香港浸會大學理學院
HKBU Faculty of Science

DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

PhD Candidate:	Mr. YAN Sixing
Date	20 January 2025 (Monday)
Time:	6:00 pm – 8:00 pm (35 mins presentation and 15 mins Q & A)
Venue:	ZOOM (Meeting ID: 939 8264 4241) (The password and direct link will only be provided to registrants)
Registration:	https://bit.ly/bucs-reg (Deadline: 12:00 nn, 20 January 2025)

Towards Clinically Accurate X-Ray Image Report Retrieval and Generation

Abstract

Radiology imaging is a common examination approach in hospitals. Analysing and interpreting radiology images are the routine jobs of radiologists who possesses related professional knowledge. The analysis results and the interpretation are typically documented by the radiologists as radiology reports. This reporting task is known to be laborsome and error-prone. Automatic radiology image report generation using deep learning models has been recently explored and found promising to alleviate this burden. One key challenge is to ensure clinically accurate reports to be generated with the clinical findings detected on the radiology images properly included. In this thesis research, we develop deep learning algorithms to generate clinically accurate radiology X-ray image reports by taking into consideration i) the criterion for clinical accuracy evaluation, ii) the prior knowledge of radiology to be effectively incorporated, iii) the systemic approach of examination X-ray images, and iv) the diagnostic uncertainties.

In particular, we first propose to construct attributed abnormality knowledge graph by leveraging a radiology ontology so that more fine-grained representation of abnormalities can be learned for the report generation. Second, we extend a clinical accuracy metric for evaluating the correctness of the attributed abnormalities. Then, we further explore the retrieval-based approach and propose a hierarchical visual encoding based on CLIP with anatomy-awareness to mimic the systematic approach of examining X-ray images by radiologists. The proposed visual encoder can support interactive report retrieval to assist the user for the report preparation. Third, we propose to qualify the diagnostic uncertainty of radiology reporting by estimating the variability of both abnormality and radiologist, which in turn can enhance the report generation performance.

To demonstrate the effectiveness of the proposed algorithms, we carried out performance comparison with the state-of-art algorithms based on two publicly available datasets with promising results obtained.

***** ALL INTERESTED ARE WELCOME *****