

# Assignment 4

Albin Larsson Forsberg

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## 1 Dataset

The dataset used for this assignment is a txt file containing the novel "Goblet of Fire" by J.K. Rowling. The goal of this assignment is to create a model that can mimic the novel and generate text on its own that resembles the text in the novel.

## 2 Model

The Model used is an RNN with a hidden layer of size 100. The input for the model is a one hot representation of the characters. In total there are 80 different characters including blank space, newline, and other such characters.

## 3 Results

The training of the model succeeded well and the results were satisfying. Using Adagrad is important for the model to train properly.

### 3.1 Check of gradient

The gradient was checked with comparing the analytical gradient with a numerical equivalent. The relative error was in the order of  $10^{-8}$ , which is a really good result. Another good indicator that the gradient is correct is to look at how the loss is progressing. It is continuously decreasing. Also, when training on only the first 25 characters the loss went very quick to get close to 0, which it should if there are 100 hidden nodes. I am very certain that the gradients are correctly calculated.

### 3.2 Loss function over time

The loss progression over ten periods for a model can be seen in figure 1

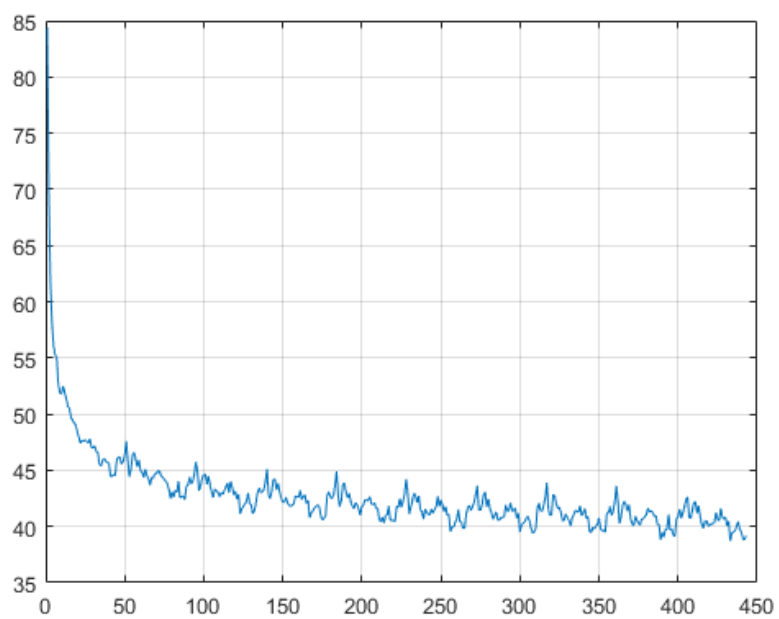


Figure 1: Training loss for a model over time

## 4 Synthesized text

### 4.1 1, Smooth loss = 109.5502

K^hdE2'Q}4Jyü,7c l3qGgs cK!}ktRiTt!dpIfdKeWY\_}?v•Welgd61z7rQscEZxZ  
;DuDeKD"A?,gQCs4xYHSj0O"}"\_.TK1a"RHEWK4nBLJ"'qLX.3Pr-.r}O7zK U  
31mLilf"y2MRrsDQf2Wt6!BA3Nqp!x\_v,üeN ")\_-/Peôî?W4JpüE:ambTdq2JQ\_3 AOĤ

### 4.2 10 000, Smooth loss = 51.7815

waster to reve sait, "Harmitbot." "And Ind fiod the lilttad, I'm - her and Dud-  
voondioglinghille?" 'd TYou storly Gomt plechang threvertant and hims. "Nr-  
gus at Pard tr's itturtst. Harrer from. "The

### 4.3 20 000, Smooth loss = 48.4003

RYale trelested brith?" Malfse for the untin know the sooch in Harrig. Barkioyt  
for?" Mow ither he saiver, pein thingebled it was bake with -" He when thourdn  
like betereleze, be't you wa jumpy sour

### 4.4 30 000, Smooth loss = 46.9833

so muss plang this? Hurry belit a minivole in of the spoly harsing to of the  
glister araster of sh whim her you arled hadr ceher age hilf. Harry said hagl of  
welly enou, vorwers. He come lits out

### 4.5 40 000, Smooth loss = 45.6826

hins therE foring into that peeting the gresediel grecle wall wasned year atsert  
and that I his from madiemard Harry Grifterst acled it gowed itusor which not.  
. . . Dumbls! Ever furgie red to fark .

### 4.6 50 000, Smooth loss = 46.3362

theh as pums goenicking they that the Rit's as expalf to chank. Beinging-on a  
Ccfours didn't contilly anclating at still -ees butsham. Mrmould fixramess was  
Fyeted theys they only ortisted aly then

### 4.7 60 000, Smooth loss = 44.946

m find the bented appased. "Thut back unentgwer, natiddy's and Grids hers  
being plar have Heowned stared d"NA Quiddooght Geen sher?" Herdyis was to  
take Cros anciexaid, wering. .." Ame. Harry. The

#### 4.8 70 000, Smooth loss = 44.6889

hen, could tase do Harry helen is wss wore. nar arss winched she faur oblering wank flyVur zarks at him, joys dook. The ringefigh amay. "He was stown, to dires." "Unor by was he't or she being. "It

#### 4.9 80 000, Smooth loss = 43.0708

hook of thim, cruwS agat's agaly, goting around. Harry. "Arked cone scublnadobed will, a farking dgets you browirs and - he was his upmiuch. I Domed, fes svit of thanruul dearkenow theur goce intey b

#### 4.10 90 000, Smooth loss = 43.6806

t manting, that ater as them. Mindleghing see had it Angink peep demenched waste aur it wheilf mefe stold a - his legicaar be the calules. You wannes fare was swem. frach tay he was but Marinct ouen,

#### 4.11 100 000, Smooth loss = 44.6308

ut thome very'lloom. "You have o-lewto in it and thouble. Neep, the weride a shooking us puble to araping an they no the exchantone tho Dishowing copen let then as looked to onely, must what sead se

#### 4.12 Print out of 1000 characters

The following section of text is the print out of the best performing model I managed to train. It was trained for 10 epochs and is the one seen in figure 1. The loss at the end was 38.742.

"ARf Fid he got be you going hamegsilg his agry?" said Dumbledore. "He show of Cedryent!" I vishowesway s." "Mr. Crouch, and as Ron no," said Chout dey worle," "Snape seg boke othing in of atave. He .way Harry had his through under offie his back to with om. They was as for him. what it through. "Then guil - and He ronet, turned looch. Himusade, stand," said Harry was out of arout. Prevered that ." "Now works to the dight to corranly, there's felbed the stoarge bixhted at Harry!" squie on to on; -" "Had no Kagcious bessor," said Harry at budne," said Gime. Charm. "Quily but better the father the cereffers rooks Crouce mumbled and could at the tair Fllased and levered, and conkay." "Herward sicts on the sacl sermed you crapply rose to troning now arse's handily matching mind. Wend the got and was thick ustam the offered brown, smoar say hes . . he smoling over to too the couldn't direded the juml... Iborted." Harry And continytully's and, swilar. "Auck wen fooldayer he ingwork h"