

Research Statement

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I am a junior student in Computer Science and Engineering at Shanghai Jiao Tong University in China. My current researches concentrate on natural language processing, machine learning and computer vision.

I have done some researches in natural language processing and social network analysis since I attended Advanced Network Laboratory in Shanghai Jiao Tong University in Oct. 2018. I completed real-time topic detection tasks on long-text contents. In this work, I firstly use an improved GloVe model to learn global word representations, which adds penalty terms to detect semantic vibrations in word embedding when new articles coming. Then the model obtains the weights of all words by TextRank and extracts the keywords. Finally, keyword frequency clustering algorithm is adapted to the topic detection task in textual feature space. Besides, the topic merge mechanism is also introduced into the model to reduce the similarity between different topics. Compared with previous models, this model performs well especially for long-text contents, which are updated in real time.

I study the popularity prediction for social networks as well. I make a classification and establish a unified evaluation framework of popularity prediction methods for social networks like Twitter. The work divides mainstream prediction methods into four types: feature based methods, time series modeling, collaborative filtering methods and deep learning methods. Then I conduct experiments on the real-world weibo data using these methods to predict. Finally, according to five indicators, including accuracy, efficiency, timeliness, robustness and bias, I evaluate and compare the methods. This work systematically reviews and evaluates the latest prediction methods, clarifies the popularity prediction mechanism of social network information, and points out the direction for future research.

I also do some research on the computer vision field in my digital image processing class and computer graphics class last semester. My final scores of these two courses are 99 and 98 separately (full mark is 100). In the digital image processing class, I finished an image dehazing project using an end-to-end gated context aggregation network model. This model is based on GCANet, using the smoothed dilated convolution to avoid the gridding artifacts and applying a gated subnetwork to fuse the features of different levels. To improve the final dehazing performance, I also replace the simple mean square error loss with perceptual loss and ssim loss. This model performs better than previous dehazing methods by a large margin.

During these research processes, my theory and engineering abilities have been greatly promoted, mastering the machine learning framework like Pytorch and neural network models. These research experiences will qualify me to work better in the future study.