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Eat it, Review it: ANew Approach for Review Prediction

Deepal S. Thakur[1], Rajiv N. Tarsarya[2], Ashwini Save[3]

[1](*Computer Engineering Department, VIVA Institute of Technology, India)*

Abstract: *Deep Learning has achieved significant improvement in various machine learning tasks. Nowadays, Recurrent Neural Network (RNN) and Long Short Term Memory (LSTM) have been increasing its popularity on Text Sequence i.e. word prediction. The ability to abstract information from image or text is being widely adopted by organizations around the world. A basic task in deep learning is classification be it image or text. Current trending techniques such as RNN, CNN has proven that such techniques open the door for data analysis. Emerging technologies such has Region CNN, Recurrent CNN have been under consideration for the analysis. Recurrent CNN is being under development with the current world. The proposed system uses Recurrent Neural Network for review prediction. Also LSTM is used along with RNN so as to predict long sentences. This system focuses on context based review prediction and will provide full length sentence. This will help to write a proper reviews by understanding the context of user.*

Keywords – *CNN, Deep Learning, LSTM, Machine Learning, RCNN, RNN*

1. INTRODUCTION

The field of learning has given rise to Artificial Intelligence due to which innovations have reached to another level. Today AI is bringing revolutionary changes to each and every field be it in nation's security, health or education. Machine learning and Deep learning are the two main subfields of artificial intelligence has proved a boon to the learning. Both plays different role and has their different importance in aspects of environment learning. Machine learning is a sub-discipline of Artificial Intelligence and today it is much in demand since it is able to provide relevant tools that the society needs to bring about change. Machine Learning takes the core ideas of Artificial Intelligence and uses them to solve real-world issues. It is here that the neural networks come into play as they are designed to imitate the human decision-making ability. Deep Learning focuses on a subset of ML techniques and tools and then applies them to solve any problem that requires the quality of human thought. Henceforth making learning a machine would more feasible than making learn a human mind. In field of text the data is enormous to handle. Leaning the data in deep helps in understanding the different meanings of words. This meaning plays important role in understanding the context of user. Existing systems predicts next word for better suggestions using machine learning techniques but lack in understanding the context of the

costumer, which is the main drawback of these systems. Deep Learning techniques provides way for context based prediction which can overcome the limitations of existing systems [1]. This system emphasizes on the context based sentence prediction and mainly focuses on restaurant review system.

2. LITERATURE REVIEW

S. Lai, et. al. [1] have proposed the context-based information classification; RCNN is very useful. The performance is best in several datasets particularly on document level datasets.

Hassa, et. al. [9] have proposed RNN for the structure sentence representation. This tree like structure captures the semantic of the sentences. The text is analyzed word by word by using RNN then the semantic of all the previous texts.

J. Y. Lee, et. al. [7] have proposed that text classification is an important task in natural language processing. Many approaches have been developed for classification such as SVM (Support Vector Machine), Naïve Bayes and so on. Usually short text appears in sequence (sentences in the document) hence using information from preceding text may improve the classification. This paper introduced RNN (Recurrent Neural Network) and CNN (Convolutional Neural Network) based model for text classification.

V. Tran, et. al. [5] have proposed that n-gram is a contiguous sequence of 'n' items from a given sequence of text. If the given sentence is 'S' ,we can construct a list on n-grams from 'S' , by finding pairs of words that occurs next to each other. The model is used to derive probability of sentences using the chain rule of unconditional probability.

Z. Shi, et. al. [4] have defined that recurrent neural network has input, output and hidden layer. The current hidden layer is calculated by current input layer and previous hidden layer. LSTM is a special Recurrent Neural Network. The repeating module of ordinary RNN has a simple structure instead LSTM uses more complex function to replace it for more accurate result.

J. Shin, et. al. [10] have defined that understanding the contextual aspects of a sentence is very important while its classification .This paper mainly focuses on classification. Various approaches like SVM, T-LSTM, and CNN have been previously used for sentence classification.

W. Yin, et. al. [11] have defined various classification tasks are important for Natural language processing applications. Nowadays CNN are increasing used as they are able to model long range dependencies in sentence, the systems used are with fixed-sized filters. But, the proposed MVCNN approach breaks this barrier and yields better results when applied to multiple datasets: binary with 89.4%, Sentiment140 with 88.2% and Subjectivity classification dataset (Subj.) with 93.9% accuracy.

