

Analysis and Data Science Seminar

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IMPROVING INVARIANCE PROPERTIES IN PRETRAINED MODELS WITH WASSERSTEIN CORRELATION MAXIMIZATION

Tuesday, October 28, 2025

3:00 P.M. in Catskill 130

ABSTRACT. We define a novel notion of probabilistic encoder called an augmented encoder using the machinery of Markov-Wasserstein kernels in order to broadly formalize augmentation-based representation learning. We then show that when an augmented encoder is trained to maximize the Wasserstein correlation of its induced joint distribution, we arrive at an encoder that is approximately invariant to a chosen collection of augmentations and that, crucially, does not alter the structure of the original, non-augmented input distribution. This allows us to improve invariance and robustness properties in state-of-the-art pretrained models, without corrupting or collapsing their representations, by appending only a standard, shallow MLP to the latent space. No previous knowledge of representation learning or optimal transport is required. Joint work with Lizuo Liu and Yoonsang Lee.