Jumpout : Improved Dropout for Deep Neural Networks with ReLUs

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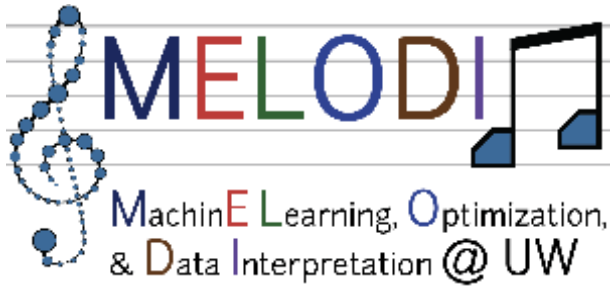
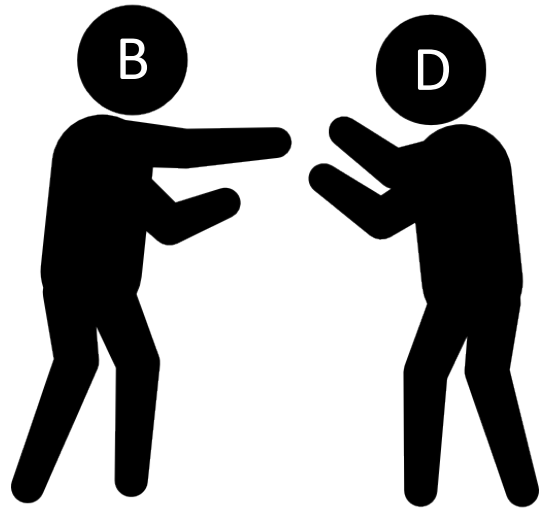


Dropout has a few Drawbacks...

- Dropout encourages DNNs to apply the same linear model to different data points but does not enforce local smoothness.
- Dropping zeros has no effects but still counts in drop rates.
- Dropout does not work well with BatchNorm.



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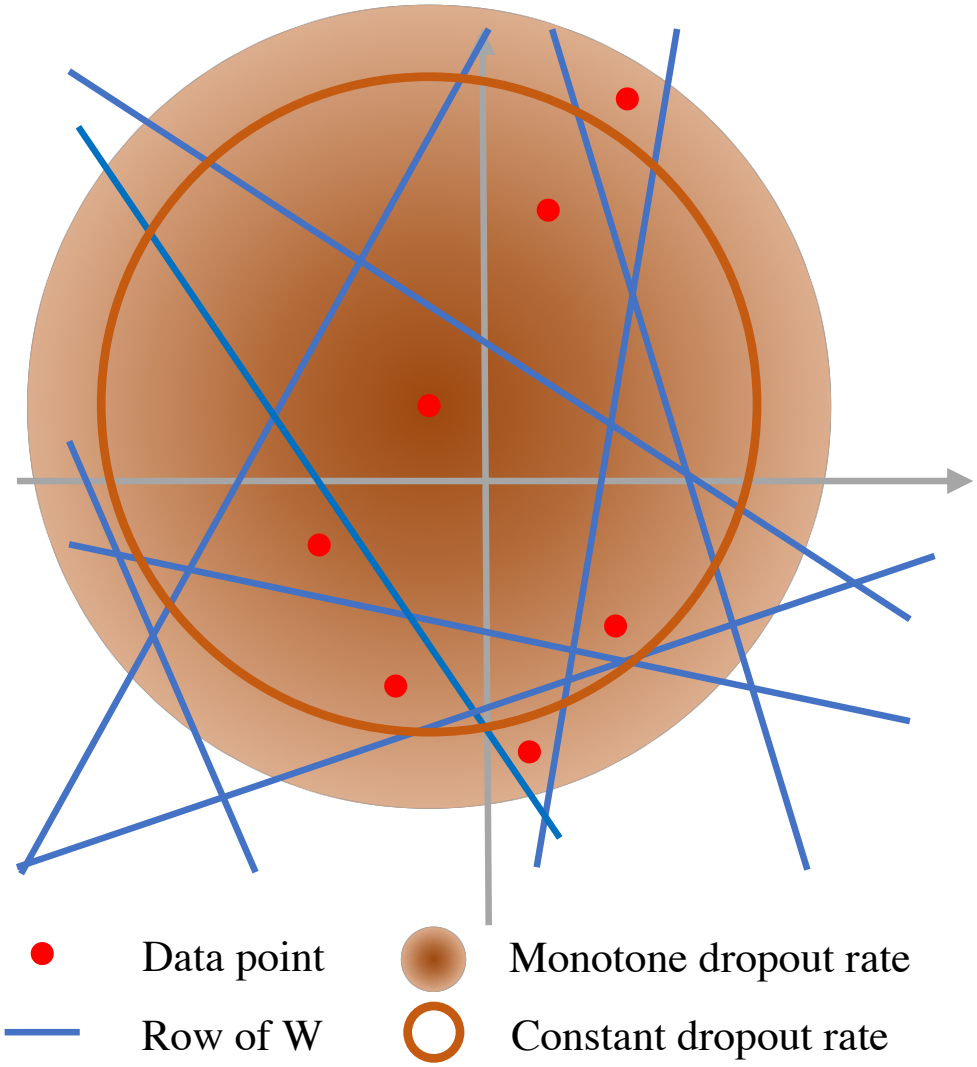
- Jumpout improves dropout with three modifications with (almost) no extra computation/memory costs.

