Invited Talk Abstract

ICOML 2026 | July 27–29, 2026

Concave Certificates: Geometric Framework for Distributionally Robust Risk and Complexity Analysis

Chu Thi Mai Hong

College Engineering and Computer Science, VinUniversity

Date	July 29, 2026
Time	13:30–14:00
Session	Session 7
Venue	S102, Lecture Hall, Gong-Guan Campus, NTNU

Abstract

Distributionally Robust (DR) optimization aims to certify worst-case risk within a Wasserstein uncertainty set. Current certifications typically rely either on global Lipschitz bounds, which are often conservative, or on local gradient information, which provides only a first-order approximation. In this talk, we introduce a novel geometric framework based on the least concave majorants of the growth rate function. Our proposed concave certificate establishes a tight bound of DR risk that remains applicable to non-Lipschitz and non-differentiable losses. We extend this framework to complexity analysis, introducing a deterministic bound that complements standard statistical generalization bound. For practical application in deep learning, we introduce the adversarial score as a tractable relaxation that enables efficient and layer-wise analysis of neural networks.