## 1(a)

|  |  |  |  |
| --- | --- | --- | --- |
| stack | buffer | new dependency | transition |
| [ROOT] | [Nadia, rode, the, old, donkey, with, dexterity] |  | Initial Config |
| [ROOT, Nadia] | [rode, the, old, donkey, with, dexterity] |  | SHIFT |
| [ROOT, Nadia, rode] | [the, old, donkey, with, dexterity] |  | SHIFT |
| [ROOT, rode] | [the, old, donkey, with, dexterity] | rode ->nsubj Nadia | LEFT-ARC |
| [ ROOT, rode, the] | [ old, donkey, with, dexterity] |  | SHIFT |
| [ROOT, rode, the, old] | [ donkey, with, dexterity] |  | SHIFT |
| [ROOT, rode, the, old, donkey] | [ with, dexterity] |  | SHIFT |
| [ROOT, rode, the, donkey] | [ with, dexterity] | donkey ->amod old | LEFT-ARC |
| [ ROOT, rode, donkey] | [ with, dexterity] | donkey ->det the | LEFT-ARC |
| [ROOT, rode] | [ with, dexterity] | rode ->dobj donkey | RIGHT-ARC |
| [ROOT, rode, with] | [dexterity] |  | SHIFT |
| [ROOT, rode, with, dexterity] |  |  | SHIFT |
| [ROOT, rode, with] |  | with ->pobj dexterity | RIGHT-ARC |
| [ROOT, rode] |  | rode ->prep with | RIGHT-ARC |
| [ROOT] |  | ROOT ->pred rode | RIGHT-ARC |

## 1(b)

steps.

One step to shift into stack and one step to popped from stack with LEFT-ARC or RIGHT-ARC for each word.

## 1©

In the described parsing, when we add left or right edge between stack[-2] and stack[-1], we removed all words between stack[-2] and stack[-1]. Thus we can’t have two edges crossing each other.

For example, if we first add edge saw -> yesterday, a dog is already removed and no way to add edge a dog -> was. Or if we first add edge a dog -> was, then yesterday is already removed and not way to add edge saw -> yesterday.

## 2(b)

I have finished all the functions in model.py. The most difficult part I think is the add embedding function. I made a mistake at first. I don’t create the tensorflow variables and the performance is very poor. After debugging, I realize that if I don’t create the variables, then the training can’t optimize the embedding. After correct this, my performance improves dramatically and achieves the desired performance.

Loss at last epoch: 0.1038

Validation on dev set LAS: 0.88

Validation on dev set UAS: 0.90

Test on test set LAS: 0.88

Test on test set UAS: 0.90