# 计算机科学与技术学院神经网络与深度学习课程实验报告

| 实验题目：扩展 RNN | | 学号：201900130015 |
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**实验目的：**

扩展 RNN 文本自动生成，并使用 Shakespeare dataset (shakespeare_train.txt)进行测试

**实验软件和硬件环境：**

Intel(R) Core(TM) i7-8550U CPU

华为云

**实验原理和方法：**

根据 RNN 源代码，自动生成文本

编写一个使用 RNN 来完成字符串的函数

使用 RNN 对莎士比亚数据集进行训练。，自动生成风格相近的文本

**实验步骤：（不要求罗列完整源代码）**

1. 编写一个函数来使用不同的温度从模型中采样文本

```
x = np.zeros((vocab_size, 1))
x[seed_ix] = 1
ixes = []
for t in range(n):
    h = np.tanh(np.dot(Wxh, x) + np.dot(Whh, h) + bh)
    y = np.dot(Why, h) + by
    p = np.exp(alpha * y) / np.sum(np.exp(alpha * y))
    ix = np.random.choice(range(vocab_size), p=p.ravel())
    x = np.zeros((vocab_size, 1))
    x[ix] = 1
    ixes.append(ix)
return ixes
```

1/α 可以被认为是一个“温度”，即较低的 α 值对应一个“热”分布

2. 编写一个使用 RNN 来完成字符串的函数

```
# Start Your code
h = np.tanh(np.dot(Wxh, x) + np.dot(Whh, h) + bh)
# x is one of k encoding of which index is 1 in the char
x = np.zeros((vocab_size, 1))
ix = inputs[word_index + 1]
word_index += 1
x[ix] = 1
# End your code
ixes.append(ix)
```

```
y = (np.dot(Why, h) + by)
p = np.exp(y) / np.sum(np.exp(y))
ix = np.random.choice(range(vocab_size), p=p.ravel())
x = np.zeros((vocab_size, 1))
x[ix] = 1
```

```
h = np.tanh(np.dot(Wxh, x) + np.dot(Whh, h) + bh)
y = (np.dot(Why, h) + by)
p = np.exp(y) / np.sum(np.exp(y))
ix = np.random.choice(range(vocab_size), p=p.ravel())
x = np.zeros((vocab_size, 1))
x[ix] = 1
```

3. 一个训练过的 RNN 的权重被包括为 char-rnn-snapshot. npz

a = pickle.load(open("char-rnn-snapshot.pkl"))

```
Third Citizen:
Stood the state so? No, no, good friends, God wot;
For then this land was famously enrich'd
With politic grave counsel; then the king
Had virtuous uncles to protect his grace.

First Citizen:
Why, so hath this, both by the father and mother.

Third Citizen:
Better it were they all came by the father,
```

4. 测试

```
Continuation:
----
enoum, you, nerr gesine'lt home exist:
To-by are me he ford: arm nopl shall to us our by be my it I this a bufes, mount bemespe delving
Caught buids seav! Piplo we long hearn hate slousts kirgme 'Bove
----
780 200
```

```
Continuation:
----
l scear we mereder and not thou the and prore with my toarand: gonserefed a muck, I'll arnirefes an low is seave Rore what

SICINIUS:
Casing, made ald we-lit,, peapos, he dice full menour peatten. moran men manomes as table deit. The not fear so hos' twinc
Cites-dikn
Hough heat and dupe behanbe.

BRAKENBURY:
He's:
Teay and of att theed is mych you cwat wis have dedeetant! now hady have ward you from he not that shempon dapable gare; h
Whyousth lece.

CEN R
----
2 500
```

**结论分析与体会：**

实现了 RNN 自动生成文本的神经网络。

明白了 RNN 对自然语言处理有很好的适应性。

解释了参数不同造成的结果不同

就实验过程中遇到和出现的问题，你是如何解决和处理的，自拟 1－3 道问答题：

如何确定 alpha 位置

根据公式，将 Y 与 a 相乘