I. Sutskever, et. al. [12] have defined deep learning being the newest technology in the era has advanced in many fields. One of the techniques called as Deep Neural Networks are very powerful machine learning models

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and have achieved efficient and excellent performance on many problems like speech recognition, visual object detection etc. due to its ability to perform parallel computation for the modest no of steps. The results showed that a large deep LSTM with a limited vocabulary can outperform a standard SMT-based system.

W. yin, et. al. [3] have defined that deep neural networks have revolutionized the field of natural language processing. Convolutional Neural Network and Recurrent Neural Network, the two main types of DNN architectures, are widely explored to handle various NLP tasks. CNN is supposed to be good at extracting position invariant features and RNN at modelling units in sequence. CNNs are considered good at extracting local and position-invariant features and therefore should perform well on TextC, but in experiments they are outperformed by RNNs.

K. C. Arnold, et. al. [6] have proposed an approach that presents phrase suggestion instead of word predictions. It says phrases were interpreted as suggestions that affect the context of what the user write more than then the conventional single word suggestion. The proposed system uses statistical language modelling capable of accurately predicting phrases and sentences. System used n-gram sequence model and KenLM for language model queries which used Kneser-Ney smoothing. It pruned the n grams that repeated less than two times in the dataset, by marking the start-of-sentence token with some additional flags to indicate the start of the sentence. The work demonstrated the phrase completions were accepted by users and were interpreted as suggestions rather than the predictions.

M. Liang, et. al. [8] have defined that in past years, deep learning techniques has achieved great success in many computer vision tasks. The visual system of the brain shares many properties with CNNs and hence they have inspired neuroscience to a great extent. CNN is typical feed forward architecture while in the visual systems recurrent connections are abundant. So incorporating recurrent connection in each convolutional layer the following system was proposed for Object Recognition. The proposed model tested several benchmark object detection datasets. RCNN achieved better results over CNN.

P. Ongsulee [2] has defined that machine learning explores the study and construction of algorithms that can learn from and make predictions on data. Machine learning is sometimes conflated with data mining, where the latter subfield focuses more on exploratory data analysis and is known as unsupervised learning. Machine learning can also be unsupervised and be used to learn and establish baseline behavioural profiles for various entities and then used to find meaningful anomalies.

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3. PROPOSED SYSTEM

The system makes use of Deep Learning techniques which has more accuracy rate as compared to other machine learning techniques like SVM etc. This system is developed by using python language which consist of interfaces to many system calls and libraries. It uses Amazon Food Reviews dataset. This dataset consist of different food and ambience related sentences.

In initial state sequence padding is performed on dataset so that the batches of padded sequences can be used for training. Word embedding is performed by using word2vec. Word embedding converts the input in the form of vectors. The vectors generated from word embedding are given as data to the recurrent neural network for training and the further process is carried out by RNN and LSTM which predicts the sentence. Figure 3.1 shows in detail how the data flows.

