

Initial NN Studies for SiD

Jason Barkeloo

June 25, 2019



Parameters

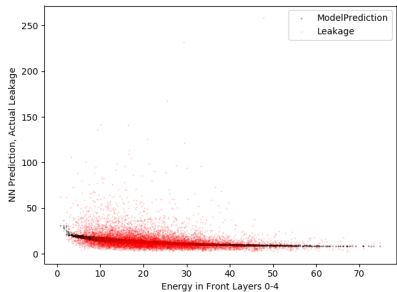
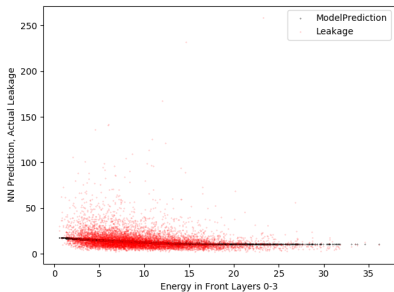
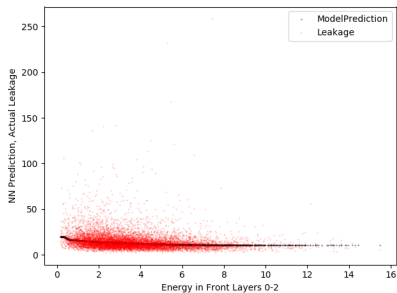
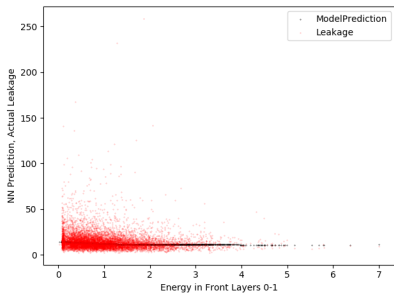
- ▶ 10,000 Events (9,000 training, 1,000 validation)
- ▶ No Prescaling (Unnecessary for regression networks?) - Explore
- ▶ Truth Leakage = sum layers 41-60
- ▶ Including first n layers, model attempts to calculate leakage
- ▶ 40 Models made (Layer 1, Layers 1 and 2, etc.)

Python Code (very ugly, sorry) on Indico Page for this meeting as well (need keras installed) Also at this git repository:
<https://github.com/JTBarkeloo/SiD-Neural-Network>

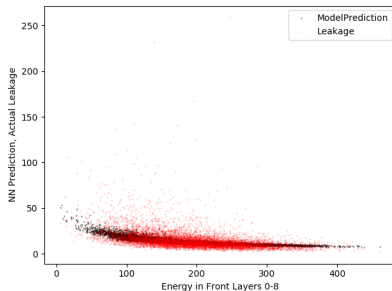
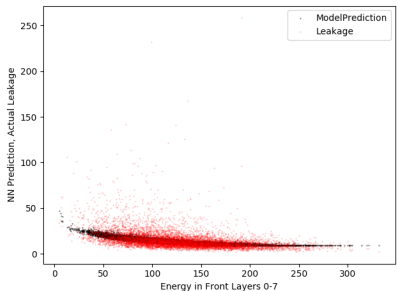
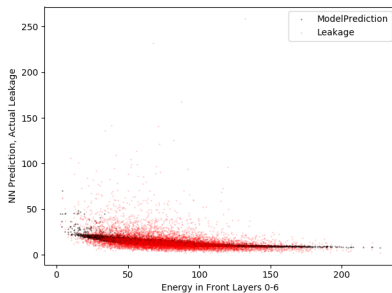
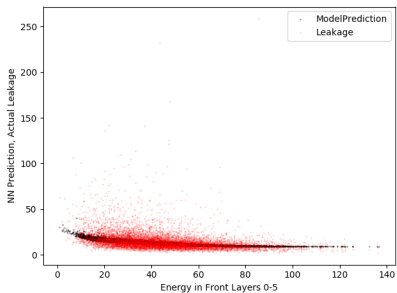
Hyperparameters

