

## Assignment 4: Report basic

### 1. Checking gradients numerically

In order to check the gradients numerically I rely on the relative centered difference formula:

$$\frac{|g_a - g_n|}{\max(\text{eps}, |g_a| + |g_n|)}$$

where eps a very small positive number

The model used for checking possesses  $m=100$ ,  $\text{seq\_length}=25$  and  $h = 1e-4$ :

Sum of relative weights error for the `grad_b` :  $2.124211e-08$

Sum of relative weights error for the `grad_c` :  $1.161892e-07$

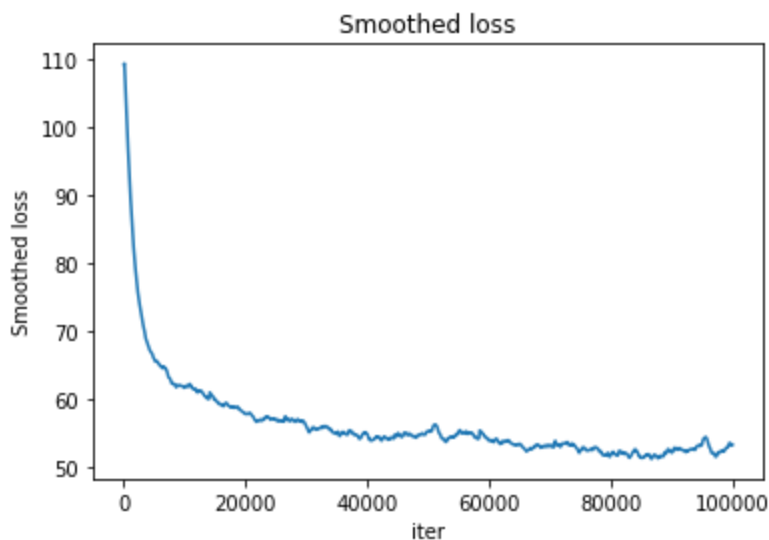
Sum of relative weights error for the `grad_W` :  $6.922823e-07$

Sum of relative weights error for the `grad_V` :  $8.704212e-07$

Sum of relative weights error for the `grad_U` :  $3.460611e-07$

From the low relative error we can conclude that the backpropagation is implemented correctly.

### 2. Smoothed training loss plot



### 3. Evolution of the text synthesized by the RNN

- a. **iter =0, smooth\_loos=113.03441848017451**

""ikkt

fsd

"fa

k"i

"sah"ikra"h"ii

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" fai"TT

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ha

- b. **iter =10000, smooth\_loos=55.10490080312675**

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us. . .e.

"Now mett orrysthrary you goodmiy linked hil!" ro, bythe h

- c. **iter =20000, smooth\_loos=50.14027488546103**

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to momebes. . . . harpanweker ew welleafa Harry; Crol horeply Suriney't keint ait ine beng out hewbel. I" sard,  
dehesm the inthir dexiro

- d. **iter =30000, smooth\_loos=48.63475631394583**

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"Bafon had!"

"Wistr ong hit Harry!

" lloblea

- e. **iter =40000, smooth\_loos=47.21440615307932**

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poldeta at, she bping unn't the pro

- f. **iter =50000, smooth\_loos=48.135389248416764**

evemard Dungen'n'thers whearp'th Hermioshing abonges of couching bature rethis, thaild that twath them  
armangly said.

Thas Bluttely tayequipud.

"Sill -"

"EH Myned hey in. Cexting Crood Dudgen shim. I'm.

"We'n od pagasily oxiden you gatime youseS.

g. **iter =60000, smooth\_loos=46.5565982594587**

nttroutw recine, impore uppering and and aspealpely, and as hurigaick. severyed hotigul had cold said lied them, chop I himce bemafficly, prin fule with said Hare, in goor that mights that charons sabllt brehescook, and ousled enouth gure and the r

h. **iter =70000, smooth\_loos=46.21408387929533**

ad the deampe stillestedn't he spot choiseing," sacher ham. She ryow pich, hever dongndoo, sl plangirg herrur.

