's result, we can multiply the result by the drop probability to get that.
3. Part II Question (a):

Step 4:
Stack = [ROOT, parsed, this]
Buffer = [sentence, correctly]
New dependency = []
Transition = SHIFT

Step 5:
Stack = [ROOT, parsed, this, sentence]
Buffer = [correctly]
New dependency = []
Transition = SHIFT

Step 6:
Stack = [ROOT, parsed, sentence]
Buffer = [correctly]
New dependency = [sentence → this]
Transition = LEFT-ARC

Step 7:
Stack = [ROOT, parsed]
Buffer = [correctly]
New dependency = [parsed → sentence]
Transition = RIGHT-ARC

Step 8:

Stack = [ROOT, parsed, correctly]

Buffer = []

New dependency = []

Transition = SHIFT

Step 9:

Stack = [ROOT, parsed]

Buffer = []

New dependency = [parsed → correctly]

Transition = RIGHT-ARC

Step 10:

Stack = [ROOT]

Buffer = []

New dependency = [ROOT → parsed]

Transition = RIGHT-ARC

ii. $2n$. Because every word in sentence to be parsed need in stack and buffer once time.

4. Question (f):

i.

Error type: Verb Phrase Attachment Error

Incorrect dependency: wedding → fearing

Correct dependency: heading → fearing

ii.

Error type: Coordination Attachment Error

Incorrect dependency: rescue → and

Correct dependency: rescue → rush

iii.

Error type: Prepositional Attachment Error

Incorrect dependency: Midland → in

Correct dependency: Texas → in

iv.

Error type: Modifier Attachment Error

Incorrect dependency: elements → most

Correct dependency: crucial → most