

Title: "ASPER: Answer Set Programming Enhanced Neural Network Models for Joint Entity-Relation Extraction"

Authors: Trung Hoang Le, Huiping Cao, Tran Cao Son

Abstract: "A plethora of approaches have been proposed for joint entity-relation (ER) extraction. Most of these methods largely depend on a large amount of manually annotated training data. However, manual data annotation is time consuming, labor intensive, and error prone. Human being learns using both data (through induction) and knowledge (through deduction). Answer Set Programming (ASP) has been a widely utilized approach for knowledge representation and reasoning that is elaboration tolerant and adept at reasoning with incomplete information. This paper proposes a new approach, ASP-enhanced Entity-Relation extraction (ASPER), to jointly recognize entities and relations by learning from both data and domain knowledge. In particular, ASPER takes advantage of the factorial knowledge (represented as facts in ASP) and derived knowledge (represented as rules in ASP) in the learning process of neural network models. We have conducted experiments on two real datasets and compare our method with three baselines. The results show that our ASPER model consistently outperform the baselines."