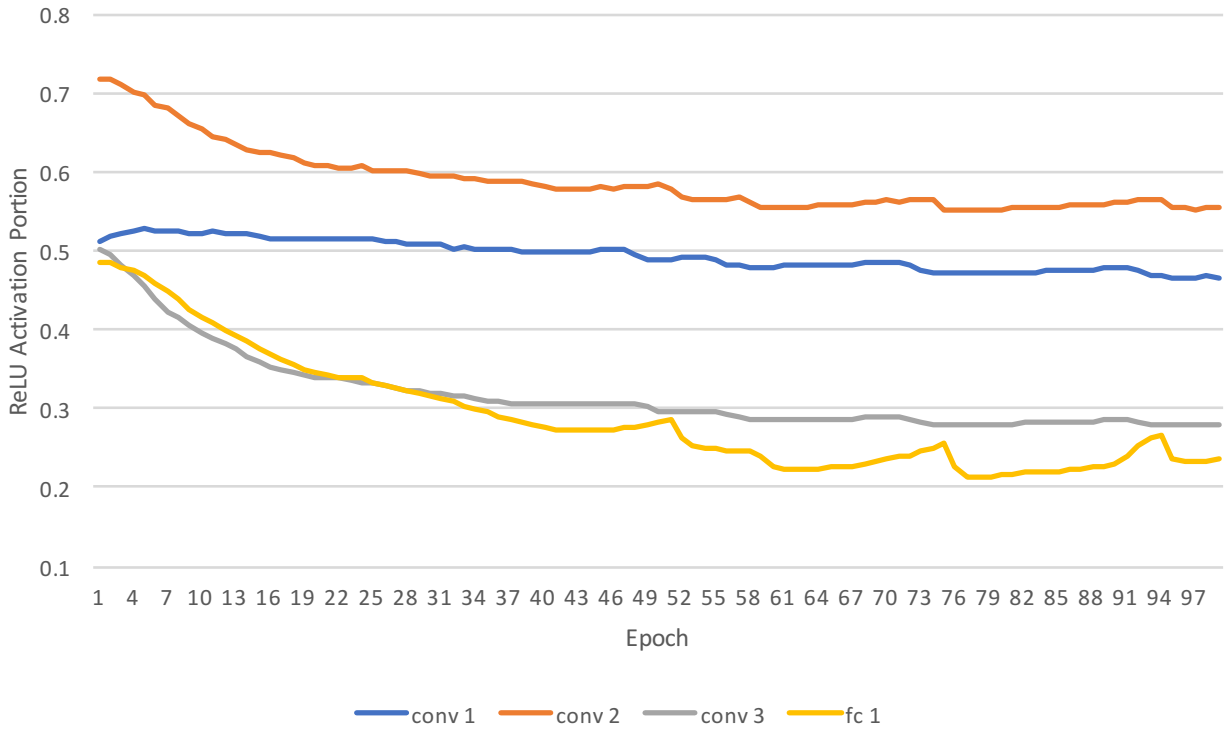
Jumpout Modification I – Encourage Local Smoothness

