Rethinking Multi-task Learning

Observation: For a given supervised task, some auxiliary tasks help more than others.
- Can the optimal auxiliary task be generated automatically?
- Can this be done without access to additional data for this auxiliary task?
Yes and yes — with Meta Auxiliary Learning!

Meta Auxiliary Learning (MAXL) - Overview

- MAXL is a framework which meta-learns an optimal labels for an auxiliary task, to assist training of a given primary supervised task.
- With MAXL, we no longer need manually-defined labels for auxiliary tasks to improve the primary task: we have self-supervised generalization.

MAXL - Detailed Formation

- **Multi-task Network**: trains on the primary task and auxiliary task in a standard multi-task learning setting.
- **Label-generation Network**: generates the labels for the auxiliary task using meta learning. A double gradient formulation encourages auxiliary labels which reduce the loss on the primary task.

Utility of Generated Labels

Visualisation of Generated Labels

Comparison to Auxiliary Label Generation Baselines

MAXL is unsupervised, but is able to generate auxiliary tasks with comparable performance to a human-defined auxiliary task.