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"What frouit didn re, lorkuasobilates soowl)'s welisicy, I finkeel lall in Mesily cloom welied ick wikad and isurtin

i. **iter =80000, smooth\_loos=44.777725294268556**

the didere and a recesed Cussapao Mafpe of then point Kiving him, Fwizes himn. .. wave hild toiny carten. . . Greached Bys in pistes.

"Whach lapel. . Herrimy sehing at betinem to marct if sers beso had Mrdith one or a weouse. He Buitenpeout . .

j. **iter =90000, smooth\_loos=45.30368533365512**

budster wing thione to the abound laken Vold and Pranr, you shass a bart in that became, it his om, hil oftont, Here awalle . ."

Thad lapped to dean appean fasward.

He was and of the lalk. . .cap; Gerile.

Cther suld cormorking inchat's wiseedey

k. **iter =100000, smooth\_loos=46.168642792181956**

h leaper otting the abone back fease pouvlyy Harry?" "Dut Halve with as sund Orm it - on, morf behint baine mad. "Chead Harry, she glourte?" sund they sand tinned then Ron. She been theirs shand say.

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l. **iter =200000, smooth\_loos=43.4222319761773**

r a dohh owH Hall of age said Sirgous dow, meathed there how Hother told barn brimfed, platther. Thens in the Quing had n've comins, a Untidn't so noped Max," said Rin tabbley on him, soase out nocrocessafing dis wlimping notlink as your in hiing an

m. **iter =350000, smooth\_loos=42.64002730724213**

was haves the cafler, Dumbleder the the've; he hading might glovn mull the cas, is. I where at his him, the I thing the insaid is. Cogaid around macked firn Voah.

"I do any hese sockevell fight," indortor but eas; Mahagwilet was ever bedans skish..

## 4. 1000 characters synthesized from my best model

“

ercanced whort's could bellose, he wald toward Brecaes parsting a lemout out the pre-bove."

Hame beating to Krum blowin gust. See," said Cullifing to peonce ever the reteng and monasalion her in teat his memore."

"He getsided so And deing the Righ he wataring about! Mambon. It've to been and quttull Harry carging the yeling ey pet if had you secrouxt. Harry parte he said him for ily Vore.

"Sarged." "Yan you sorbeised McGong his so must sigoced them is hild into the face with, but magperreath up did she but and still simbleds. "Seetsolf with tursully's argrin! Trichad nools of the had a he other and and unvely fat robly you stell Vrum hunid would, and the smem with refer noivese, fame for his dran, not ten hid do death though, - and abived to see thorcting gric his hay.

"They judgetlife," said Harry do ke to could I serse swor he hasy, Dut twitter, now, dean all about sest to the holdor Voge onuth Dut Voldiee, magthover looke his bal in S!" she clingeesfinntors. No Bight about the wazce - there there. I that the beat ie.

"You regaor wart.. be-bar, surped, I doup timent?" Mosecked macled at bloiess. "Wele, dsaroned though this weve with salle," sacket mown the Deat and I be refer, have pooly," said Muggens gront purn, Harrcionst the dond, be at the baces cannelicencays lepp? He dan seepase."

"Don't sund," said Dumbledore sowp to they centht wave get unditedeapay off yat facling."

"Isking even shand you?"

"Youe suctorm to Karkerow, learter to has myisever, as the pleaned fagsy me!"

"lther the mons evercein, preld tong lacfed talled the cazgosebly," Gotagting Vor boot to take blals noth. . . said Geopre, not and could on Harry.

"Thems wence swished the fired if langh rrang of another to gless. He to vertayn's was looking in at nous not comperster Crouch.

"I knos off, Wistruck a recont. Olling moldored bot. I grownen, thower instron-"En't too" Swant. Sond in it it, and serse had day his Delk themon extemough taition," So whack that's witk of I. It he

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