- Instead of applying a constant dropout rate, the dropout rate is sampled from the positive part of a gaussian distribution, and the standard deviation is used to control the strength of regularization.



Jumpout Modification II
- Better Control of Regularization

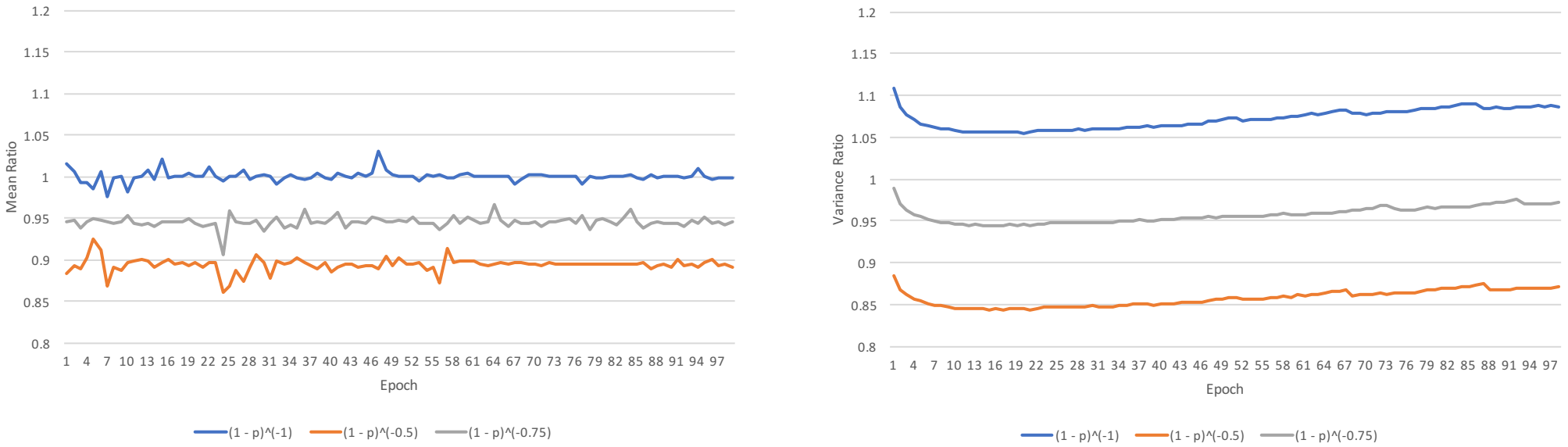
- The dropout rate is <u>normalized by the proportion of active neurons</u> of the input layer so that we can better control the regularization for different layers and for different training stages.



Portion of active neurons across training epochs for different layers.

