Abstract

The main task of happiness science is trying to understand what behaviors make people happy in a sustainable fashion, which is an area of positive psychology. The primary model for analyzing the emotions expressed in the text is Valence-Arousal-Dominance (VAD) model. To evaluate the text by the VAD model and to classify the text in different classes, there are many dimensions to be calculated. A multi-task model is needed to evaluate the data across these dimensions.

Introduction

Multi-task learning (MTL) has been widely used in applications of machine learning, from speech recognition and natural language processing to drug discovery and computer vision. We used Multi-Task Learning (MTL) to predict multiple Key Performance Indicators (KPIs) on the same set of input featuresTwo MTL methods which are most commonly used ways to achieve MTL in deep learning are hard parameter sharing (HPS) method and soft parameter sharing (SPS) method.

HappyDB is a corpus with 100,000 crowdsourcing happy moments. The goal of the corpus is to advance the artistic state of understanding the causes of happiness that can be gathered from the text.



Figure 1. Demonstration of HappyDB dataset

MATH 6380q Project 2: Whether and why are people feeling happy? Multi-Task Mining Based on Text-based Information

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Methodologies

I. Hard parameter sharing (HPS) method

Hard parameter sharing (HPS) method is the most popular approach to MTL in neural networks. It is basically applied by sharing the hidden layers between all tasks while keeping several task-specific output layers. HPS method reduces the risk of overfitting significantly. The risk of overfitting is related to the shared parameters is an order N(N is the number of tasks). When doing multi-task learning, the goal of the task is to capture all of the tasks in a less overfitting rate.



II. Soft parameter sharing (SPS) method

In soft parameter sharing (SPS) method, each model just contain one task with its own parameters and setting. To encourage the parameters and setting to be similar, the distance between the parameters and settings of the model is then regularized.



Figure 3. Soft parameter sharing for multi-task learning in deep neural networks





Figure 4. Comparison of Multi-task model and Singletask model on (A) Classification. (B) VAD model.

Discussion & Conclusions

The multi-task learning (MTL) shows its considerable power in handing deep learning on multi-task jobs. In our results, the multi-task model shows

the better performance compared to the single-task model trained on each specific task. The comparison also indicates that the multi-task model still has space to improve. In a further study, we could update the current model and fine-tune it to get more accurate results.

References

• J. Wu et al., "HappyDB: A Corpus of 100,000 Crowdsourced Happy Moments," pp. 1–11, 2018. Sebastian Ruder., "An Overview of Multi-Task Learning in Deep Neural Networks", This paper originally appeared as a blog post at http://sebastianruder.com/multi-task/index.html on 29 May 2017.