- ▶ Keras on top of TensorFlow is used
- ▶ 3 Hidden Layers, 20 Nodes/Layer + 1 Bias node/Layer
- ▶ 4,000 epochs, EarlyStopping: patience = 200
- ▶ batchsize = 10
- ▶ Activation: ReLU on Input/Hidden Layers, Linear on Output Layer
- ▶ Loss: logcosh, less forgiving with large outliers than mean squared errors

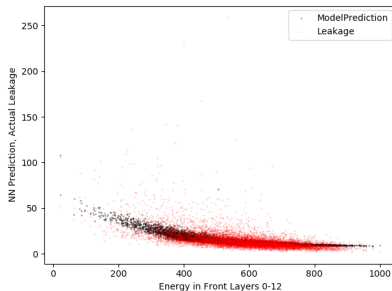
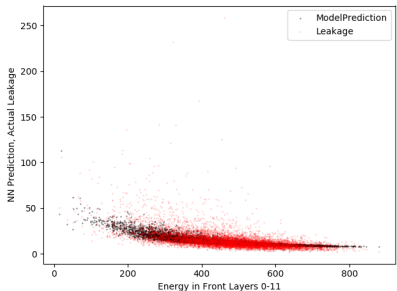
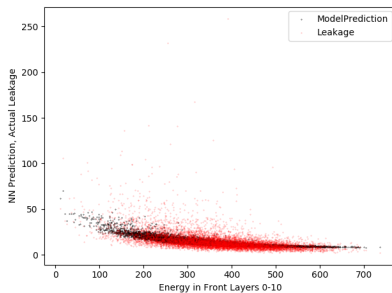
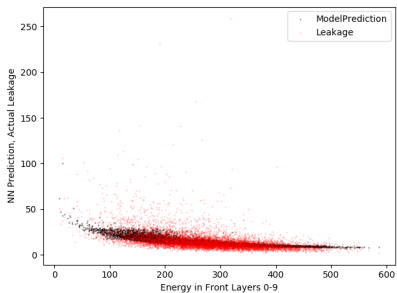
Including Front Layers 1,2,3,4



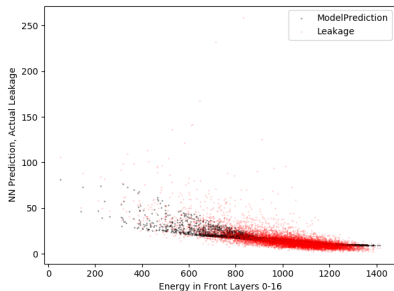
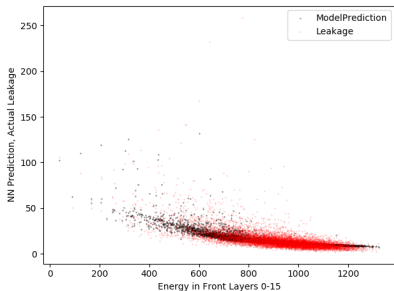
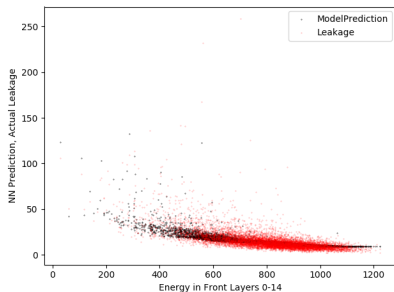
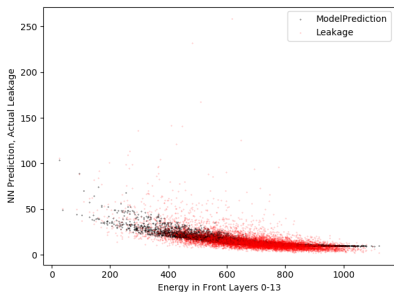
Including Front Layers 5,6,7,8



