Text Creation with Artificial Neural Networks

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***Abstract*—Artificial intelligence technology has gradually become a part of human life, with taking place in the fields of finance, medicine music, games and many other various fields. Neural network is a computer system modeled on human brain and methods of applying artificial intelligence. Our system aims to create a new text based on a series of inputs.**

I. Introduction

Some features are generally specific to human intelligence that are perceiving, learning, thinking, finding solutions to problems, communicating and making decisions, etc. .Artificial intelligence is the work to bring these special features of human to the machine .[1]

Artificial intelligence is actually used to perform tasks or tasks assigned to it. It can imitate human beings and their intelligence, or rather try to pretend, by collecting information. Also, the systems and machines that can further improve themselves with this data is called as artificial intelligence [2].

Artificial neural networks, are the algorithms designed to classify some data by looking at the structure of the human brain and inspired by this structure. Artificial neural networks, interpret people's sensory data by labeling and clustering the input. These structures can recognize and process numerical and vector data. For processing the requested data, it should be converted [3].

Recurrent Neural Network (RNN) is the general name for feed forward neural networks that has its own memory. This network processes each input in the same way, but the result of the operations varies according to the results of the previous data. Each result feeds the network again and with changing the actions to be taken, affects the subsequent results. RNN networks, unlike normal neural networks, can keep inputs in its internal memory, thus it can process unclassified data from such as handwriting recognition and voice recognition. [4] RNNs has emerged through word placement trials. It is also widely used for topics such as natural language processing.[5]

Long Short Term Memory (LSTM) is a type of RNN developed to learn long-term data. It has been developed to solve the difficulties of RNNs in long-term information storage. [6]

Recurrent Neural Network (RNN) was tried to create free texts previously and succeeded. Using RNN Networks, this project tries to create texts that are suitable for a meaningful and taught writing style. For this, specific style and spelling owning texts are collected and fed into neural networks, then logical and meaningful results are expected [5-6].

II. Project structure

Deep learning enables machines to understand the rules and grammar of human language. In this way, machines, can produce outputs as speaking and writing like humans. Thus, deep learning can give machines the ability to think. In this context, our system aims to create a new output which is based on a series of inputs.

Based on previous studies on long texts, in this study our goal is to produce whole paragraphs as opposed to singular sentences. Also, our aim is to present a model that does not require a restriction. To create a meaningful story flow, the system can model the general human language. The system understands author-specific features such as the author's description, and briefly understand the writing style and reveal new texts.

The main purpose of our system is to understand the order of words and to write a new text similar to a text that is poduced by human thought. But there are many difficulties to achieve this goal

In Auto-Author, specific text files are given to deep learning algorithms to be trained. After training with the data obtained from this given text or texts as input, it produces a unique output different from these inputs [7].

TensorFlow, used in the project, is a deep learning library service which is made available by Google as open source. With Tensorflow , an Artificial intelligence model can be trained, Artificial neural networks can be created, or object recognition can be done using trained models pre-By Google [8].

Also, Keras used in the project is an interface written in Python that can run on the TensorFlow framework.

III. Model training steps and results

Models whose structure is defined and compiled are ready for training. The function to be used after this is fit (). It is an training function.

```
fit( x, y, batch_size=32, nb_epoch=10, verbose=1,
                callbacks=[],
class_weight=None, sample_weight=None)
```

The network makes training according to the parameters and the nb_epoch value given when calling the method. Each training process is called an iteration (epoch). Its parameters are :

x : It is the parameter that holds the input data, Numpy array or arrays.

y: It is the parameter that keeps the tags of the input data as a Numpy array. [9]

Since the model has been trained, intermediate results are recorded and the development is recorded. The text file given to the model as training data was created by combining several e-books. These e-books are :

Sabahattin Ali - Yeni Dünya [10]
Orhan Kemal - Grev
Sabahattin Ali - Kuyucaklı Yusuf [11]

Sabahattin Ali - Kürk Mantolu Madonna [12]
Orhan Kemal - Müfettişler Müfettişi [13]
Oğuz Atay - Tutunamayanlar[14]

While processing the first ten thousand characters of the articles given as training data to the model, output taken in the tenth epoch :

“olan bir kalını bir karılın alatında bir kalını bir karılın alatındabir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir karılın alatında bir kalını bir”

