EEE 586 Term Project Proposal

Text Classification with Graph Neural Networks

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1 Aim & Purpose

In this project we will work on sentiment classification problem. The purpose of this project is to design a graph neural network model to correctly classify the sentiments of the tweets in the dataset.

2 Inspiration

There are only a limited number of studies that have explored the Graph Convolutional Neural Networks. The vanilla Text GCN model in [1] showed that it can surpass most of the state-of-the-art models without any external word embeddings of knowledge on the benchmark datasets. Therefore, there is still room to improve on this structure and obtain better results.

3 Approaches and Methods

The aim of this project is to obtain a novel graph based model that can classify 20 different categories. Text GCN model in the [1] will be the baseline model for this project and we will try to adapt the structure to our own problem. Furthermore, we also want to develop novel structures to even increase the performance of this model.

4 Literature Review

The related text classification with GNNs are [1]–[3]. Also there is an architecture which uses attention mechanism with Graph Neural Networks [4].

5 Dataset

The dataset that will be used in this project is TweetEval. It consists of seven heterogeneous tasks in Twitter, all framed as multi-class tweet classification. These

tasks are irony, hate, offensive, stance, emoji, emotion, emotion and sentiment. In this project emoji multi-class classification tasks will be investigated. There are a total of 20 different emojis which represent the text. Datasets can be found here [5].

6 Gantt Chart

The Gantt chart of the work packages are provided in Figure 1.

Work Package No	Work Package Name	Percentage of Work (%)	Lead	WEEKS													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	**Literature Review**	**30**	Tuna & Arda														
1.1	Identifying previous work on text classification with GNNs	10	Tuna														
1.2	Finding and proposing possible novel structures onto previous works	20	Arda														
2	**Data Preparation**	**20**	Tuna & Arda														
2.1	Structural data need to pre-processed	5	Arda														
2.2	Processed structural data need to be converted to its graph representation	15	Tuna														
3	**Training Baseline Model**	**5**	Arda														
4	**Improving Model**	**40**	Tuna & Arda														
4.1	Trying Novel Structures	30	Arda														
4.2	Hyperparmeter Tuning	10	Tuna														
5	**Testing Model**	**5**	Tuna														

Figure 1: Gantt Chart

References

[1] L. Yao, C. Mao, and Y. Luo, *Graph convolutional networks for text classification*, 2018. arXiv: 1809.05679 [cs.CL].

[2] T. N. Kipf and M. Welling, *Semi-supervised classification with graph convolutional networks*, 2017. arXiv: 1609.02907 [cs.LG].

[3] H. Peng, J. Li, Q. Gong, *et al.*, *Hierarchical taxonomy-aware and attentional graph capsule rcnns for large-scale multi-label text classification*, 2019. arXiv: 1906.04898 [cs.IR].

[4] P. Veličković, G. Cucurull, A. Casanova, A. Romero, P. Liò, and Y. Bengio, *Graph attention networks*, 2018. arXiv: 1710.10903 [stat.ML].

[5] F. Barbieri, J. Camacho-Collados, L. Espinosa-Anke, and L. Neves, "TweetEval:Unified Benchmark and Comparative Evaluation for Tweet Classification," in *Proceedings of Findings of EMNLP*, 2020.