

Appendix

A: Feature Selection

| | Cifar10 | | SVHN | | Cifar100 | |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Resnet | Densenet | Resnet | Densenet | Resnet | Densenet |
| | XOOD | XOOD | XOOD | XOOD | XOOD | XOOD |
| Min & Max | 99.47 | 99.55 | 99.85 | 99.97 | 97.86 | 98.29 |
| Min | 99.4 | 99.41 | 99.77 | 99.93 | 98.04 | 96.84 |
| Max | 99.32 | 99.54 | 99.69 | 99.97 | 97.13 | 97.48 |
| Positivity | 98.76 | 98.22 | 99.82 | 99.81 | 90.47 | 92.06 |
| Sum | 98.92 | 97.1 | 99.81 | 99.75 | 96.41 | 92.82 |
| L1 | 98.75 | 98.2 | 99.53 | 99.74 | 95.77 | 94.18 |
| L2 | 98.78 | 98.68 | 99.51 | 99.82 | 96.01 | 94.78 |
| L3 | 98.9 | 98.99 | 99.54 | 99.87 | 95.96 | 95.37 |
| Split L1 | 98.96 | 98.19 | 99.78 | 99.88 | 96.23 | 93.13 |
| Split L2 | 99.08 | 98.89 | 99.72 | 99.89 | 97.36 | 94.74 |
| Split L3 | 99.18 | 99.24 | 99.82 | 99.92 | 97.5 | 95.66 |

Table 8: AUROC-score when replacing the extreme values with other features which have linear computational complexity.

| | Cifar10 | | SVHN | | Cifar100 | |
|------------|--------------|-------------|--------------|--------------|--------------|--------------|
| | Resnet | Densenet | Resnet | Densenet | Resnet | Densenet |
| | XOOD | XOOD | XOOD | XOOD | XOOD | XOOD |
| Min & Max | 99.46 | 99.5 | 99.85 | 99.97 | 97.8 | 98.18 |
| Positivity | 99.54 | 99.34 | 99.92 | 99.98 | 97.21 | 97.52 |
| Sum | 99.5 | 99.19 | 99.93 | 99.96 | 97.66 | 97.45 |
| L1 | 99.43 | 99.38 | 99.87 | 99.92 | 97.5 | 97.74 |
| L2 | 99.42 | 99.39 | 99.78 | 99.92 | 97.61 | 97.86 |
| L3 | 99.43 | 99.39 | 99.78 | 99.93 | 97.58 | 97.97 |
| Split L1 | 99.43 | 99.17 | 99.91 | 99.95 | 97.5 | 97.11 |
| Split L2 | 99.41 | 99.22 | 99.87 | 99.94 | 97.82 | 97.51 |
| Split L3 | 99.44 | 99.25 | 99.87 | 99.94 | 97.85 | 97.74 |

Table 9: AUROC-score when extracting additional extreme values before each activation layer.

