Exploring Neural Networks with Interactive Visualization

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Introduction

- Designing neural networks is based on performance evaluation and trial and error can be enhanced to a more intuitive way
- This preliminary study incorporates visual analytics into neural networks helping researchers to extrapolate the model performance based on visualized model behavior
- Currently we shows three example cases, which are choosing adequate learning rate, annealing strategy, and activation function

Materials and Methods

Literature Review

- Designing neural networks, such as deciding activation functions, type of normalization, is an extremely active field and thereby deciding an adequate (hyper)parameters consists of trial and error and evaluating the actual performance of the model
- A few research proves that visual analytics enhances human understanding clarifying the relationship between input and output of the model.

Hypothesis

- Incorporating visual analytics into neural networks supports researchers to understand the model *in the process of* designing the system
- As cross-modal datasets are investigated, designated visualizations are expected to show dissimilar patterns of training strategies across different modalities.

Experiments

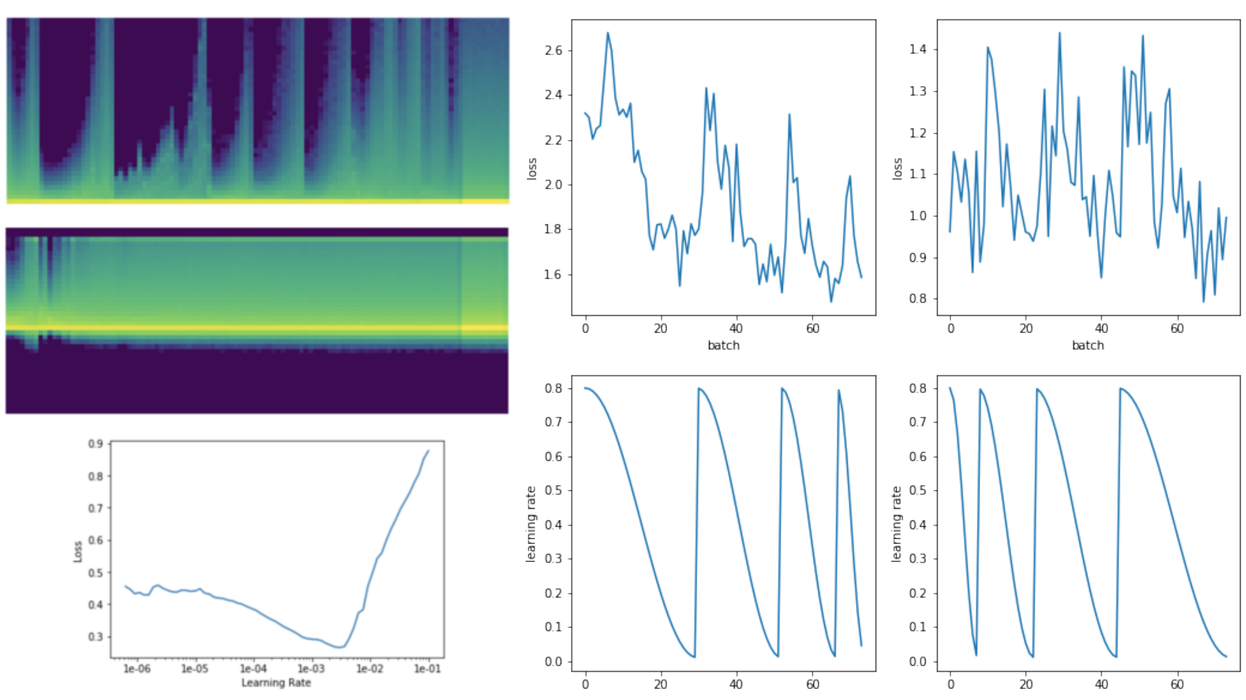

Figure 1: Three example cases, where 1) leaky-relu (left, first two) shows more well-balanced distribution 2) learning rate(left, bottom) shows steepest gradient near 0.001, and 3) warm-up performs better than cool-down strategy (middle and right, while top represents loss and bottom represents iterations

Further Research

- How can I adapt interactive toolkit to this framework
- How could I generalize cross-modality features

References

[1] James J. Thomas and Kristin A. Cook. A visual analytics agenda. *IEEE Computer Graphics and Applications*, 26:10–13, 2006.

[2] Hao Li, Zheng Xu, Gavin Taylor, and Tom Goldstein. Visualizing the loss landscape of neural nets. In *NeurIPS*, 2018.

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