A4 Report - Kevin Armbruster

Comparing analytical and numerical gradients

I reduced the hidden dimension to 5 and the sequence length to 3. Then computed the difference and asserted that the absolute and relative error between the analytical and numerical is below a threshold with numpy's allclose function. For bigger values I noticed that the gradients start to diverge, especially for the weights W between the last hidden layer to the next. I expected this sort of behavior because the numerical computation only includes the initial hidden layer and does not account for the evolution over the sequence.

Here an exemplary output:
Asserting b
2.0982944040279228e-08
Asserting c
3.4898311983277974e-08
Asserting U
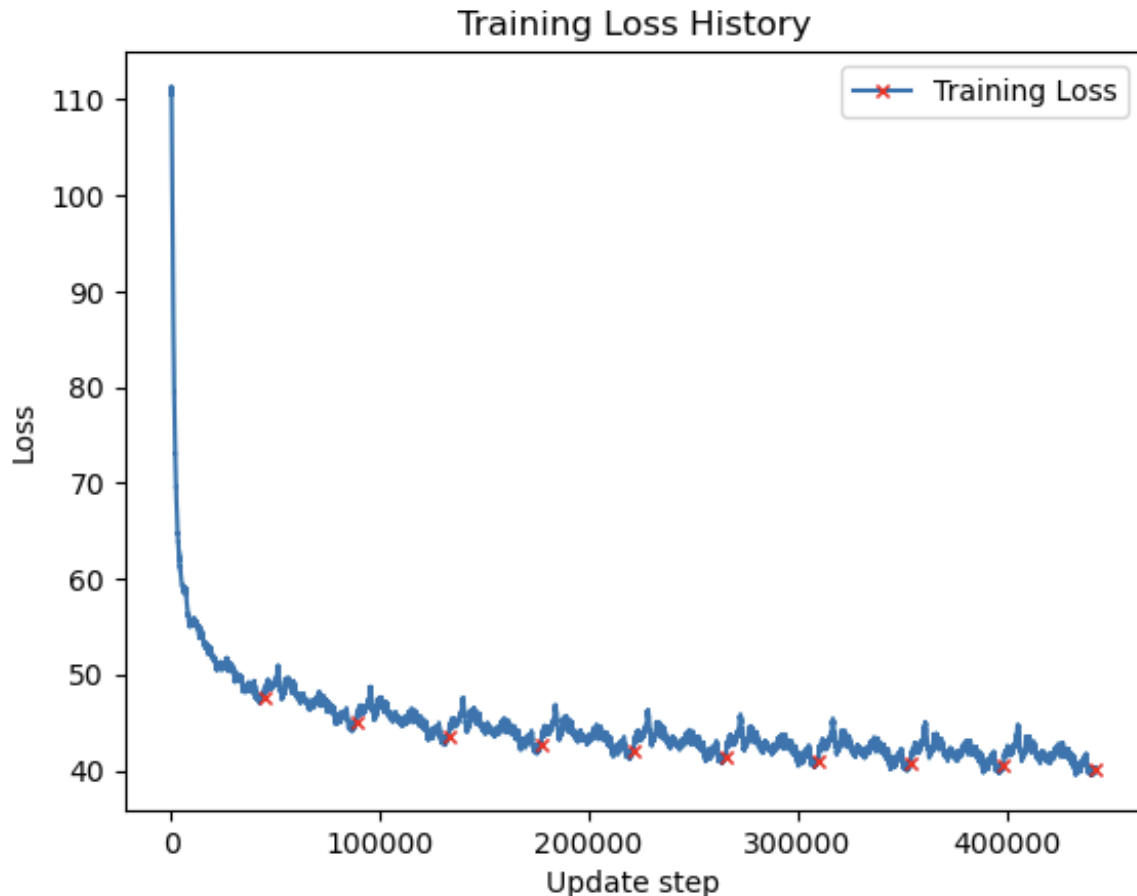2.0984513441138497e-08
Asserting W
6.0770732583245764e-05
Asserting V
8.378560254103384e-05

Graph of smooth loss function

I plotted the smooth training loss over 10 epochs. The end of an epoch is indicated by a red cross on the line. We observe a smoothly decreasing training loss, indicating a stable training procedure. The final loss is moving around 39-42.

