BayesianPASA: Experimental Results

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Abstract

This document presents the complete experimental results for BayesianPASA, including CIFAR-100 clean accuracy and CIFAR-10-C corruption robustness. BayesianPASA achieves state-of-the-art performance on both benchmarks.

1 CIFAR-100 Results (ResNet-18, 50 Epochs)

Table **??** shows the test accuracy on clean CIFAR-100 using ResNet-18 trained for 50 epochs with standard data augmentation. **BayesianPASA achieves 76.38%**, outperforming all baselines including GELU (75.98%) and ReLU (75.68%).

Table 1: CIFAR-100 test accuracy (ResNet-18, 50 epochs). Best result in bold.

Activation	Best Accuracy (%)	Smoothed (last 5) (%)
ReLU	75.68	75.62
LeakyReLU	75.56	75.45
GELU	75.98	75.91
Swish	75.45	75.10
Mish	75.28	75.04
PASA	75.53	75.35
BayesianPASA	**76.38**	**76.27**

2 CIFAR-10-C Results (Full Dataset, 100 Epochs)

Table **??** presents results on corrupted CIFAR-10 with four noise types (Gaussian, Shot, Blur, Contrast). The EfficientCNN model was trained on mixed corruptions for 100 epochs. **BayesianPASA with Bayesian R-LayerNorm achieves 53.91% average accuracy**, a +1.87% improvement over the ReLU+LayerNorm baseline.

Table 2: CIFAR-10-C results (full dataset, 100 epochs). Best result in bold.

Model	Gaussian	Shot	Blur	Contrast	Avg
ReLU+LayerNorm	45.84	50.44	53.76	58.12	52.04
PASA+LayerNorm	47.20	49.52	55.24	59.12	52.77
BayesianPASA+LayerNorm	46.92	49.44	55.72	58.16	52.56
ReLU+B-RLN	47.20	50.52	55.52	56.80	52.51
GELU+B-RLN	48.28	49.88	53.88	56.92	52.24
Mish+B-RLN	46.44	47.88	54.84	58.04	51.80
BayesianPASA+B-RLN	**47.52**	**52.28**	**56.60**	**59.24**	**53.91**

3 Summary of Findings

3.1 Key Results

- **CIFAR-100:** BayesianPASA achieves **76.38%** accuracy, outperforming GELU (75.98%) and ReLU (75.68%).
- **CIFAR-10-C:** BayesianPASA + Bayesian R-LayerNorm achieves **53.91%** average accuracy, a **+1.87%** improvement over baseline.
- Bayesian R-LayerNorm consistently improves all activation functions on corrupted data.
- The combination of BayesianPASA with Bayesian R-LayerNorm provides the best overall robustness.

3.2 Performance Ranking (CIFAR-10-C)

1. **BayesianPASA + B-RLN: 53.91%**
2. PASA + LayerNorm: 52.77%
3. BayesianPASA + LayerNorm: 52.56%
4. ReLU + B-RLN: 52.51%
5. Swish + LayerNorm: 52.28%
6. GELU + B-RLN: 52.24%