B: Additional Experiments

| | | TNR (95% TPR) | Detection Acc. | AUROC |
|----------|-----------|-----------------------|--|------------------------------|
| Imagenet | Resnet18 | Uniform | 2.3/ 100. / 100. / 100. | 86.8/99.1/99.7/ 100. |
| | | Gaussian | 0.0/81.2/72.7/ 100. | 76.1/95.4/94.4/ 99.9 |
| | | Places | 23.9/34.8/ 57.2 /37.8 | 70.7/75.9/ 82.3 /76.9 |
| | | SUN | 26.4/40.0/ 65.5 /47.7 | 71.6/78.4/ 85.3 /80.1 |
| | | iNaturalist | 41.6/43.2/ 69.9 /62.1 | 78.9/82.5/ 87.4 /85.0 |
| | | DTD | 28.6/46.7/ 60.8 /56.9 | 71.3/79.1/ 83.6 /81.3 |
| | resnet34 | Uniform | 86.6/ 100. /99.6/ 100. | 94.6/98.0/97.4/ 100. |
| | | Gaussian | 49.0/ 0.0/ 0.0/ 100. | 92.6/89.8/89.1/ 100. |
| | | Places | 26.1/37.2/ 64.1 /39.1 | 71.4/77.0/ 84.2 /77.8 |
| | | SUN | 27.6/42.6/ 73.6 /49.0 | 72.3/79.2/ 87.5 /81.2 |
| | | iNaturalist | 40.5/46.0/ 75.9 /65.6 | 78.3/82.2/ 88.8 /86.2 |
| | | DTD | 29.9/44.9/55.3/62.2 | 71.7/79.3/83.5/ 84.0 |
| | Resnet50 | Uniform | 3.5/ 100. / 100. / 100. | 89.7/98.3/99.6/ 100. |
| | | Gaussian | 0.0/ 0.0/ 0.0/ 100. | 69.7/81.7/87.7/ 100. |
| | | Places | 28.0/34.8/ 66.6 /43.5 | 72.8/76.9/ 85.0 /79.6 |
| | | SUN | 31.0/41.9/ 76.0 /54.0 | 74.0/79.4/ 87.9 /82.7 |
| | | iNaturalist | 46.8/46.3/ 80.5 /70.6 | 79.9/83.9/ 90.0 /88.3 |
| | | DTD | 33.5/47.9/54.3/ 64.0 | 73.0/79.7/82.8/ 84.1 |
| | Resnet101 | Uniform | 27.3/96.7/ 100. / 100. | 87.3/96.5/99.4/ 100. |
| | | Gaussian | 0.0/ 0.0/ 100. / 100. | 78.9/87.8/98.3/ 100. |
| | | Places | 28.8/39.4/ 63.7 /47.4 | 72.9/78.2/ 84.2 /80.7 |
| | | SUN | 32.1/46.8/ 73.4 /59.1 | 73.9/80.6/ 87.2 /84.5 |
| | | iNaturalist | 42.9/41.6/ 79.1 /65.9 | 77.4/81.1/ 89.5 /87.0 |
| | | DTD | 37.4/52.6/59.6/ 74.0 | 73.4/80.8/83.5/ 87.0 |
| Cifar10 | Resnet | Uniform | 72.0/81.3/89.9/ 100. | 93.6/94.2/94.6/ 100. |
| | | Gaussian | 91.1/98.9/98.4/ 100. | 95.8/97.0/96.7/ 100. |
| | | TinyImageNet (Crop) | 46.9/62.1/65.1/ 98.0 | 85.5/86.5/86.5/ 96.7 |
| | | TinyImageNet (Resize) | 45.1/59.5/63.9/ 97.8 | 85.1/85.8/86.3/ 96.9 |
| | | LSUN (Crop) | 49.1/65.7/62.5/ 96.9 | 86.4/87.5/85.1/ 96.0 |
| | | LSUN (Resize) | 46.3/62.9/69.4/ 99.1 | 85.5/86.7/88.2/ 97.8 |
| | | iSUN | 45.6/62.0/68.0/ 99.1 | 85.2/86.3/87.9/ 97.8 |
| | | SVHN | 33.3/47.9/37.9/ 96.4 | 85.4/85.5/77.5/ 96.2 |
| | | Cifar100 | 34.2/ 44.0 / 44.0 /43.0 | 80.5/80.7/78.7/ 81.6 |
| | | Uniform | 77.9/96.7/ 100. / 100. | 94.9/96.4/98.0/ 100. |
| | | Gaussian | 88.9/99.9/ 100. / 100. | 95.4/97.9/98.4/ 100. |
| | | TinyImageNet (Crop) | 57.4/84.1/68.6/ 98.6 | 88.2/91.6/87.6/ 97.7 |
| | Densenet | TinyImageNet (Resize) | 60.1/86.2/68.7/ 99.2 | 88.8/92.3/87.3/ 98.2 |
| | | LSUN (Crop) | 52.4/76.1/66.4/ 96.8 | 87.2/89.8/88.4/ 96.1 |
