The 2nd KR2ML@IBM Workshop at AI Research Week

The Second KR2ML@IBM Workshop at IBM's AI Research Week (https://kr2ml.github.io/ibm-2019/) was opened by Andrew McCallum, professor at UMass Amherst. He gave a vibrant keynote summarizing nearly 10 years of research in information extraction in his group. His excitement about approaches such as Box Embeddings as an alternative to standard vector representations -- and suggestions on how they could be applied in neural networks – got everyone excited for the rest of the day.

Graphical representations were the topic of the first invited talks session. Kelsey Allen and Ferran Allet, both PhD students at MIT, demonstrated the power of graph neural networks, covering applications as diverse as construction and weather prediction. Check out the toolgames (http://scripts.mit.edu/~k2smith/toolgames) to get an idea of how graph networks can help to simulate physical processes. Lee Martie (MIT-IBM Watson AI Lab) suggested a methodology to integrate potentially conflicting predictions of different learners based on a graph integrating the classes.

The session on innovative combinations of KRR and ML was opened by Milind Tambe, professor at Harvard. He gave an inspiring talk on AI for Social Good, in which he presented a variety of impressive field studies of his research that showed that a combination of game theory and learning can provably improve outcomes for wildlife in national parks, passengers on airplanes, and homeless and at-risk youth. He also called on everyone to contribute similarly with their research advances, given the large number of serious and hard real problems that are still to be solved.

Subsequently, Masataro Asai (MIT-IBM Watson AI Lab) presented his work integrating symbolic grounding of visual information and traditional automated planning techniques in order to solve problems such as visual puzzles, which cannot been solved by standard planners. Achille Fokoue (IBM Research) gave an overview of a system using reinforcement learning to guide proof search in automated theorem proving. Contrasting these fully-automated solutions, Lucian Popa (IBM Research) presented results showing that humans in-the-loop can significantly help in obtaining high-level, explainable linguistic expressions using learning, which can then be in various applications.

The afternoon was dedicated to knowledge graphs and query answering. In the opening keynote, Tim Finin, professor at UMBC, talked about 60 years of knowledge graphs, stressing recent results on applications for learning. Alfio Gliozzo (IBM Research) gave an overview of the work in his group, on developing knowledge induction techniques to automate the knowledge base creation process. Ganesh Ramakrishnan (professor at IIT Bombay) presented work from his PhD student Vishwajeet Kumar on automatic generation of questions and answers. Finally, Lingfei Wu (IBM Research) showed an application of graph neural networks to automatic translation of facts from knowledge graphs into natural language texts.

The last session of the day focused on the crucial problem that natural language questions have to be translated into structured, formal representations if we want them to be answered automatically over knowledge bases. Sumit Bhatia (IBM Research) introduced a challenge on translating questions into structured SPARQL queries, and Tengfei Ma (IBM Research) presented a system learning to translate into SQL.

Overall, the variety, quality, and excitement of the talks was outstanding, and got the attendants engaged in interesting discussions all over the day. During the coffee breaks, posters from all over IBM gave an insight into the work in the area conducted at IBM. The workshop showed the vast potential of combining techniques from KRR and ML both in terms of the different technical areas and final applications. Additional details about the program as well as the query translation challenge can be found on our homepage: https://kr2ml.github.io/ibm-2019/

We thank all attendees and facilitators for making this workshop such a great experience, and hope to see everyone at future KR2ML workshops!

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