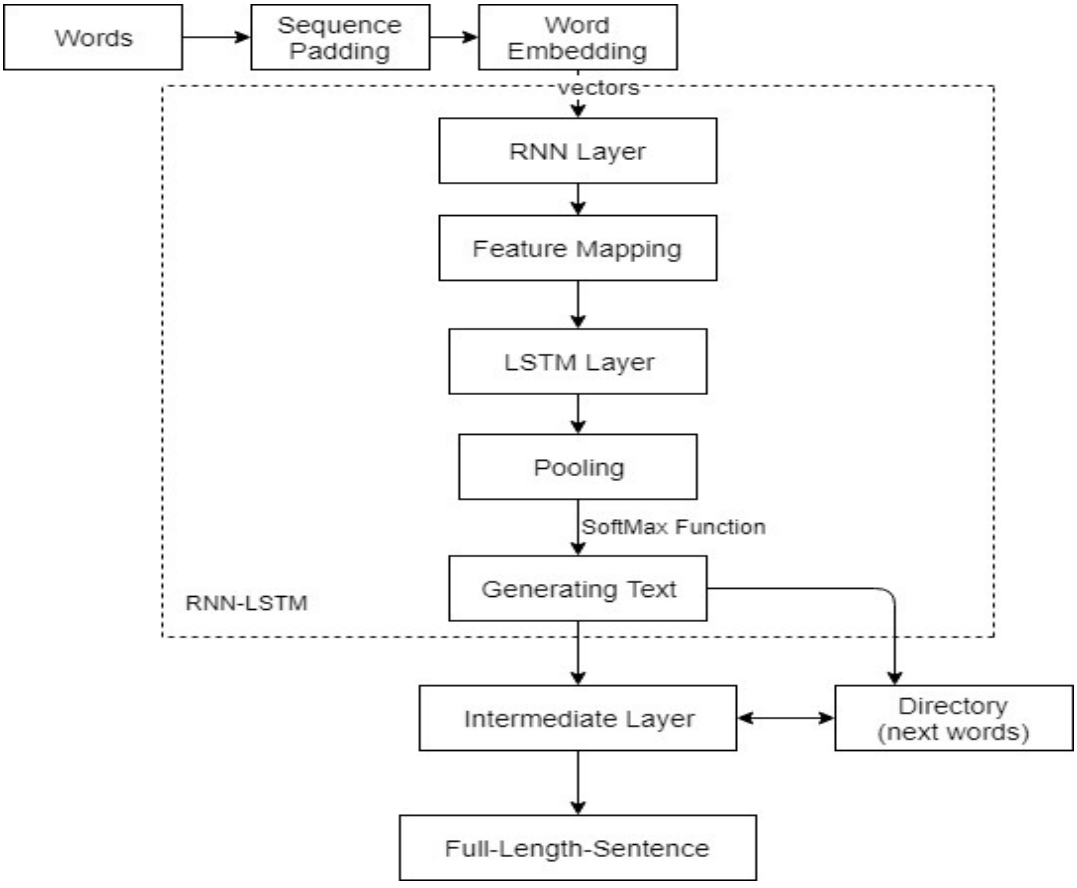

Figure 3.1: System Flow Diagram

Figure 4.1 describes the generated vector is given as input to RNN, which on applying activation function generates features automatically. The feature mapping layer is fully connected to the recurrent structure. RNN consist of the hidden states which works as a memory for the network. Hidden states capture the information of previous time steps. LSTM cells are designed to be capable of learning long term dependencies. Recurrent structure and LSTM identifies the context of the current word and by applying max-pooling and soft-max function gives the probability of the next word. Which is then forwarded to intermediate output layer an d

directory. Directory contains the probabilities of next word predicted by soft-max layer. Intermediate layer and directory then predicts the sentence and displays to user. Before starting training the model, we need to pad the sequences and make their lengths equal. It generates padded sequences and label where padded sequences are words that will be taken under consideration to predict label, i.e. the next word. Deep learning models works totally on mathematics, so the sequences need to be converted into vectored form, so word embedding is done using Word2vec. All the calculations are carried on this vectors. No feature inputs are to be given to the model as in deep learning the model maps the features based on activation function, where parameters are selected automatically by the model itself. Max Pooling layer then operates on every feature independently, it reduces the spatial size of representation to reduce the amount of parameters and computational cost of network. Output layer projects the values obtained through max-pooling.

4. RESULTS

While predicting a sentence, it needs a lot of data to understand context of user. To predict what a user want to write in a sentence is difficult task. Current generation mobile keyboards predicts next word but are not able to predict sentence. The main standout feature of the system is it predicts sentence and not a single word. There is no such system developed that predicts or suggests sentences. More the data more can be better accurate sentences, hence size of data are also important.

5. CONCLUSION

The system will helps user to write restaurant reviews. Current system in market predicts the words using machine learning techniques. This system provides new innovative approach for review prediction which analyses the context of the word written by user and then predicts full-length sentence. The system helps user to review the items, infrastructure and atmosphere in jargon that would be easy for the customer. Also it allow user to express their own recipe in review section. Deep learning paves way not only for accurate sentence prediction but also a system that considers a user's point of view and then generate a sentence. Users can review at an ease and can easily type a review through this system.

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