Short Story On Framework for Deep Learning-Based Language Models Using Multi-Task Learning in Natural Language Understanding: A Systematic Literature Review and Future Directions

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3 min read

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Just now

Abstract

Learning a new language is difficult for all and its even more difficult for a computer to learn and process human language. But due to the recent techniques in Deep Learning(DL) Natural Language Processing(NLP) tasks are enhanced significantly, but these models

cannot be entirely generated using NLP models. In order to meet the latest trends Natural Language Understanding(NLU) a subfield of NLP is emerged. NLU tasks include things like machine translation, text entailment, dialogue based systems, natural language inference, sentiment analysis. The advancement in the field of NLU can enhance the development in these models.

Introduction

NLU is the emerging nowadays due to the increase in the GPT models , it mainly concentrates on analyzing and extracting information from human language text. NLU tasks include information-retrieval, summarization, language translation, classification. NLU aims to attain the task proficiency for tasks contained in standard benchmarking datasets like GLUE (General Language Understanding Evaluation) and superGLUE. (Super GLUE).

Methodology

The methodology mainly consists of key-phrases required to search results, inclusion and exclusion criteria, selection results, quality assessments extraction and data synthesis. The below table shows the evolution of models in NLU

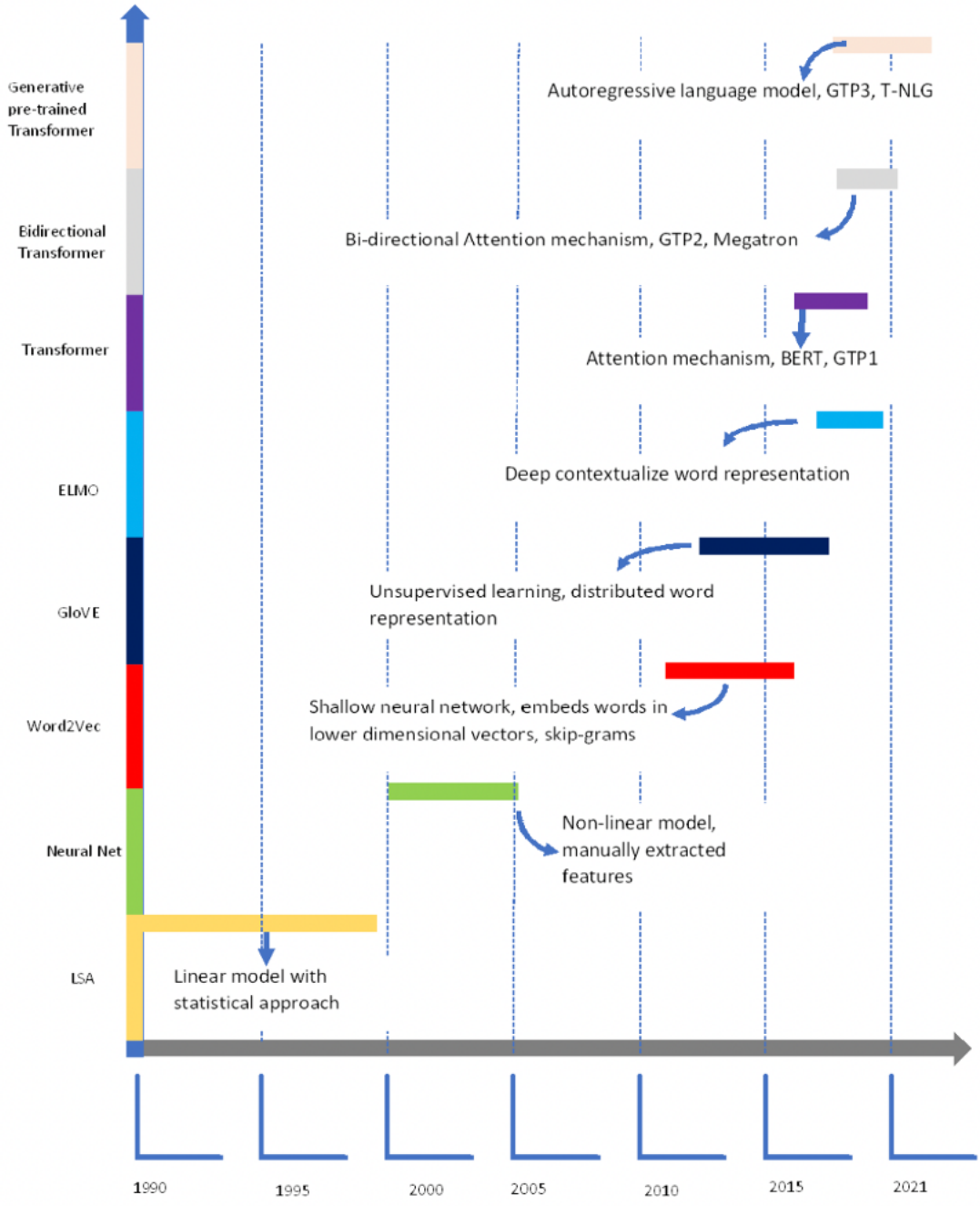
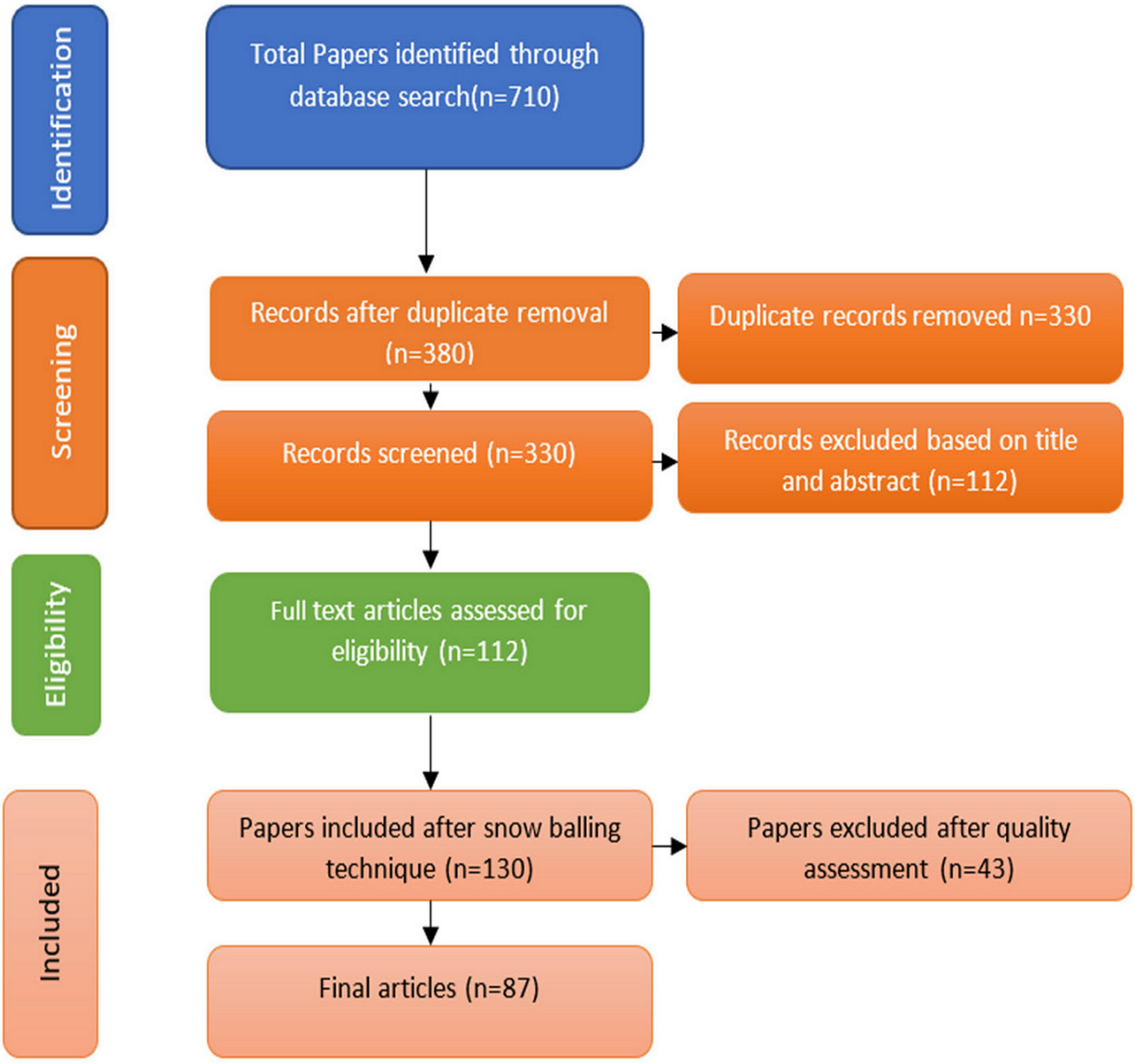


