Title: Applications of Tolerance-based Granular Methods

Abstract

The proliferation of large-scale web corpora and social media data as well as advances in machine learning and deep learning have led to important applications in diverse Natural Language Processing (NLP) areas. In this talk, we investigate machine learning methods based on a tolerance form of rough, near as well fuzzy rough sets in two NLP areas: Named Entity Recognition (NER) and Sentiment Analysis. We present novel semi-supervised learning algorithms (TPL and FRL) based on tolerance rough and fuzzy rough sets for NER tasks. Specifically, we address the problem of labelling relational facts from large web corpora. The performance of the presented algorithms is discussed in terms of bench-marked datasets and algorithms. Another natural appearance of the tolerance relation occurs in near sets and descriptive proximity space theory. We present our recent work on tolerance near sets-based supervised learning algorithm (TSC) to perform coarse-grained sentiment categorization from text by leveraging high-dimensional embedding vectors from pre-trained transformer-based models. We discuss the impact of using different embeddings on the performance of TSC on well-researched text classification datasets. We make the case that approximation structures viewed through the prism of tolerance display fluidity and integrate conceptual structures at different levels of granularity appropriate in the domain of NLP.

Biography

Sheela Ramanna is a Professor and past Chair of the Applied Computer Science Department at the University of Winnipeg (UW). She is the co-founder of the UW ACS graduate studies program and is currently the Chair of the graduate studies program. She received a Ph.D. in Computer Science from Kansas State University, U.S.A (1991) and a BS in Electrical Engineering and MS in Computer Science, Osmania University, India (1983). She received 8 UW merit awards for exceptional performance. She serves on the EB of Springer Transactions on Rough Sets (TRS) Journal (ended July 2023), EAAI Journal (ended June 2022) and Advisory Board of the International Journal of Rough Sets and Data Analysis and is a Senior Member of the International Rough Set Society. She co-edited a book Emerging Paradigms in Machine Learning in 2013 published by Springer. She has served as Program Co-Chair for IJCRS2021, MIWAI2013, RSKT2011, RSCTC2010 and JRS2007. She is the recipient of a 2015 TUBITAK Fellowship (Turkey). Her research is funded by NSERC Discovery /Engage /Alliance /MITACS Accelerate grants. Since 1992, she has received more than $1,130,000 in funding. She has published over 55 articles in the past 10 years and supervised around 20 award winning graduate students since 2012. Her research is in fundamental and applied research in machine learning with computational intelligence (CI) methods which are ideal for solving complex learning and decision-making problems under conditions of uncertainty. Her current research is on foundations and applications of granular methods (rough, near and fuzzy-rough) with applications in Natural Language Processing, Multimodal Information Processing. Her research interests also include persistent homology-based machine learning and application of descriptive proximities.