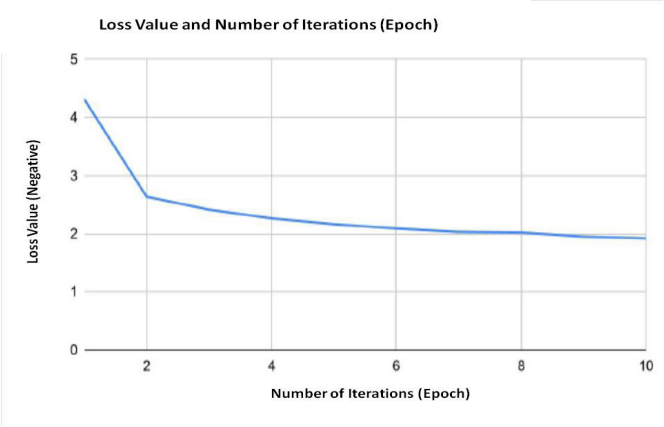

Fig. 1. First 10 epoch counts and loss chart

Output taken after the fiftieth epoch:

“bir şey bazırkan gibi bu araptırın aykı kocaklarını biliyorsun. Yaptığı yere demiş, kalkalarına uzak şiliyordu. Koğu çevirden kendine ilgile denim cindin.”
Selim: “Dut! Bu oyunuz artık şemdin demektir. Karıtık, hem de kendine ve başka tikale vere oynadan bir insanda hemen okunak, diye adlandıracak. Ele durup bir garebe kuvvetiniz kara eden mi? Bize çevirmeye başladım. Benim Gazit’di, durgun ve hemen son kabasına altı diyapıyordu. Bu sesler ve ilk gün alnşı gibi, sonunda hareketleri yapalan ”
The working steps of the project:

-Texts belonging to a determined style and writing style are collected digitally.
- These texts are preprocessed to provide machine-learning.
- Necessary artificial neural networks are created.
- Preprocessed texts are taught to the machine as input.
- An output is taken based on the texts learned from the machine.
- The outputs obtained are compared with those previously taught.
- Observation will be made by comparing the results.
- It is checked whether the model meets the desired criteria as a result of the observations made.

These steps continue until the appropriate model structure is created.

In the presented Project, when it comes to the fiftieth epoch, it is seen that the model is gradually learning how to capitalize sentences and use punctuation marks.

IV. Conclusion

In the project, LSTM was used for its convenience and capabilities in free text creation. Free text creation rules have been examined.

In Auto-Author, RNNs have been used to create productive models. Here, the network learns a problem sequence and creates a completely new sequence for the same problem area. Long Short Term Memory (LSTM) is an RNN architecture that can remember values for long or short periods was developed to generate new text. Also, LSTM was developed to learn word strings from multiple input texts that form three main modules, to process inputs, and to train neural networks.

References

[1] Investopedia, Jake Frankenfield, 2020. Artificial Intelligence, https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp, last visited 14-08-2020.
[2] What is AI, last visited 14-07-2020, https://www.oracle.com/tr/artificial-intelligence/what-is-artificial-intelligence.html
[3] A Beginner’s Guide to Neural Networks and Deep Learning, last visited 11-07-2020, https://pathmind.com/wiki/neural-network
[4] Aditi Mittal, Understanding RNN and LSTM, last visited 10-06-2020,https://towardsdatascience.com/understanding-rnn-and-lstm-f7cdf6dfc14e
[5] Christopher Olah, Understanding LSTM Networks, last visited 10-08-2020,http://colah.github.io/posts/2015-08-Understanding-LSTMs/
[6] Peter Potash, Alexey Romanov, Anna Rumshisky, “Using an LSTM for Automatic Rap Lyric Generation”, Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing, Lisbon, 2015.
[7] Train without labeling data using Self-Supervised Learning by Relational Reasoning, last visited 10-08-2020,https://towardsdatascience.com/train-without-labeling-data-using-self-supervised-learning-by-relational-reasoning-b0298ad818f9
[8] Tensorflow, last visited 10-06-2020, https://www.tensorflow.org/api_docs
[9] Keras, last visited 10-07-2020,https://keras.io/api/callbacks/model_checkpoint/
[10] Kobo, last visited 02-07-2020, https://www.kobo.com/us/en/ebook/yeni-dunya
[11] Kobo, last visited 02-07-2020, https://www.kobo.com/ww/en/ebook/kuyucakl-yusuf

[12] Kobo, last visited 02-07-2020,https://www.kobo.com/ww/en/ebook/kurk-mantolu-madonna-6
[13] Books, last visited 02-07-2020, books.google.com.tr/books/about/M%C3%BCfetti%C5%9Fler_m%C3%BCfetti%C5%9Fi.html?id=Jbs_AAAAIAAJ&redir_esc=y
[14] DR, last visited 02-07-2020, https://www.dr.com.tr/Kitap/Tutunamayanlar-Butun-Eserleri-1/Oguz Atay/Edebiyat/Roman/Turkiye-Roman/urunno=0000000061424