

# DD 2424: Assignment 4

Clément Gousseau

July 8, 2018

## 1 Checking the gradients

To check my gradients' calculations I computed the gradients on the first 25 characters of the book with the function I implemented (analytical gradients) and the function provided (numerical gradients, with  $h=1e-4$ ).

Then for each coefficient I calculated the quantity  $\frac{|g_a - g_n|}{|g_a|}$  where a refers to the analytical gradient and n to the numerical gradient. Then I took the maximum of these quantities for each coefficient, for each of the different gradients.

```
max relative error wrt to U:
  1.8464e-06

max relative error wrt to V:
  0.0047

max relative error wrt to W:
  5.9798e-04

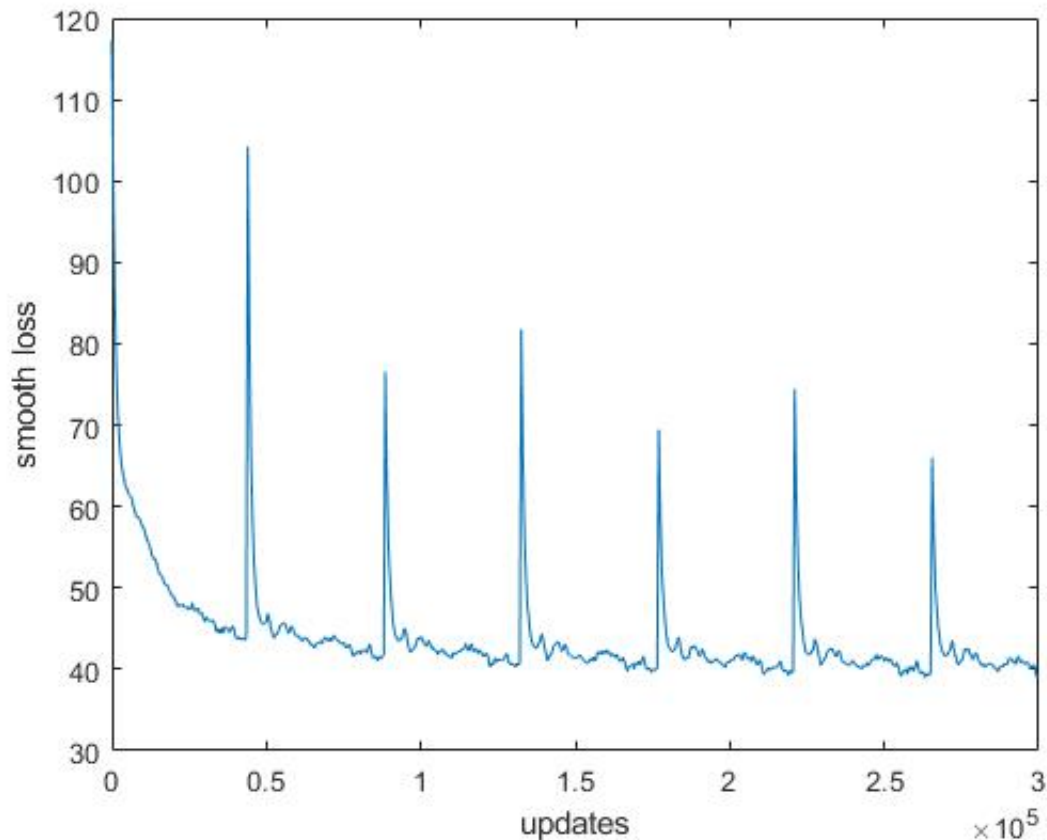
max relative error wrt to b:
  2.0799e-07

max relative error wrt to c:
  2.7988e-09
```

The errors are pretty small (less than 0.1%) so I considered my gradient computations were bug free.

## 2 Loss for a longish training

The parameters are  $m=100$ ,  $\eta=0.1$ ,  $\text{seq\_length}=25$



The final loss is 38.9. One can see there are some peaks. They correspond to the new epochs. The loss increases since the context is lost (h is set to the zero vector).

