

# Report RNN

## 1 Analytical gradient check

I checked my analytical gradient by comparing its value with the numerical values:

```
print("W difference: ", np.min(grad_W - grads.W))
print("U difference: ", np.min(grad_U - grads.U))
print("V difference: ", np.min(grad_V - grads.V))
print("c difference: ", np.min(grad_c - grads.c))
print("b difference: ", np.min(grad_b - grads.b))
```

and obtained the following results:

```
W difference: -4.1326405253623577e-10
U difference: -3.4164546885984137e-10
V difference: -4.170429990929536e-10
c difference:  2.3226487400052065e-10
b difference: -6.161565979656558e-10
```

Thus, I am certain that my gradient computation are bug free.

## 2 Smooth loss plot

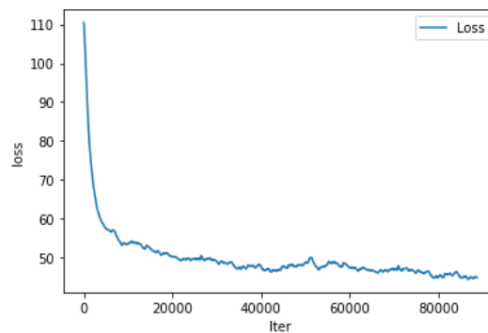


Figure 1: Smooth loss for 2 epochs

### 3 Evolution of text synthetised

```
0 done from 100000
```

Loss: 110.47097426331077

TPNTNDTNNNTNTNNINNTNTTTNTNTNNTNTNNTNTNTTTNNNNNTNTNNTNNTNT  
NNTNTTTNNNNNTNTTTNTNTNNTTTNTTTNTNNTNTTTNNTNNTNTTTNNTTTNDTNTTN  
TNNNTNRNTNTNNTNNTNRTTNTTTNTNNTNNTNNNTTTNNTNNTNNTNNTNNTNTTTNNTN  
NNTTTNTNNTNTTTNTTTNNNTT

10000 done from 100000

Loss: 57.98030783939175

"a d therre ah tortoang and ngeng tn s tneo u tntang aor  
an netntortn eutt taoug " they shhe aon e ttrsl th  
aon aotd tidg tr WHn toug t" hhrdyd tne tarln tnd r dtir  
aor toauestore

20000 done from 100000

Loss: 54.368464761984804

eng thr tnd the tus eng ut tf tarryd Haard d ti aaush ta  
ng terrs tn th hh ng "Whe te tau tar ns tand the torel  
tner tot nd "When tann tnd t er u  
here etnertd teutete H " taeret d

30000 done from 100000

Loss: 52.545125589680026

aaarry tire tas tetkeng te te dthe soat arrayd r af tnr  
tas tat thte ddat ed ne tneti seoule re taueyng tn tutee  
utd sar d terly toth andnerth tuhr Har tirnhreythe  
.Hhen n sn tn e torlng t

40000 done from 100000

Loss: 51.504493047038004

od r hf taetgs wortr dte r d tf trt theughe srrg tet et  
he sard dtrre . . . .rootk tarry the tooort ere totk  
t hnsold torete wes tes tarryworne re tn hn thrd tn tor  
ei dne hethrt d teong tesh

50000 done from 100000

Loss: 50.87005705339197

n thesh n areitare tow eed rgser ydt srenng anl ae  
hHouryng tnd toewketn d rtnsrou wes tore y eng tne  
aeuked teetgeyng anl aaoutd T ar hid wete an thrl ao te ao  
tow tnd tn n the to r

60000 done from 100000

Loss: 51.40873312158631

.otgtrde tf tat thet "eu aare n tonhe tored tnl tndard  
ed d thes tauktn tnd aes tis tn the tette rnhtnd Ine trthtntetktdd "a ryu aot  
aaor tn tea ng th tor

70000 done from 100000

Loss: 50.416350006170646

af te i r touke ng "arrrt tt te heng ta e tne u tndt  
hrrln wnd thet tar .ou s tetht Hhe tn tnee tarthed e  
n n t  
h tertidt thet taurd whe saners aea ngs howene tn the tou  
lewed eng tnd saa

80000 done from 100000

Loss: 49.97823868837356

a tet tteeu endtrent s tas treotboouend tarry saidt s soa  
td dtn t bf tuwnlng " nd aettenk and snd "erry tneetged  
te ne tf euteuk ngh tohr "Ite te tfeng th eers the saake  
e r snn hed thtr toot

90000 done from 100000

Loss: 49.542196724011596

e ahtltl the sal erenn tf tn th hothd toid sareonr the "a  
ri the sotrl e tf then tnr rd the t aetter d tuumethe to  
n yd teoat tor n rg the srnhhd tromud tndorng e . .o r  
teude ahe s har an t

100000 done from 100000

Loss: 48.83398964424483

Eg harry s Hoeuetn ybeaoreed tare ahe aas e terd an id  
theugd taet ae eng the sh "I "utdered then ai " Hae  
"Iou took te af tnee de r th th hooaetae tas tadd tumdond  
.oid te rsuml TT

## 4 Passage of 1000 characters from best model

For 7 epochs of training I got a best loss of 40.66163692889274 and the following sequence:

. .Ie weokedf s ahey wor a ths sosgrt d and thrner th te tn tn te th tarry  
HI haa e toet tumbed s an thesk ahe song d tf oec oh k aotwir on H  
worn terllasked tiroyi tathholeianlre teot ered er " "Y tf the h shene  
sot te the tocent tot er tf tis h aapirldsrdd s seoad the farthle sd tomte"  
"You hire of tar ssai he wast ng t d thaont d trou tn ti work th thth  
the fiat aus . .otg tn tiwenenn oidhey aubgt of socn aou tas tn  
Hn or y ane sarrn said Hrgictont" said Hrenhis te ted . .n ai teght  
toe thet taoted te tnoue wact tis balh the was s tumbltengel yte r trary  
ah ard taikey  
"Ye sad th the ftarenkito ter neeee aermhnn and the s regeid tv rotd tn the  
son't tp tf tis torkier oe ernder Hh dhe wasletettng the wo ard tarenttd  
tern tf the sare d ti wad bem bvt rt tf the sas sft an an the e wf the fas  
thme tfer tiwt ant to t tou sare thse s tfer te wad tnteiee lnhd tnard  
theouk ertrofe " toe tard telandtendleceed toeateng tnsespns nn taech . "hll ie