

The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

PROJECT TITLE	KNOWLEDGE GRAPH ENRICHMENT FOR HEALTH SEARCH
PROJECT CODE	UQIDAR 00147
PROJECT DESCRIPTION	<p>Making correct and informed health decisions is challenging because of the variety of domain specific and dynamic information sources involving the interplay of observations, symptoms, medications, and complex, albeit sparse, domain knowledge. Use of knowledge graphs (KGs), structures that are automatically learnt from big health data, combined with domain knowledge promises to be valuable for tasks such as clinical decision support, consumer health search, precision medicine, etc. The aim of this project is to address the following open challenges in this area: dealing with poor data quality (including missing, uncertain, and noisy data) in automatically constructed knowledge graphs, maintain data provenance for providing transparency and, primarily, how to effectively integrate knowledge-graphs within information retrieval and decision support systems in the medical domain. The expected benefits of this project include more efficient decision making in the medical domain.</p> <p>Project structure:</p> <ul style="list-style-type: none"> • Year 1 (student based at UQ): Human-in-the-loop methods for noise and bias reduction in KGs based on domain expert label propagation. Based on KG embeddings that project KG elements into a lower dimensional space, we will design and evaluate data quality improvement methods that leverage few expert-generated labels to scale the quality improvements over the entire graph thus optimizing the benefit of these human labels. • Year 2 (student based at IIT-D): Novel methods for KG enrichment based on relation discovery from external sources (e.g., scientific publications) and for KG information provenance tracking (e.g., authors of studies where KG information has been extracted from). • Year 3 (student based at UQ): Design, implementation, and evaluation of KG-based search systems where provenance data is leveraged for ranking and surfaced to users to foster trustworthiness in the results and to support better decision-making. • Year 4 (student based at UQ): Extended KG-based search systems for construction of condensed information sources (e.g., health cards).
PROJECT OUTCOMES	<p>The expected outcomes of this project include the design and evaluation of novel techniques to enrich knowledge graphs and to improve their quality by means of information extraction and human computation. The expected impact is in the medical domain as we plan to use domain-specific datasets and domain experts for the human-in-the-loop component of the project. Research outcomes will include joint publications between the co-supervisors based at the two institutes and joint follow-up funding proposals.</p>

<p>ADVISORY TEAM</p>	<p>Dr Gianluca Demartini https://researchers.uq.edu.au/researcher/18932 g.demartini@uq.edu.au School of Information Technology and Electrical Engineering The University of Queensland</p> <p>Dr Shrikanta Bedathur http://www.cse.iitd.ac.in/~bedathur/ srikanta@cse.iitd.ac.in Department of Computer Science & Engineering Indian Institute of Technology Delhi</p>
<p>TYPE OF STUDENT DISCIPLINE BACKGROUND OF STUDENT</p>	<p>Applications are open to i students who meet eligibility criteria.</p> <p>Ideally, this project requires students with a background in knowledge graphs, linked data, software engineering, data management.</p>
<p>IDEAL CANDIDATE</p>	<p>Essential capabilities:</p> <ul style="list-style-type: none"> • Strong software development skills &; Degree in Computer Science or related discipline • Research experience related to the field of Information Retrieval, Semantic Web, or Database. <p>Desirable capabilities:</p> <ul style="list-style-type: none"> • Research publications in the field of Information Retrieval, Semantic Web, or Database.
<p>APPLICATION PROCESS</p>	<p>Apply online by the due date: https://www.uqidar.org/students/how-to-apply/</p>