| | | LSUN (Resize) | 67.3/92.3/83.1/ 99.5 | 90.5/93.9/91.4/ 98.6 |
| | | iSUN | 63.8/89.3/78.4/ 99.5 | 89.5/93.1/90.0/ 98.6 |
| | | SVHN | 40.9/52.9/65.3/ 96.3 | 83.4/83.5/88.1/ 96.2 |
| | | Cifar100 | 41.7/ 55.3 /49.3/47.1 | 83.2/ 83.6 /82.2/78.4 |
| SVHN | Resnet | Uniform | 85.6/86.2/71.6/ 100. | 93.2/92.4/84.5/ 99.6 |
| | | Gaussian | 86.0/87.1/74.9/ 100. | 92.9/92.5/85.9/ 99.8 |
| | | TinyImageNet (Crop) | 81.3/83.0/74.4/ 99.7 | 91.1/90.7/85.5/ 98.6 |
| | | TinyImageNet (Resize) | 79.8/81.5/74.1/ 99.7 | 90.6/90.1/85.2/ 98.4 |
| | | LSUN (Crop) | 77.2/79.0/71.5/ 99.2 | 89.9/89.4/84.0/ 97.7 |
| | | LSUN (Resize) | 75.5/77.2/67.2/ 99.5 | 89.1/88.3/82.0/ 98.3 |
| | | iSUN | 78.1/79.8/69.0/ 99.8 | 89.9/89.4/82.7/ 98.7 |
| | | Cifar100 | 77.7/78.9/74.0/ 97.8 | 89.5/88.9/85.2/ 96.4 |
| | | Cifar10 | 79.1/80.3/75.5/ 98.1 | 90.2/89.6/86.0/ 96.7 |
| | Densenet | Uniform | 66.0/63.6/37.9/ 100. | 87.9/83.9/79.4/ 100. |
| | | Gaussian | 88.7/91.4/56.8/ 100. | 93.8/93.5/84.3/ 100. |
| | | TinyImageNet (Crop) | 79.1/77.1/72.4/ 100. | 89.9/87.4/86.6/ 99.4 |
| | | TinyImageNet (Resize) | 80.1/78.7/73.1/ 100. | 90.3/88.1/87.0/ 99.5 |
| | | LSUN (Crop) | 74.0/67.8/71.6/ 99.7 | 88.1/83.2/85.5/ 98.7 |
| | | LSUN (Resize) | 77.4/76.8/70.6/ 100. | 89.3/87.1/85.4/ 99.8 |
| | | iSUN | 78.7/78.2/70.2/ 100. | 89.8/87.6/85.8/ 99.7 |
| | | Cifar100 | 68.5/64.6/74.8/ 98.1 | 86.6/83.0/87.3/ 96.8 |
| | | Cifar10 | 68.5/65.0/74.9/ 99.6 | 86.5/83.1/87.6/ 98.2 |
| Cifar100 | Resnet | Uniform | 11.6/ 1.7/ 1.2/ 100. | 81.6/84.9/80.7/ 100. |
| | | Gaussian | 0.0/ 0.0/ 0.0/ 100. | 60.9/60.9/81.7/ 100. |
| | | TinyImageNet (Crop) | 25.0/27.1/28.5/ 90.1 | 72.6/74.4/71.2/ 92.9 |
| | | TinyImageNet (Resize) | 21.3/25.3/25.6/ 88.9 | 71.0/73.0/68.6/ 92.3 |
| | | LSUN (Crop) | 19.2/18.0/28.0/ 84.4 | 69.6/69.2/77.7/ 91.2 |
| | | LSUN (Resize) | 19.4/23.3/23.0/ 89.5 | 70.0/71.9/68.5/ 92.6 |
| | | iSUN | 17.7/20.9/21.5/ 88.9 | 70.3/72.1/68.5/ 92.5 |
| | | SVHN | 21.3/18.8/26.3/ 87.0 | 73.4/73.5/77.3/ 91.4 |
| | | Cifar10 | 18.9 /17.4/12.5/11.8 | 71.0/ 71.2 /63.4/67.3 |
| | Densenet | Uniform | 0.0/ 0.0/ 0.0/ 100. | 64.2/66.6/76.0/ 100. |
| | | Gaussian | 0.0/ 0.0/ 0.0/ 100. | 58.8/52.9/69.8/ 100. |
| | | TinyImageNet (Crop) | 23.5/39.3/65.1/ 94.9 | 68.8/76.9/86.4/ 95.0 |
| | | TinyImageNet (Resize) | 16.6/22.8/64.4/ 95.3 | 65.9/71.4/86.8/ 95.2 |
| | | LSUN (Crop) | 27.5/51.9/43.8/ 84.2 | 72.5/82.2/79.0/ 90.8 |
| | | LSUN (Resize) | 15.8/22.0/72.8/ 94.0 | 65.0/72.4/88.8/ 94.7 |
| | | iSUN | 14.2/18.2/68.4/ 93.6 | 64.0/70.5/86.9/ 94.4 |
| | | SVHN | 25.2/33.2/33.1/ 86.8 | 75.5/80.5/79.5/ 91.6 |
| | | Cifar10 | 16.9 /16.0/14.0/ 9.9 | 69.3 /68.7/66.3/61.9 |

Table 10: Baseline/Energy/React/XOOD.