Title of the paper

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Abstract

The abstract paragraph should be indented ½ inch (3 picas) on both the left- and right-hand margins. Use 10 point type, with a vertical spacing (leading) of 11 points. The word **Abstract** must be centered, bold, and in point size 12. Two line spaces precede the abstract. The abstract must be limited to one paragraph.

1 Introduction

Introduce the idea of idempotent neural networks; give the definition. Justification for usefulness in applications where solutions can be both idempotent and not, and where the idempotent solution may be beneficial. Give a brief overview of the rest of the paper.

2 Method

Outline the perturbation analysis which yielded the update rule. Jordan Normal form justification for looking at eigenvalues and for fixed-points. Stability analysis (and nice Julia heatmap) to argue that specific fixed-points are reached. Compare ordinary and modified autodiff by looking at derivative on a single-layer, non-bias network.

3 Experimental Results

On experimental networks we give line graphs comparing absolute error at varying learning rates. We also give line graphs for LRs over many epochs. Takeaway message is that for deeper/wider networks we outperform ordinary autodiff by a lot.

We replicate the results of IGN on MNIST and CelebA. Latent space analysis. Takeaway is that we show application to a U-net GAN architecture based on Conv layers.

4 Related Work

Review Idempotent Generative Networks, contrasting our work on a gradient-free approach. Have others applied perturbation theory to ML? We suffer same problems as GANs: mode collapse.

5 Conclusion

Give a conclusion of central idea: the use of perturbation analysis to find an iterator which we have successfully applied to a range of toy examples and GAN scenarios.

Preprint. Under review.