

**МИНОБРНАУКИ РОССИИ**  
**САНКТ-ПЕТЕРБУРГСКИЙ ГОСУДАРСТВЕННЫЙ**  
**ЭЛЕКТРОТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ**  
**«ЛЭТИ» ИМ. В.И. УЛЬЯНОВА (ЛЕНИНА)**  
**Кафедра МО ЭВМ**

**ОТЧЕТ**  
**по лабораторной работе №8**  
**по дисциплине «Искусственные нейронные сети»**  
**Тема: Генерация текстов на основе «Алиса в стране чудес»**

Студент гр. 7383

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Медведев И.С.

Преподаватель

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Жукова Н. А.

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## Цель работы.

Сгенерировать текст на основе произведения «Алиса в стране чудес».

## Выполнение работы.

В ходе выполнения лабораторной работы была написана программа на языке Python, код программы представлен в приложении А.

Была написана рекуррентная сеть и callback для того чтобы отслеживать то, какие тексты генерирует сеть после каждой эпохи. Были просмотрены тексты после 1, 10, 15 и 20 эпох. Ниже приведены результаты:

1) 1 эпоха:

Seed:

it is the same thing with you,' said the hatter, and here the conversation dropped, and "

[illegible]

После одной эпохи обучения сеть выдала повторяющееся слово “the”.

2) 10 эпоха

Seed:

she said, by way of keeping up the conversation a little.

"tis so," said the duchess: "and the "

soeer so tee toiee if the mort of the sooe--

'i mave to the toee tf the tore ' said the kock turtle she would seit oo the woul. "the worl of the sore tf the toie '

'i dan toe kint ti the toate ' said the caterpillar.

'wou don't teie the mont ' said the datter. 'i mene tou the lore tf rt ti the toie.

'i mene the tore tf the tore ' said the kock turtle she woule seit oo the woul. "the worl of the sore tf the toie '

'i dan toe kint ti the toate ' said the caterpillar.

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'i dan toe kint ti the toate ' said the caterpillar.

После 10 эпохи сеть сгенерировала диалог, который посторила несколько раз. Среди предложений проглядываются существующие и несуществующие слова.

### 3) 15 эпоха

Seed:

"will you walk a little faster?" said a whiting to a snail.

"there's a porpoise close behin "

' she shought th the poeen, and the dorpouse said to the gorphon. "ie io tas anl the sortlen theng ' said the kock turtle, "ie iott the dorsouse so ar in ' said the kock turtle, "ie io tas ail the moakttrs ' she daded ie a vory of thite tone, 'no soe to toin the teat to tee the harter wo tee thet io the sene te the seme 'she fad se toee to the cane wo tee tha parthr of the court, and the sooe to the coold so the tooe, and the sert her lentle aeaute the was aolig th the tooe of the courd, and she seot her lent lrit thet the was aolng th

the caal of the courd so the tabd to her and the sas ao il was aoo the was aooig the harter and the sas so tae if the was so tar thet she was aolig th the tooe of the courd, and she seru her lentle aeaute the was aolig th the tooe of the courd, and she seot her lent lrit thet the was aolng th the caal of the courd so the tabd to her and the sas ao il was aoo the was aooig the harter and the sas so tae if the was so tar thet she was aolig th the t

Сеть сгенерировала текст, в котором нет повторений фраз, иногда повторяются слова. Настоящих слов в данном тексте мало.

#### 4) 20 эпоха

Seed:

" while she

was trying to fix on one, the cook took the cauldron of soup off the fire, and at once set "

e the woos of the dourd so tee thet she was no tie toide and the woide and the tas aoltg to ae a ford oa toike of the courd, and the taid to alics sate ro the toede and the tas so tar an inc to tae if the would be a very coerttto tf then to tee thet is so sot the mage of the courd, and the samd thre as all thet so tee toted the was aooing to aelie to thet iad a lertee of the rooe of the couro, and the said to herself thin it sas to toiek on the tooe to tee oo the courd, and she tas a little soreeus of the coorte oo the courd, and the taid to alics sate ro the thrtrs the madte wer oo the toede the mad hohan to the toeee tf the toond

the matter was toe toine of the moose of the courd so the the oarter, and the toou hot the whsl oerer and motkee oo the thete rabbit, and the sas at the could not th the to tee that she was no tie tine to her oo the coort, and she tas at the soolted an in was on tie tine of the courd, and the taid to alics sate ro the thrtrs and moterg the was so a

Сеть сгенерировала текст, в котором становятся понятны некоторые фразы, больше существующих слов, мало повторений.

#### **Выводы.**

В ходе выполнения данной работы была создана сеть для генерации текста по произведению «Алиса в стране чудес». Также был написан callback, который отслеживает генерацию текстов на заданных эпохах.

## ПРИЛОЖЕНИЕ А: КОД ПРОГРАММЫ

```
import numpy
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Dropout
from tensorflow.keras.layers import LSTM
import tensorflow.keras.callbacks
from tensorflow.keras.callbacks import ModelCheckpoint
from tensorflow.keras.utils import to_categorical
import sys

filename = "wonderland.txt"
raw_text = open(filename).read()
raw_text = raw_text.lower()

chars = sorted(list(set(raw_text)))
char_to_int = dict((c, i) for i, c in enumerate(chars))
int_to_char = dict((i, c) for i, c in enumerate(chars))

n_chars = len(raw_text)
n_vocab = len(chars)
print("Total Characters: ", n_chars)
print("Total Vocab: ", n_vocab)

seq_length = 100
dataX = []
dataY = []
for i in range(0, n_chars - seq_length, 1):
    seq_in = raw_text[i:i + seq_length]
    seq_out = raw_text[i + seq_length]
    dataX.append([char_to_int[char] for char in seq_in])
    dataY.append(char_to_int[seq_out])
n_patterns = len(dataX)
print("Total Patterns: ", n_patterns)

X = numpy.reshape(dataX, (n_patterns, seq_length, 1))
X = X / float(n_vocab)
y = to_categorical(dataY)

def generateSequence(model):
    start = numpy.random.randint(0, len(dataX) - 1)
    pattern = dataX[start]
    print("Seed:")
    print("\"", ''.join([int_to_char[value] for value in pattern]), "\"")
    for i in range(1000):
        x = numpy.reshape(pattern, (1, len(pattern), 1))
        x = x / float(n_vocab)
        prediction = model.predict(x, verbose=0)
        index = numpy.argmax(prediction)
```

```

        result = int_to_char[index]
        seq_in = [int_to_char[value] for value in pattern]
        sys.stdout.write(result)
        pattern.append(index)
        pattern = pattern[1:len(pattern)]

class make_text(tensorflow.keras.callbacks.Callback):
    def __init__(self, epochs):
        super(make_text, self).__init__()
        self.epochs = epochs

    def on_epoch_end(self, epoch, logs={}):
        if epoch in self.epochs:
            generateSequence(model)

model = Sequential()
model.add(LSTM(256, input_shape=(X.shape[1], X.shape[2])))
model.add(Dropout(0.2))
model.add(Dense(y.shape[1], activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam')

model.fit(X, y, epochs=20, batch_size=128, callbacks=[make_text([0, 9, 14,
19])])

```