META-LEARNING UPDATE RULES FOR UNSUPERVISED REPRESENTATION LEARNING

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1 Summary

In this paper author discusses a new meta-learning update rule for semi-supervised tasks. Instead minimizing a surrogate objective to create a learning representative, we directly target later desired tasks by meta-learning an unsupervised learning rule which leads to representations useful for the downstream tasks. Specifically, they focus on the semi-supervised classification performance, and meta-learn an algorithm –an unsupervised weight update rule, which produces representations useful for a given downstream task. Also they constrain this update rule to be a biologically-motivated, neuron-local function, which enables it to generalize to different neural network architectures, datasets, and data modalities.

2 Strengths of the proposal

1. Author presents a novel formulation of meta-learning by learning an unsupervised update rule for representation learning which is clearly written with go
2. They apply UnsupervisedUpdate to a base model which itself updated by gradient descent on the MetaObjective which will modify weight to update to achieve a top layer representation which performs well at few-shot learning. However, the update weights are decoupled from forward weights for back propagation, which will ensure proper learning of meta-data
3. Performs really well against VAE and other meta-learning technique in terms of learned representations for a downstream task and the comparison is well demonstrated.
4. The update rule can train models of varying widths, depths, and activation functions, which makes it more generalised and flexible.

3 Weaknesses of the proposal

1. The proposed technique is does not outperforms other model including VAE except for the fact that VAE could have a problem with objective function mismatch.
2. The results are sufficient for the innovative meta learning update rule that they propose. Given that the model is very much derived with the objective of the downstream task, the model should be able to learn the given representation correctly and outperform other methods. The fact that the model is not able to outperform VAE signifies that the update rule has dome flaws.

4 Results

The author was able to clearly state that the model was able to learn the objective of the downstream task for creating a meta learning representation update rule as proposed. Also, the idea was very well formulated and expressed in the paper with sufficient reference to existing literature. They provides results for both CIFAR10 and MNIST data-set and empirically proves that the proposed learning representation performs really well.

5 Discussion

Given the technique is really good in learning the representation of a specific downstream task as given in the visualization of the learned representations, why do the model lacks the performance boost that should be associated with learned representation?