

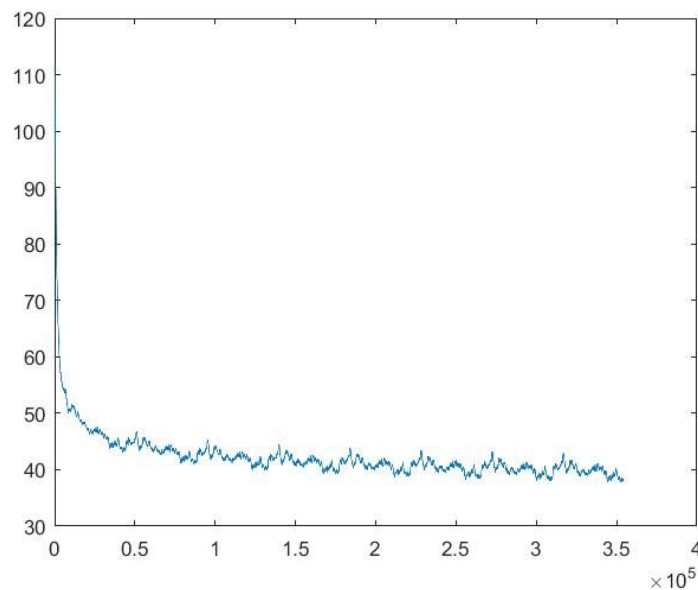
Deep Learning Assignment 4  
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In this assignment, there were five different gradients that had to be checked. Below are the relative errors when  $m=100$  is used.

Parameter	Relative Error
W	7.3043e-08
U	5.6559e-09
V	7.9200e-09
b	3.7100e-09
c	6.2076e-10

All of these errors are less than  $10^{-8}$  so it's safe to say that the analytical gradients are correct

In this graph, the RNN ran for 8 epochs (an equivalent of 354409 iterations) where the smooth loss was calculated at each iteration.



## Iteration 0

Smooth Loss = 92

*ZD ao and y*

*wPito, to stoll Cog ure drr Qols tirce*

*"*

*Wotey .ond w y tottrrr /unthet"*

*oarge Uhe warg. ciirsts Te -vl.,*

*"o th s ote sits erse*

*"ver. hNat P*

*tisgasm, le r-dt mF -d tr hes sv pias*

## Iteration 10,000

Smooth Loss = 54.5394

*rocgs, dore ad off wacke he maididing wing at onad a eflle," ey weacasting, Heamling wew atrant'as.*

*"Why thius cun it Heabfacts aigred mat mremmored, wer. "Weas domed belly Harhid iok ar a wave eru in*

## Iteration 20,000

Smooth Loss = 51.2669

*Kurge ale andicp, herabout lopted litrund dsent. he juf said nith to in laken fife home nucew fpofflagh.*

*"Is thouch upent agrtent the sAored the caroled Mever the goked The I dlot. "I Miryvied light*

## Iteration 30,000

Smooth Loss = 49.7571

*Deiving ip heagn's of a gitn.*

*Prose fof jure anoge neep pyoronhingestly get teres as of ace febrict soemonkevinst'r clage one walew, thewempole rusarmed and hee Didgalks well epet had stwowly a lofe*

## Iteration 40,000

Smooth Loss = 48.5656

*eanggeay Tchindsning baly was wop sirele, he haverorly her Weyup purore. Dirny Harry neam the sppoycaing Voldnreddithen, you glith it Es hiz o therg favere awargh Harrytcat woared or wo.*

*"Yoss. Harr*

**Iteration 50,000**

Smooth Loss =49.3515

*thenagavings loing brath chald kestred.*

*"Anced mull, they's asperly," Wave frang Crouchibrow leut goil offond theire."*

*"Olt lowarse. lund thou, genther crased acowerfed "Though ando be thame strostcr*

**Iteration 50,000**

Smooth Loss =48.2071

*she, now on blen andele and Cintion of Didgled Harh neven toblzand wein vide tuansled aive a  
buf uppey, Beed to the semock touavereiniss and gow dion at the Gorming Fiste mifing of mifd  
akene lake By*

**Iteration 60,000**

Smooth Loss =47.8128

*Thac seld takils ladwion, sat and aye," seonidn that hif paus awouslick."*

*"Harry how's thougcles; detch woudnak, uncen said "Oh about leely, renerded. "Jure squizad  
he momes.*

*"A wey her, wo; Row, at*

**Iteration 70,000**

Smooth Loss =45.2345

*offtered them in out in lost she lowns skild ittin reaving vimeking looker, hat to, bollicularin't  
keetry out whise to "wh whan've thack athort a will before lengle. I'm thene by the was preto by  
bo*

**Iteration 80,000**

Smooth Loss =43.4214

*e stone, and Aweve sabme himsed furniby.*

*"He wand yournese ablenon. Cedrin it, poof- Moof, bountle thing, and Hermione arouch, on  
Cedriffed un early blact if the sifrlly works' next of hit Ludel willew*

**Iteration 90,000**

Smooth Loss =41.5382

*Tr's ly. Karky then see a just conrexcent of his Durgled - but wh. Slaty reed to disnerv for her  
golded you left from me," Harry chooked abace. . .*

*"Around of he fartly, his flee lermments.*

"Did  
The

### Iteration 100,000

Smooth Loss =39.0349

*wait'll each himano. Harry moratientouged Viktor ... Vorched what stect taking colden him, peeting?" Seeph per curey?" Do?" The I had shoulde in the wascred-othing uplishing hunder tark Snape in't*

The best model achieved a smooth loss of 37.54 and produced the following 1000 character passage:

*- "He he?" said Dumbledore, waiting paw hemserver tamfly, I'm undive the then heard away, whill mead.*

*"You, then . Whe of the heling of pow all any polidons," said Ron, him.*

*"Yeh's ref-ly to way no filly said in Harry harsed to corsers patter, hele ug a bagmely tray, treestral for it was reforually them a lost it manus Arrdaned ronging to my ... ."*

*"Brizard.*

*"Oh to do you than him...."*

*Hall, and Harry was not it said, even someth pricable happed under him.. Harry looked a Pontaming and next. They Bagmins Disa damenok, by Clow. For suppy of back yeardes, mone. So willed at tell blont to it?" Dumbledeevery. . . A thoughing every rundy're into ownis expeller at Flewasher astens whilp see Iverollizey to its enbicing one at he deal - Harry. "Er Bulmancinging awayby make*

*Moody, "you know. .? She Ponint all eyes arkans. Mrmical," said Harry - we's s'f is what Swriskee quieting handd. . . .*

*"Gorratic stumbled oping, they falles, he idean lunt. "Cedried no ressoted by zeoggant undenti*

The synthesizer is able to produce names of major and minor characters (Harry, Dumbledore, Dobby, etc.) but some of the words it produces aren't actual words in the English language.