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IMPROVING A DEEP NEURAL NETWORK GENERATIVE-BASED CHATBOT MODEL

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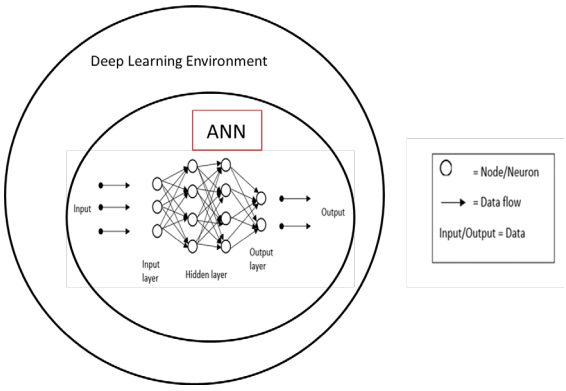
Graphical abstract



Abstract

A chatbot is an application that is developed in the field of machine learning, which has become a hot topic of research in recent years. The majority of today's chatbots integrate the Artificial Neural Network (ANN) approach with a Deep Learning environment, which results in a new generation chatbot known as a Generative-Based Chatbot. The current chatbot application mostly fails to recognize the optimum capacity of the network environment due to its complex nature resulting in low accuracy and loss rate. In this paper, we aim to conduct an experiment in evaluating the performance of chatbot model when manipulating the selected hyperparameters that can greatly contribute to the well-performed model without modifying any major structures and algorithms in the model. The experiment involves training two models, which are the Attentive Sequence-to-Sequence model (baseline model), and Attentive Seq2Sequence with Hyperparametric Optimization. The result was observed by training two models on Cornell Movie-Dialogue Corpus, run by using 10 epochs. The comparison shows that after optimization, the model's accuracy and loss rate were 87% and 0.51%, respectively, compared to the results before optimizing the network (79% accuracy and 1.05% loss).

Keywords: Deep learning, Artificial Neural Network, Generative-based chatbot, hyperparameter optimization, Attentive Sequence-to-Sequence

1.0 INTRODUCTION

In 2016, 44% of consumers claimed they would rather interact with a chatbot than a human customer service agent [1]; and the percentages are projected to continue to rise in the future years. Every industry must design a solution that uses a third-party software to automate practically everything. Chatbot application naturally fit in with the characteristic of the industry demand. A chatbot is an application that is developed in the field of machine learning, which has become a hot topic of research in recent years. It's a Human-Computer Interaction (HCI) model and an artificial intelligence application that simulates a human-computer conversation [2]. Users' intent, input-output processing, and a response generating technique that obtains information from the knowledge base are all part of the application. Figure 1 depict the general architecture of the chatbot application from upper layer view.

The majority of today's chatbots integrate the Artificial Neural Network (ANN) approach with a Deep Learning environment. The combination of ANN and Deep Learning areas, as well as Natural Language Processing (NLP) techniques, results in a new generation chatbot known as a Generative-Based Chatbot. Generative-based methods leverage natural language generation (NLG) techniques to respond to a message [3][4]. However, to build a Deep Neural Network (DNN) Generative-Based chatbot requires a complex adaption of training network that works in tandem with optimal hyperparameter. As the environment can vary, how the hyperparameter reacts with the environment will also set a different optimum value. The current chatbot application mostly fails to recognize the optimum capacity of the network

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