FIGURE 1. **Evolution of deep learning models in NLU.**

Background

NLU includes building language models training them, testing them for accuracy. This section contains the text classification tasks used in

this paper. there are two types of QA tasks QA extractive and generative QA, we are only considering extractive QA in this part. NLI is used to predict whether we can predict meaning of one text from other. neural machine translation is used as a process to translate text by simulating human brain capabilities, the main goal of this part is to retain the meaning and intent of the language while translating if from one to other



We have various models that can be used:

a)Feed forward network based models: simple Dl models using Feedforward network, good level of accuracy

b) RNN based models: Text treated in from of words in RNN model, mainly used for text categorization

c)CNN models: Used to identify patterns in space unlike RNN which identify patterns over the time

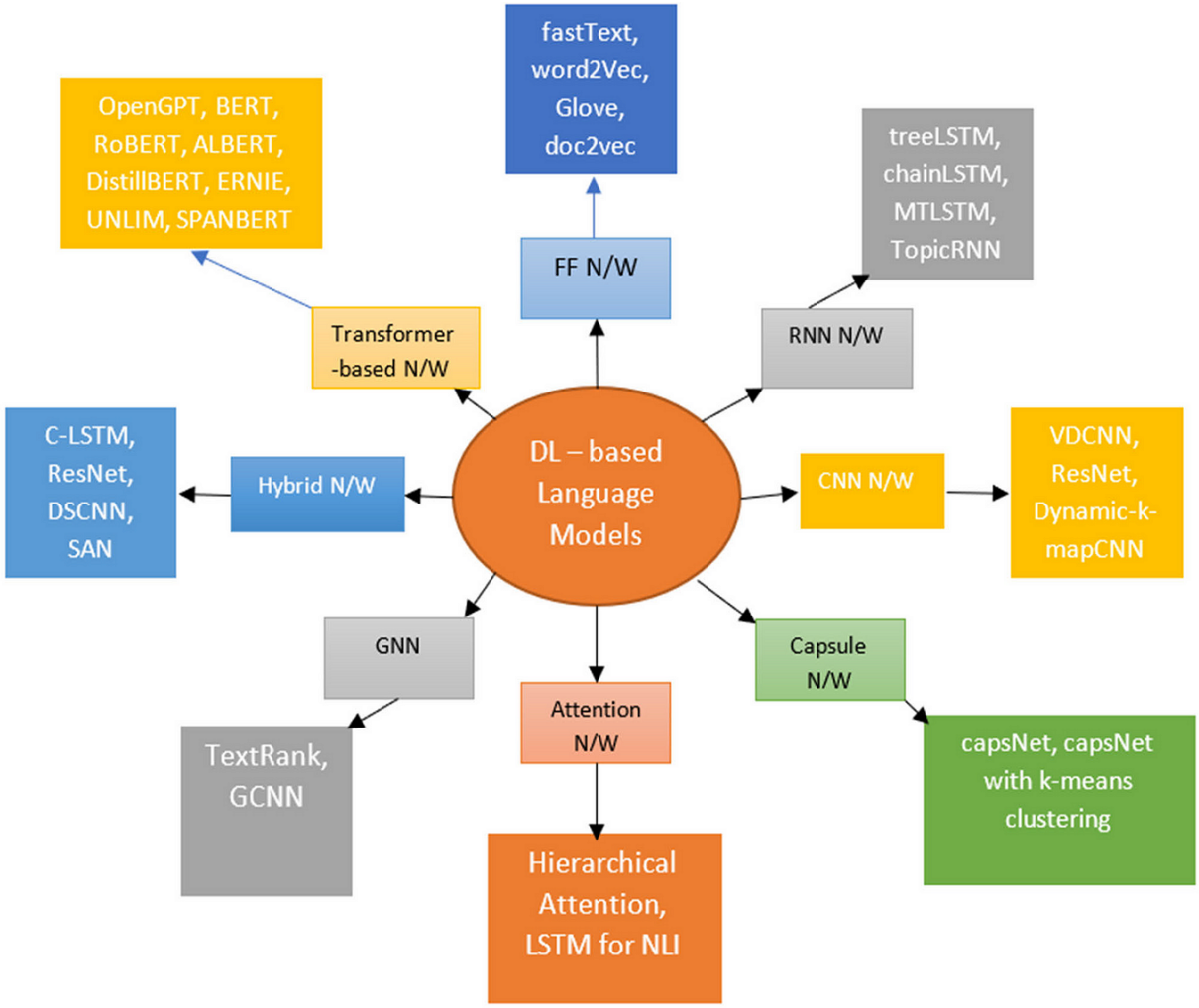
d)Capsule neural network based models: Decreased complexity of a CNN model and increase overall performance

