

Assignment 4

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May 22, 2021

1 Figures, plots and comments

Each subsection covers a question of the assignment.

1.1 Gradient Checking

I am starting to get the hang of checking this error rates for analytical and numerical gradients. I used extremely similar code from all previous assignments to calculate the relative error rate. The only real differences is that we check the gradients for b, c, U, W and V. The relative error rate between the analytical and numerical gradients with $h=1e-4$.

Gradient	Relative Error rate
b	1.81E-09
c	4.69E-10
U	3.61E-09
W	1.57E-08
V	9.65E-08

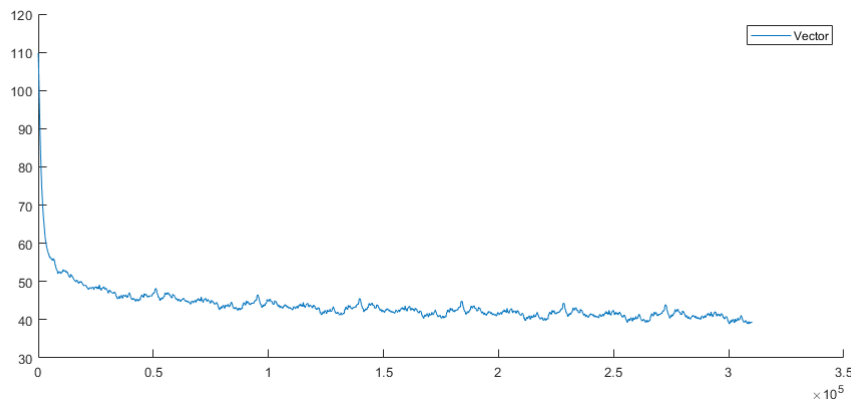
Table 1: relative error rate for gradients

We conclude that the error rates are very low and we continue with the assignment.

1.2 Smooth loss plot

Shown in figure 1.2, is the smooth loss plot with parameters $m = 100$, $seq_length=25$, $\eta=0.01$ and $\sigma=0.01$. In the beginning, loss is really high and then it seems to converge to about 39.

Figure 1: Smooth loss plot



1.3 Character generation

Character generation when training for 100.000th update step is shown below. Parameters equal to the when the evolution of loss is plotted was used. In the first step, the text just seems like a random character generator, but after 10.000 update steps text that starts to reassemble real language appears (although it makes very little sense and contain a lot of non existing words). After 60.000 update steps we see words as "Harry" and "Hermione".

step 1, smooth_loss=109.8

ao64ca)z4 a q'52g21,sspsi}9'S7i.j7n)(0ak

aUswad6adJKLjasnd(alkn12lkn)as8OlaGsFn1Aaöljsdyu{asdl1lknads?.1:23lK aklj 2oisd(asdlk_asdASdF_C
O?kA;dasd 827AS Ssdi masDasjdalkjfüAHRkVSadsdugkmql KLe4

step 10.000, smooth_loss=52.717928

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thaid she tharlizginct ance to Misch ige to than Crromoo te or,. fericen you Duicarkisgerendrer.
. ". Roo s

step 20.000, smooth_loss=48.950202

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ut ereioing kandert wal he - aronayhir and hive had beedingofre that -pert to wes could you
mect aid frryenurf

step 30.000, smooth_loss=47.670794

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the quoflesed the s

step 40.000, smooth_loss=46.362351

•Od yound youn a thar bees hist thaive bot's hid whing blist os tleoped alart dot his elle wion,
awnef that of hisce squetirid. . . weclst towing fermizime bospree. I was ffome bought,
indemp

step 50.000, smooth_loss=46.651161

"Wquill, they a s?iggher... - ling a sack it tnor bede thered, Pyicly of of you's avarys looked," Bexamborthe kintuy the was serseagry reard Cen' leanfroby and thedladdy, rombyele of but the colling,

step 60.000, smooth_loss=45.151205

7/tusinchingbealy, Harry. lid," said Karn Wealle Mall Hermione slien Mr!" sandes you?" we arking forevencefien." "The rallen hearded't wey he sloullaid, -"a a enacar the the legwas," said Rrest aw.

step 70.000, smooth_loss=45.045486

nour gort I menmalmening Crouard a foo - a going. Petlard reper at when from, he racking lot the figes yee?" . Mudde on mesents famions slouth up flow the heord work? Back doward the vary trope, a

step 80.000, smooth_loss=43.362871

7ver hever us looking forminon wean, she mould in it?" "Yee knop dyot modn's watch thatherose's betering, beant of the talking that onling that he was muthing irovet.

Varound it you'll what nasf wi

step 90.000, smooth_loss=44.170826

3den-applancost pligetur to us have got in scand she waste has binebrishig to wect you, stawing nese beatereds. Cecreccogenling would agwed," to dieft at the end theiled manituin in couse blimely ag

step 100.000, smooth_loss=44.936937 (vore me are siment Grould ewlas a gove on cleee," seak Harry, -" "Aroft - whor else you bat kface eleave explated inup a vitill, the weadd. "mereag. "He room Deand-Verting tho all alloom se wotced w

1.4 1000 Characters synthesized from best model

The best achieved smooth loss was 38.8747 and using that model and synthesizing 1000 characers, the following text was produced. This model generates words and phrases which are more sensible than above, and has more grammatical structure. However, a lot of the words don't make sense.

"hrimpoffen, one was one," see erjuy Dumbledore over to to Deebby asteks dumblers Crouch, igromben alpeaned. "Mr. "Bell." Foms, why noll, see be him!" Hermione julling your of the shaks've wath turn, hards stamming Harry was noudd night had been her way out was afterly had leated they he's the sp, frow. Porting. Them bera. -" Wearre tone prokets of Sitching tonced eventy and gom of were them, "I is the Ithel neaple, Armull of him. "Yeah stillosed gork," But meching asmreedled our actot, to, he man you here thook rithore the come fux - to crick note hams, greatious face to the stone you'll wote car him. Whecter shander, was prever hat shakentyng thele sterent rightling got gramidy. "Nut. "S stare in to noth ondas. "No," said Rented, he had hag over a jumbled atched is for cauch Gearf, we thive going us very eatory, you remponteny infe'll be oper in the menty. Vontay's word, shaken the Wenking. Taking tigur dimpleves up, which be around. "But unething to leen unct up, gos. "But