

CMPE 297: Emerging Technologies in ML

Short Story Proposal

A Survey of Attention Mechanism in Deep Learning

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Sources :

1. <https://arxiv.org/pdf/1904.02874.pdf>
2. <http://papers.nips.cc/paper/8302-stand-alone-self-attention-in-vision-models.pdf>

Abstract:

In a biological system of human, the visual processing system focuses only on certain parts of an image while ignoring other irrelevant information in such a way that helps in perception. It is similar to different problem solving, such as speech, vision, language, etc. In Deep Learning, it is achieved by using the Attention Mechanism. The attention mechanism was first introduced for the encoder-decoder in neural sequence transduction model. Over the period, the Attention mechanism has become more popular among the researchers in Artificial Intelligence community. It is considered as a vital component of neural network architecture for various applications in Computer Vision, Speech recognition, Statistical Learning and Natural Language Processing.

The [survey paper](#) provides a structured overview of various developments in attention modeling. This paper gives information about how attention mechanism can solve the challenges of Encoder- Decoder architecture. In addition to that, the authors have proposed a taxonomy of attention models. Neural network architectures like encoder-decoder, memory networks which a single-input sequence, and architectures with components of RNN which are used in conjunction with Attention mechanism are described. It also shows the role of attention mechanism in interpretability improvement of neural networks along with the application of AM in application domains like Natural Language Generation, Recommender System and Classification.

The [paper](#) gives us insights of augmentation of Attention Mechanism with standard Convolutional Neural Network architecture for Computer Vision problems. The authors have used Self Attention which is one of the categories of Attention Mechanism. This work proves that self-attention can be effectively used as a stand-alone layer. The steps of constructing a fully attentional vision model are discussed followed by the experiments on ImageNet Classification and COCO object detection. In addition, this paper gives insight of the important components of attention, effect of spatial extent of self-attention, importance of positional information and spatially aware attention stem.

In conclusion, I propose a short story on Attention Mechanism in Deep Learning which will give information about taxonomy, various applications, and development of Attention Mechanism. This will also include the used of Attention Mechanism in Computer Vision as a stand-alone self-attention layer along with experiments and ablation study.