e)Models with mechanism of attention

f)Models based on graph neural networks

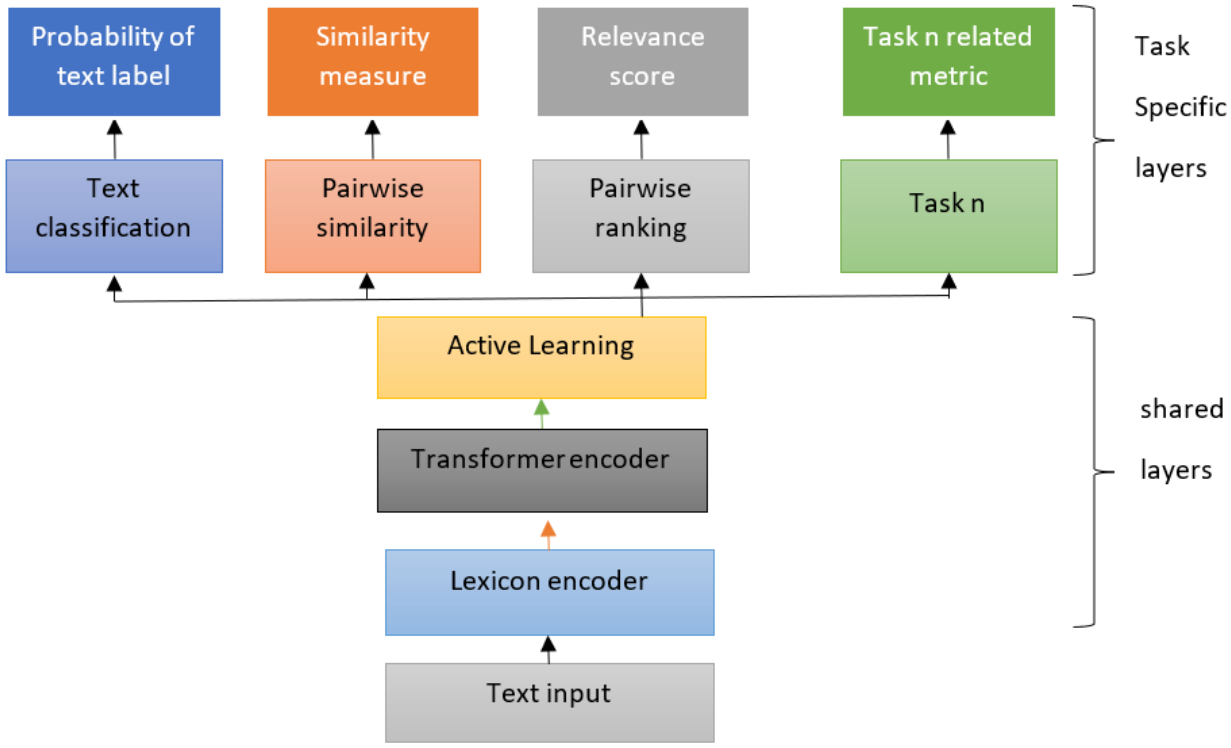
g)Models with hybrid techniques

h)Models based on transformers



Discussions and limitation

Large number of research papers are considered for this aspect in building large language models in DL



The above mentioned framework is proposed for creating NLU models in future, it is mainly done considering BERT models. The models has two parts multi-tasking and pre training, the proposed framework should work well as it combines multiple techniques.

Current models employ text classification tasks due scarcity of literature and research in multi tasking DL models in NLU, and availability of large number of models makes it difficult to find the suitable model and that meets the requirements

Conclusion

Majority of issues faced by multi taking learning are same and the findings suggest that a hybrid model that contains strategies from

Multi task learning and active learning , still there is lot of scope to figure out how to improve accuracy and resilient MTL models for general AI and next gen models

References:

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