

CRUNCH Seminars at Brown, Division of Applied Mathematics

Friday - December 11, 2020

**Information transfer in multi-task
learning**

**Hongyang Zhang, Assistant
Professor of Computer Science at
Northeastern University**

Multi-task learning has recently emerged as a powerful paradigm in deep learning to obtain language and visual representations from large-scale data. The advantages of multi-task learning are two-fold: (i) reducing the cost of curating massive training data sets needed by deep learning methods; (ii) providing a shared feature representation with fewer parameters. While great improvements have been reported compared to single-task learning, practitioners have also observed problematic outcomes, where the performances of certain tasks have decreased due to task interference.

In this talk, we discuss three common challenges of applying multi-task learning: negative transfer, imbalanced datasets, and covariate shifts. First, we investigate how these issues of task interference affect information transfer in multi-task learning from both theoretical and empirical perspectives. Based on the analysis, we propose several ideas for addressing the three challenges. Finally, we consider a medical imaging diagnosis application that learns from both the images and human gaze data. We share several lessons from applying multi-task learning in this context.

Paper: <https://arxiv.org/abs/2005.00944>, <https://arxiv.org/abs/2010.11750>