Postgraduate Seminar Series

Venue: Graduate Seminar Room
Date & Time: January 11, 2025 at 3:00 PM

Speaker Information

Md. Ashraful Islam (Student No. 04220522007) is a part-time M.Sc. student in the Department of CSE at BUET, currently serving as a Lecturer in the same department. His research interests focus on Natural Language Processing, particularly in the area of Code Generation with the help of Large Language Models (LLMs). He is conducting his postgraduate thesis under the guidance of Dr. Mohammed Eunus Ali. In this talk, he will present insights into his ongoing research work.

A Multi-Agent Code Generation Approach for Competitive Problem Solving

Code synthesis, which requires a deep understanding of complex natural language (NL) problem descriptions, generation of code instructions for complex algorithms and data structures, and the successful execution of comprehensive unit tests, presents a significant challenge. Thus, while large language models (LLMs) demonstrate impressive proficiency in natural language processing (NLP), their performance in code generation tasks remains limited. In this paper, we introduce a new approach to code generation tasks leveraging the multi-agent prompting that uniquely replicates the full cycle of program synthesis as observed in human developers. Our framework, MapCoder, consists of four LLM agents specifically designed to emulate the stages of this cycle: recalling relevant examples, planning, code generation, and debugging. After conducting thorough experiments with multiple LLMs ablations and analyses across eight challenging competitive problem-solving and program synthesis benchmarks—MapCoder showcases remarkable code generation capabilities, achieving their new state-of-the-art (pass@1) results—(HumanEval 93.9%, MBPP 83.1%, APPS 22.0%, CodeContests 28.5%, and xCodeEval 45.3%). Moreover, our method consistently delivers superior performance across various programming languages and varying problem difficulties.