## 3 Evolution of the text

iter= 10000.000000 loss= 57.916426

o- siist la, shancoieg yeiont whaces an mang the af mowed sorct Ponid Drer heis tol. "Rowly wo  
ithat mtwao woud!f. sainatalg." "I. errmamad,ins far et taet bard amnim tes. "B and terde rom  
anco lie go

iter= 20000.000000 loss= 49.054089

y had cacl horry -" "tu bith the Sublked are koong surionry, - dtol arowe mith" Is in'n thi hid  
lowed the ta hid to s that of thous te pithe to ons wer tey whe leac. "I ware elid Hally mascting yout

iter= 30000.000000 loss= 46.485429

lirs expazand blfsl. Mome cererkly nothcry, his on herey mult ingl tirne, he, shompingd stroppe  
buened tire, aroded kit. Harr a owaing in fromef isaezfere lyaly arme yeut liont and Dack. Lied far a

iter= 40000.000000 loss= 44.985093

ed a anverwis, - the Srit were wangatly thith thon his nos was stopessornill to hiuness was uele wolt  
his hersing the shimlurm. rerlan, a parming on a blomed of's was thanb bbet thirntecoups, warn," -

iter= 50000.000000 loss= 45.759244

the know to itlary. he wlemre of an and-'s Eathered they Griuseere and if fill girsliong horiof and  
he," saized Butine to the layts the sid could who expeerifss of the wizele wicand spille sut thee

iter= 60000.000000 loss= 44.138173

ed, Am, Harry's, "I't. Hardy eyher enfind dabring when grans the car nusistinatine hroumpleads so cingory, prawn his stanted bpot Ficl." AGry had Hardy's recaitain't oBled ball, even the westorle tha

iter= 70000.000000 loss= 43.713927

ine hive food the Sonked they Magest. " Thalldes the doptric2 the dech Flad usee make slitwer, Kere eamy his acchun thing at Ron. Buch in ullen wan mwasl of I mpinken that attonence propping ost deck

iter= 80000.000000 loss= 42.085727

el take. Shat Kechint siverabo M dime of "fow, y very some fonment teys the Dimbing sood and Kann is . . "The fol Kare behtafs at he way the Chremabfel, was a light stogning of the day eding tere tha

iter= 90000.000000 loss= 55.178910

key d Hur sfoing has yously mant, but ho sioted twat a cleckura as who had denele houdhed swghanastovy and insing loggers thatlane." " the conleac.. Provem ever berighted fol -" Harming if Hurrid, w

iter= 100000.000000 loss= 43.680031

er, I'l Harry sleatsoll was pail bofitlessed bedoart feat maned the to leffer!" "You're seacent comewrears, who compeding his cou wroatictars. Eapbed; riggorg. Yow was Dudpicrort the Durge will evil

## 4 Example of synthesized text

This sample was created with a RNN that had a loss of 38.9. I highlighted the english words.

'u the lists. "Yeft to tafinch with nomestoe he wlingchiccar he sowing bofimer. "He's, frem." Tumatbining werrous he said mull last into they ans - Mr. CHadre us!" In he thiaks tere who himm. Hermione agreed it himpeven defwadd you atoase the cand. . . . " got Billed wacks mead hims isn't sore of his chartund apulfineves on tishing starfer," He streateralyy bectidn't thouthes down throuse east "you Rinn the with couldn't fake and tritg dant hight main's ground sooa could and Way spitry kneck an the croetstor Herry's Moody Profe, Hey from Klent - In't the other to bot and somemoul it conson. Is, vy't al almigaries." "Nousnathing his ally smay a gock so that, Cangers," said Heg wast eyeved te pook-y. Harry's deption Durmed!" "It, how and Mudch Lady swempeld you youlth," said Dome to got plastifusn't yen if their oul in one!" he botton these around swlenty of ground awa o." "I like then't at horf. There's as peave . On't sevent nasta know Dumbonted the till be that's shopped had my '