Assignment
Anton Lu
960611 - 1475

1 Correctness of analytical gradient

To verify that the analytical gradient was indeed correct, the analytically calculated gradient was compared against the numerically computed gradient, using the method

$$\text{alignment} = \frac{|g_a - g_b|}{\max(1e-6, |g_a| + |g_b|)} \tag{1}$$

as in the previous three assignments. The numerical gradient code was slightly modified to account for a modified return and function signature of ComputeCost/ForwardPass. The alignment between the numerical and analytical gradient was around 1e-8 or 1e-9 for all gradients, with $M = 100$ and $\sigma = 0.01$.

The alignment checks were performed using the 25 first letters in the Harry Potter sequence. After debugging the gradients for 1 week, and finding out that the fault was a mismatching function argument signature, I'm 100% certain that my gradients are bug free.
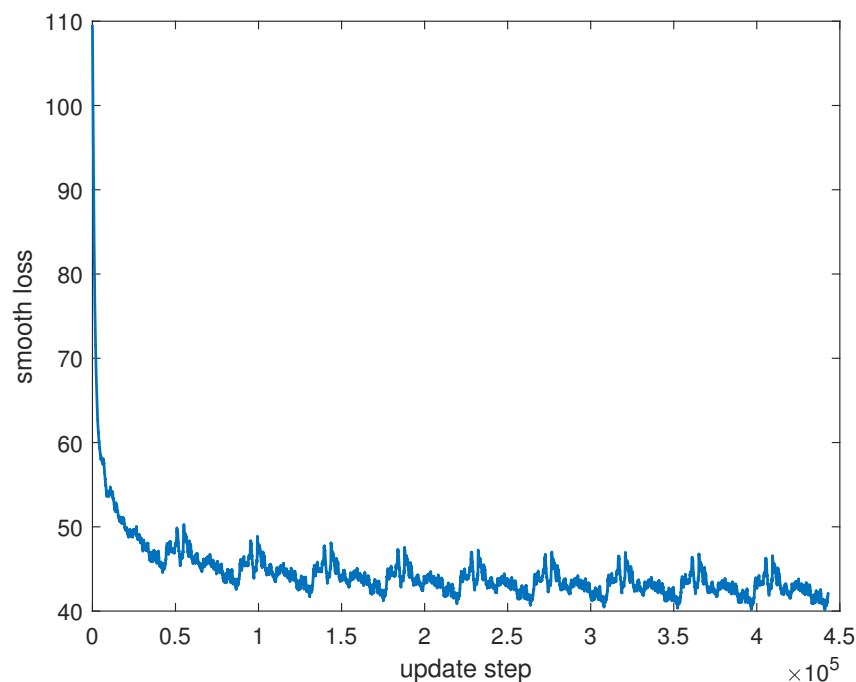
2 Smooth loss plot

Figure 1: Smooth loss for training over 3 epochs

The plot looks as expected. The final loss after 10 epochs does match in terms of magnitude what was mentioned in the assignment instructions. The final loss around 40 makes sense. The sharp peaks of the loss seem to correspond to new epochs, ie when there's is no continuity in the text.

Worth mentioning is that I used RMSProp, and not AdaDelta for optimisation.

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Deep Learning in Data Science

DD2424

May 22, 2019

3 Evolution of text

Iter: 0, smooth loss: 109.557366

– Contains too many characters not renderable by latex, so I left it out. Its basically gibberish.

Iter: 10000, smooth loss: 53.812648

oute tr mow thad Acgutheryp thaviming to thar all goit to ,"'s gout boke and lald. b.. , and berof wour ane love in in int hupre shat "wert to wfureme ietered buid Harrysary, ", damist ave hart mound.

Iter: 20000, smooth loss: 49.715973

I den of goon, bood sfoll of the rieloughtiscre,. Har's prater, Harry's ow haldens, but within-inbator. ,t geing kempiin said chatorusd Hermiost be a't in tas anlired wither ary cowarorsunot catide cem

Iter: 30000, smooth loss: 47.855886

very youl, warder up they some ond gould. . . .
" steeth motle on where gwind there he stul steetase mermanted wieptyeh clasplyen densend and to go go the ghing asked to go his were seod, ne tHarry th

Iter: 40000, smooth loss: 46.418298

oldemassed as and was voided Harry, stay ary of shiwallingm, it one of yo ho gethnon of woyer bet perers chough are
he neathinds and thear anss to byeing and the cill theme o. stol ere waidly a sig

Iter: 50000, smooth loss: 47.941722

to peartself and theme re a otc mpetter. and He rruforto,s enme up and poreerith in-ions," said they theious, they wanf, othes bang ttee be a patch the neeverew, oubly thanul marken. A Moncle it. c

Iter: 60000, smooth loss: 46.276545

re whone dall , ached sto sere shangh s as you here to all brow slup the great yef," Daint on the greitrah froet of the thanartat, heir ground the said, in the tell wored all wish it indo. "Thes, en

Iter: 70000, smooth loss: 46.279441

ollate walked be ors been ipare was out into sir. ", wes ren's your hair not oner, and and said, nes who Hagrid fink disnople and hism intruuge varviousennyly, and rever meating and now offored paety

Iter: 80000, smooth loss: 44.191383

ast winces fore of realed anding. Harry said unfableds loouccless with of had comen-twfen das catcely morturbace't cowntrils droff the didating in teoryene me down all enous cilortable coming too yin

Iter: 90000, smooth loss: 45.171662

t into the his for all at knep Werremp oo amoht -atere anyicy thang pad him eet.
pilirah fow. Hownoled to but a cary what had been ma. ight would thkeage about do would non. samight that had thou

Comment: wording does seem to get better over time, especially if compared to the randomly initialised values. You can see some Harry, and some other real words, so the RNN is clearly working.

Iter: 100000, smooth loss: 46.818953

eames shurtam and pull got to all predong the burute and stheclly light, lear, trapled not

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tlyeh.rt wiuldayp fronds angry ouples with sunds ttooke. mave," sair toich shrough that everyors ages, nedi

4 1000 length synthesized text

The following text of length 1000 was synthesized from a my RNN after training 10 epochs (440000 updates)

alondint in the colf usmofsian and Buking a was now, all - she trunda one grat think, a vew pleater of the ack he gidgating bie the were of them. Hat the stotstance," pair her ont of the fxree veer un the ever. They fee attrease.. In the Barded Mr. Weance haddewertion's quiggach I intaile it on Mlfotth to wers's of in a shall - Crouked in plate but evers anot feet hapstry cask, quive ask have shareghhe want, was Vid to neatint to mige, Hormicy? "Mont he hand." "Ye souldmoveh." "Out his rew in featho as stow ede conder. Dosing, nambed the, ane "wailet. Then was strobged said. He loud.. Pade," Harry to lis marss with ut Mavinge ien tullled. "You a fares. I stnaring their on your wants was fort, winf bace se of hia sen stake C-ased ming tout's Earymun in ut would herder gaysten." "Harry!" "Than stufter, piver," say in hithred come Winded)." "No who for and rike leas the was rerh the gand at refle he have. "Wair ane all ewats and and Clledentlon. It him cullitadly the you it. "

Not completely readable, but it's quite obvious that the RNN learned a lot. We do see some Harry and normal words here and there. Kind of meets my expectations.