Social Relationship Detection using Rules

Sarit Kraus
Department of Computer Science, Bar-Ilan University, Israel
pcchair@ijcai19.org

Abstract

Social relationships play a very important role in social network. Social relationship detection has attracted increasing attention, typically, which can help to understand the behavior of humen in our daily life. Previous social relationship detection models focused too much on relationships between the same pair and ignore the interplay of different relationships in the same scene. We found that the interaction between the relationships in the same scene plays an important role in the detection of social relationships and we can model the interaction via person-pair relational message passing. This paper proposes a novel end-to-end model named *PRN* which focuses on the interaction between person-pair relationships in the same scene to solve the social relationship detection problem. It puts all person-pair relationships in a scene into the standard RNNs and make the relationships interact well. The model can take advantage of the interaction of the relationships and makes more accurate social relationship predictions. Experimental results on two classic data sets show that our approach significantly outperforms state-of-the-art models in social relationship detection, which justifies the significance of focusing more on the interaction of the person-pair relationships in social relationship detection task.

1 Introduction

This part will be written by **liangjinrui** . This part will consist of the following sections:

- The significance of social relation detection
- **[Example Figure]**
- Analyze the shortcomings of the current model and introduce our model(based ILP)
- Challenges
- Contributions

2 Related Work

This part will be written by **liangjinrui** and it will be surveyed by **liangjinrui** and **chenhaicheng** by January 31.

2.1 Social Relationship Detection

The foundation of social network is the social relationships detection, an important multidisciplinary problem that has attracted increasing attention in computer vision recently. A much number of studies that aim to infer social relationships from images [Wang *et al.*, 2015; Li *et al.*, 2017; Wang *et al.*, 2018; Wang *et al.*, 2010; Zhang *et al.*, 2015] and videos [Ding and Yilmaz, 2010; Ramanathan *et al.*, 2013; Vinciarelli *et al.*, 2009] have been made since the rise of deep learning. For instance, motivated by psychological sudies, [Zhang *et al.*, 2015] and [Dibeklioglu *et al.*, 2013] exploit social relationships based on facial expression recognition and affective behaviour analysis. Besides, [Li *et al.*, 2017] and [Wang *et al.*, 2018] discover that contextual cues around people play a significant role in social realtionship infering. Concretely, [Li *et al.*, 2017] proposed a dual-glance model for social relationship, where the first glance makes a coarse relationship prediction for a given person pair and then the second one refines the prediction by using the objects around the pair. [Wang *et al.*, 2018] build a knowledge graph and employed Gated Graph Neural Network (GGNN) [Li *et al.*, 2015] to integrate the graph into the Graph Reasoning Model (GRM), a deep neural network where a proper message propagation and graph attention mechanism are introduced to explore the interaction between person pair and the contextual objects.

Unlike the aforementioned works which focus on facial expression information or contextual cues, we found that the interaction among the relationships in the same scene graph palys an important role in the detection of socail relations and we also used rules to refine the inference. Therefore, we proposed a novel model named *SRDR* which incorporates rules seamlessly into the deep learning model named *SR* to solve the social relationship detection problem.

2.2 PIPA Dataset and PISC Dataset

Analyze characteristics of datasets.

2.3 Rules and ILP

Introduce rules and ILP referring to [Wang *et al.*, 2015]

3 SRDR model

This part will be written by **liangjinrui** and **chenhaicheng**.
[model figure]

[Introduce the total model]

3.1 Social Relationship Detection Model

3.2 Imposing Rules

3.3 Integrating by Integer Linear Programming

4 Experiments

This part will be written by **chenhaicheng**.

4.1 Experiment Setting

4.2 Experiment Results

4.3 Experiment Analysis

4.4 Ablation Study

4.5 Case Study

5 Conclusion

This part will be written by **liangjinrui**.

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