



SCMS Seminar

FORMAL GEO: TOWARDS GEOMETRIC COGNITIVE REASONING AND AI-MO CHALLENGE

Speaker: Tuo Leng
Shanghai University

Time: Fri., May. 24th, 16:00-17:00PM

Venue: Room 106, SCMS

Abstract:

We will demonstrate a novel and consistent formal system for plane geometry, FormalGeo. This system plays a vital role as the bridge between symbolism and connectionism. With FormalGeo, we have enabled the integration with modern AI techniques, achieving human-like deductive automated reasoning without human supervision. Moreover, under this formalized framework, AI can now provide deductive solutions to IMO-level plane geometry problems as naturally as processing other natural languages. These proofs are readable, traceable, and verifiable. Additionally, we have constructed high-quality plane geometry problem datasets that conform to this formal system: FormalGeo7k (v1 & v2) and FormalGeo18k.

Furthermore, we have developed several plane geometry automated reasoning assistance tools and solvers integrated with modern AI models. These include the theorem sequence predictor FGeo-TP, which leverages LLMs; the new embedding method called FGeo-HyperGNet based on hypergraph theory, and the automatic solver FGeo-DRL, which utilizes deep reinforcement learning. The application of reinforcement learning and Monte Carlo Tree Search methods to deductive automated solving and proving in plane geometry is the first success attempt in this field based on our literature investigation.