```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%  WEI WANG @copyright          %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% a = W*h+U*x+b
% h = tanh(a)
% o = V*h+c
% p = softmax(o)
% W ---(m x m)
% U ---(m x K)
% v ---(k x m)
% h ---(m x 1)
% x ---(K x 1)
% b ---(m x 1)
% c ---(K x 1)
clc; close all; clear;

% read data
[ind_to_char,char_to_ind,book_data] = Read_Data('data/Goblet.txt');

% check map
Check_Map(ind_to_char,char_to_ind);

% init
[GDparam,RNN] = ParamInit(ind_to_char);

% synthesize text
n =10;
x_0 = 'b';
h = zeros(GDparam.m,1);
[generated_onehot,generated_txt] = txt_generator(n,h,GDparam,x_0,RNN,
 char_to_ind,ind_to_char);

% calculate gradient
%{
X_chars = book_data(1:GDparam.seq_length);
Y_chars = book_data(2:GDparam.seq_length+1);
X_trans = to_onehot(X_chars,char_to_ind);
Y_trans = to_onehot(Y_chars,char_to_ind);

h0 = zeros(GDparam.m,1);
l1 = ComputeLoss(X_trans, Y_trans, RNN, h0);
[a,h,o,p] = Evaluatesynth(X_trans,h0,RNN);
grads = ComputeGradients(X_trans,Y_trans,RNN,a,h,p);
num_grads = ComputeGradsNum(X_trans, Y_trans, RNN, 1e-4);
f = fieldnames(grads)';
for i=1:numel(f)
  diff.(f{i}) = norm(grads.(f{i})-num_grads.(f{i}))/
max([1e-6,norm(grads.(f{i}))+norm(num_grads.(f{i}))]);
  sprintf('the difference of gradient %s between two method is %f',
(f{i}),diff.(f{i}))
end
%}
```

```
% run sgd
%
[GDparam,RNN] = ParamInit(ind_to_char);
GDparam.epochnum = 3;
smooth_box = MiniBatchGD(RNN,GDparam);
save('smooth_box.mat','smooth_box');
%}
% plot loss
%{
smooth_box = load('smooth_box.mat');
figure;
size(smooth_box.smooth_box)
plot(smooth_box.smooth_box)
% hold on
% legend('train cost','valid cost')
xlabel('iteration')
ylabel('loss')
%}
```

```
ans =

    'good !'


ans =

    'smooth_loss: 110.468521'


ans =

    '-------- epoch 1 iterataion 1 -------------'

QC3)::ÃkdU eH!¼j42R9rÃDbJS!T4fi)tx/Pkoi
Ao2gTRy^-e7vArswYaqdR0thk91c¢'zc10O -gH-0:NWmsY€Lqa7âRÃWCH'k¢il(v
€2dK0)€ ;"Li QtP97(HXDâ¼,N Y}Ue.dYErg cv:XG?N-BRE!XSRdiaâ2Ã^Lz!
^gB9zxFiqw,ÃVL-ijG  Z4'X3¢â¢.T_

ans =

    'smooth_loss: 32.968263'


ans =

    '-------- epoch 1 iterataion 10000 -------------'

yofig the ath d as mar of a fofrd the bolingot Frond the far, sor
 aig ward feen hatrs ary ac thed arged lodig  Froled. bhor across the
 flonglors for. bo sor.  Fringighe flond caug aryarogtprag vhig ar

ans =
```

```
    'smooth_loss: 37.347671'


ans =

    '-------- epoch 1 iterataion 20000 -------------'

 -be tass he tat wrathe thewb morkins hit binghing bad wid hevinh

has wNot bat bed wha k thaf whithe th tid whit, bint ht wimht wig
 unghit his hit wan mole with b an ther hisbostibt ins wack ichid wo
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