CMPE-297 Emerging Technologies
Short Story Assignment Proposal

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Multi-Task Learning for Dense Prediction Tasks: A Survey

Description

Multi-task learning is a subfield of machine learning in which multiple learning tasks are solved at the same time while exploiting commonalities and differences across tasks
Multi-task learning corelates to many real-world problems that are inherently multi-modal. Autonomous cars, biological data processing are some of the applications. The paper provides an extensive experimental evaluation across a variety of dense prediction benchmarks to examine the pros and cons of the different methods, including both architectural and optimization-based strategies.

Abstract (for reference)

Abstract—With the advent of deep learning, many dense prediction tasks, i.e. tasks that produce pixel-level predictions, have seen significant performance improvements. The typical approach is to learn these tasks in isolation, that is, a separate neural network is trained for each individual task. Yet, recent multi-task learning (MTL) techniques have shown promising results w.r.t. performance, computations, and/or memory footprint, by jointly tackling multiple tasks through a learned shared representation. In this survey, we provide a well-rounded view on state-of-the-art deep learning approaches for MTL in computer vision, explicitly emphasizing on dense prediction tasks. Our contributions concern the following. First, we consider MTL from a network architecture point-of-view. We include an extensive overview and discuss the advantages/disadvantages of recent popular MTL models. Second, we examine various optimization methods to tackle the joint learning of multiple tasks. We summarize the qualitative elements of these works and explore their commonalities and differences. Finally, we provide an extensive experimental evaluation across a variety of dense prediction benchmarks to examine the pros and cons of the different methods, including both architectural and optimization-based strategies.

References

https://arxiv.org/pdf/2004.13379.pdf