Jumpout Modification III
- Synergize well with Batchnorm

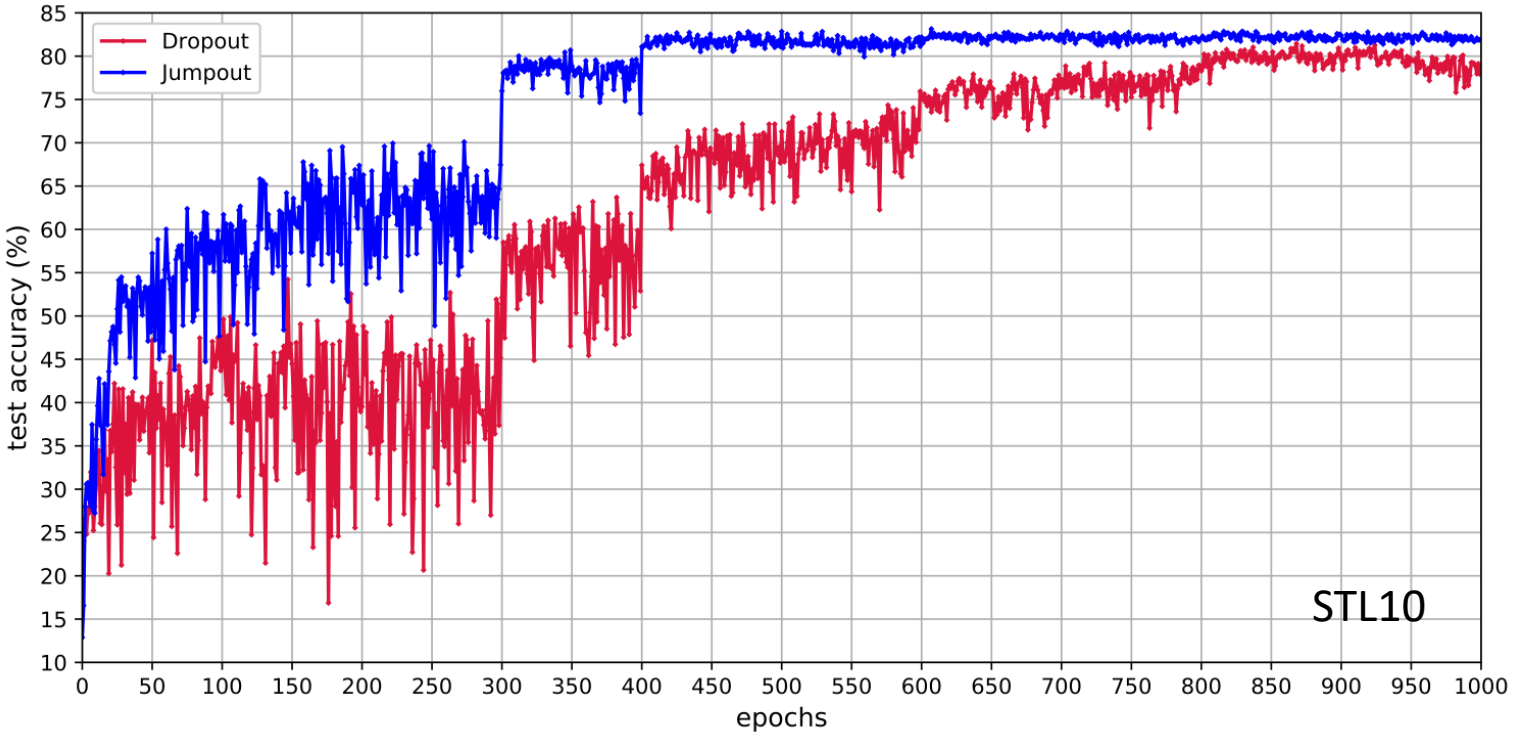
- The rescaling factor for training is changed to $\underline{(1-p)^{-0.75}}$ to account for both the changes of the mean and the variance.



Changes of Mean (left) and Variance (right) when applying various rescaling factors.
Blue: Dropout Grey: Jumpout

Results

Dataset	CIFAR10(s)	CIFAR10	CIFAR100	Fashion	STL10	SVHN	ImageNet
Original	82.47	94.07	77.98	95.85	75.21	97.39	71.04
Dropout	86.43 ± 0.11	95.21 ± 0.10	79.34 ± 0.07	95.85 ± 0.14	81.09 ± 0.27	98.15 ± 0.05	71.09 ± 0.08
Jumpout	90.18 ± 0.13	96.69 ± 0.08	82.22 ± 0.09	97.13 ± 0.12	83.87 ± 0.24	98.36 ± 0.04	71.43 ± 0.06



Thank you!

- For more details, please come to our poster session

Tuesday 06:30 - 09:00 PM

Pacific Ballroom #29