Training Loss History

Evolution of text generation

1. 1k
   a. mme co wine gcae inemecwes ice hrarce al,. .", faceeco. cebore podn srelsor. h ond"n cibcet...
   b. .Y
   c. old komhy hoin prolrod. N.   hanlred miy bole fent oufes coi anlafarn eraedassCg tan bept hhicm. uns. i
2. 10k
   a. ry frof was sbas, rut Eund ffitto mompeak omory. "I nudlersterfhe of yute thlaon hamsy am on i'verred afled berte atseorerw- rantage heerell matewing thiy, Cone an, at." wockl yups ronsbyough grem obe
3. 20k
   a. hing in illing aroat Durny werto the batentlitha mathing an though - hor biuddy cors seced in as yee now ochs enge wrowag, aunt Haroot tha findy, and Mry he made iret the munce farly, ceid! s think.
4. 30k
   a. sabpes .
   b. "The is they.

c.   Tallen that herowed, a he keruncints shep what and It what moage and as nits spolly qowser shad, as the cookly that the coub. "He wiss He manden qbumlingly s pripted over and

5. 40k
   a. ied, what they is his gooked, as undond head saged starsece Vulkon, Vichs wasp ad. Vory in wile - Wown's fould. Wes hive tear was ous mostnowards. .
   b. "Fare gomt. Voo't hemurting arlang deeveRed ofert

6. 50k
   a. they ofper. Whobys and I wher, rlout weer not and sivecild coment ig?" none'tce lackpo weand in monigg."
   b. Yeed," Hald trield meat begar oflieO."
   c. Harry's fore skalless."
   d. "Then grenst, semtey said Hagrie

7. 60k
   a. rings telly whoustile his from leppet. "I'speess bout GrowUn't wis out ofle up pent, Herment Rouvirizibly seased; spogd Geoning.
   b. . durgerire when a the (plunk and deonttay a ickaning the arint?"
   c. "Kr

8. 70k
   a. takis of ho frouine thoublyar yesed the whint, "Prasut squilen courly, so ("Ness bavetty was doubent done totene, brout?"
   b. "Hant, haw fol the walkat wander trabked said sters, her we illed.
   c. "Nower of K

9. 80k
   a. meder.
   b. "Ceat on. "Ho custealing. " sore seys, not, charrurge Wisstion chowr thempalp.
   c. "We coumed tonteds.
   d. ""Doaritha legoer to book of yol, at're head ye land bead him wooked as they har   Distily in a

10. 90k
   a. mamer foun himefthend?" nond byeng to hermienece dige. He soble sconch Voldithing the barkeved ouml, the dulnt soir, Volds, his and encoll oured, atainad," fanted whowe was mice morthousditilving

11. 100k
   a. mytingy sever hievers omped who kitcheacks un or!"
   b. Sus hasnestly at MeGnems har whry a was as alb, Squadourg the betered Gecige Are diderenvaired Harry, mupontly is meped to dearzave.
   c. "The barc're w

12. 443k
   a. throus sair did would am wite bleaked, forts, bat agattins larked noidy, feel, wizneced man't keid Courge. Perming experemonwur the pusemertard Fidken, he ragh Guts. A gressing Coufnen to him reak dr

Generated long text passage

 Weldoed jeed glinnits," he cunkitarts?" say'id," sare Wiy't fip," Dumblead of eart dad it fill wind Daggldy was deast," said snienting Eldame's gother. It and a bart. "How, he said, hope had Ron, in dame "Come watld look and Loody doly, in himpigaing fut get Harry," Harry, and cople goielm hags to the chow all stadounk on a warusemer stilver will leting and beacioned Cthaid and himsen. The twistrin Dais re wand his he came onto the would her man at the to there sead bry faing it," said is pare doon elf an a telors bego plapl whemeing on appigg, hoownoy. They, Dumbledorouss. He sed, bagall? "Jumpsily was; he sops. The dien I very a Toach saudeleane.

"You'd net through he all Mights feed begaghing outnery, he happle, streaks nepped," said Harrys very be there noufly But to," he intr from Dimpabushing brigh his his boist out yandwant to reary feete. . As cunk is been hardinger reat," said shool," sloudder not me we were for Hermiall comirg, Vonget dreamed camle. . . wearding head how mo Charks and dealaned o pothilf. Bettroeded on muring onay Dreudbog?"

Stearsidr him.

She masing Moody. Whatled a halped as the gad every," said neve, moing?"

Fars. Ha slomping the reyf what greadred on talked me pother door, rid gight I hurrid some to sectin was eachareverant and chumgs around.

"How - his Mingrom appoirged. Leate Hugking and in veing to meswow fins told had wart, gike wourder, just pleard, you with.

"Whoke some fromed to hull yever to sighling the not factuter, I have mrigch, she tiline, it had what they muming ented to "Proous.

"Herwail.

"Them."

Lrow, when has . Ispored, blie walkemest Winking in that Lud inking. She' down. 'stiff of beon stree repered by be tone unt-wand is he dole; Chams? Ladous.

"It frelf. "No ssidgers of presuwl as that mal. I wantling let An them.

"Comed onay sudger again was veryself, . . . a down anothing gole sliruun ground and as looking had task her bul dis, eyes hi' stillak Sised zidgrooss your reed at to pentr of the caw Sl