Machine Learning Capstone Project Proposal

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Project title Multi Modal Learning - Hateful Meme Detection

Datasets We will be merging Facebook Hateful Meme Dataset (10K) and Memotion Dataset (7k) to increase our training dataset.

Project Idea While memes were originally incepted for mere humour, the profusion of active social media participants has seen the motives behind memes exponentially digressing from this sole purpose. This has led to some groups and individuals being targeted with hateful memes. It is a mammoth task to assign human moderators to physically filter every posted meme; hence an automated approach is necessary.
The hate in a meme is conveyed through both the image and the text; therefore, these two modalities need to be considered, as singularly analyzing embedded text or images will lead to inaccurate identification. Our proposed approach is to initially perform preprocessing on the inputs, then model the text and images in parallel using traditional machine learning algorithms i.e. LSTM and CNN, respectively. The output from the models is later fused for classification. We also aim to conduct further experiments using one of state of the art architectures VisualBERT for vision and language and then apply Ensemble learning for the final prediction.
Our goal in this project is to maximize our knowledge in multimodal learning when applied to text and images and, also to fully comprehend its challenges (representation, translation, alignment, fusion, co-learning). We also want to understand the different algorithms which can be applied to this problem set as well as the pros and cons of the methods which we will apply.

Software library We will be using Pytorch

Teammates and work division Our team consists of Hawau Olamide Toyin, Muhammad Huzaifa, Ridwan Bello Salahuddeen, Sharon Chokuwa. As this project poses a learning curve for each team member, we have resolved that each member will be equally involved in every task, from the project title selection, literature review, methodology exploration, coding, project paper write up etc. However, depending on the progress of the project we will break down each task into smaller subtasks so that we may maximize our time constraint. But each member will still be fully aware and active in the broader task.

Midterm milestone By mid-term we aim to have finished all data preprocessing and will have tried the current baseline VisualBERT for vision and text. We expect to report similar results to the ones reported in the papers which implemented this baseline. From midterm we will focusing on techniques to improve the baseline accuracy.

Papers to read The referenced papers are listed in the references section.[1][2]

References

[1] Mihai Gabriel Constantin, Dan-Stefan Pârvu, Cristian Stanciu, Denisa Ionascu, and Bogdan Ionescu. Hateful meme detection with multimodal deep neural networks. In *2021 International Symposium on Signals, Circuits and Systems (ISSCS)*, pages 1–4. IEEE, 2021.

[2] Riza Velioglu and Jewgeni Rose. Detecting hate speech in memes using multimodal deep learning approaches: Prize-winning solution to hateful memes challenge, 2020.