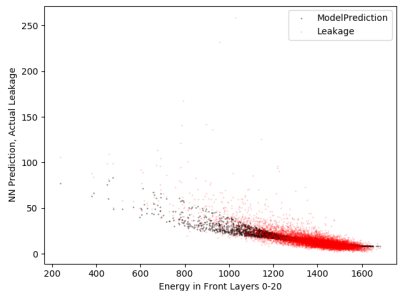
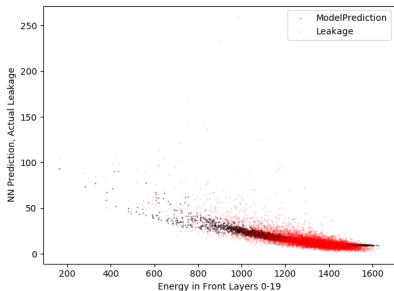
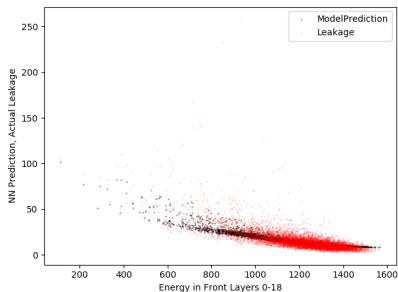
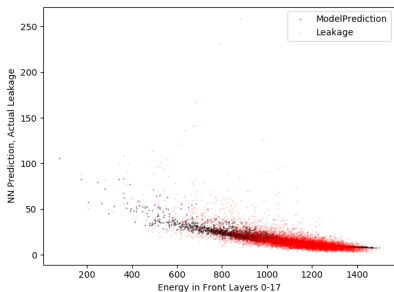
Including Front Layers 9,10,11,12



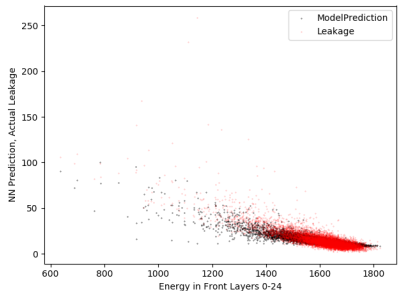
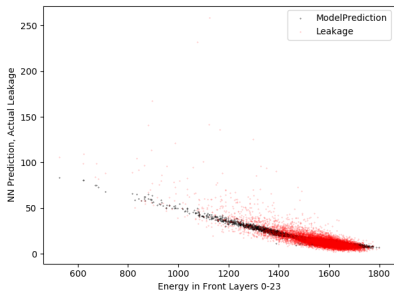
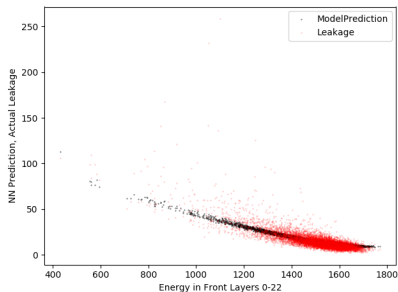
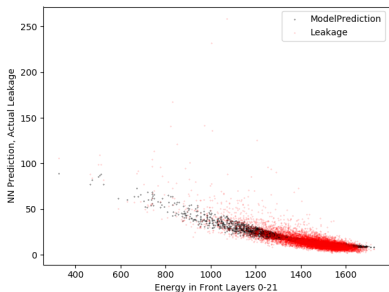
Including Front Layers 13,14,15,16



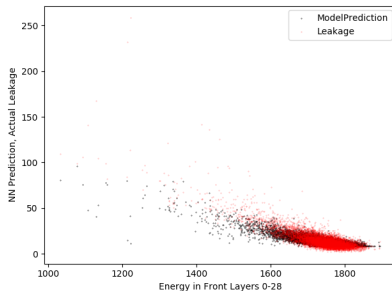
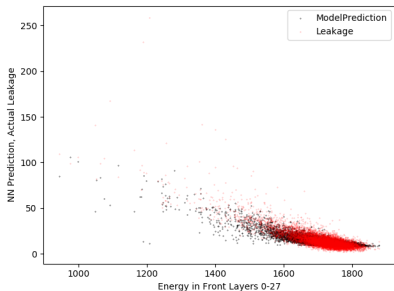
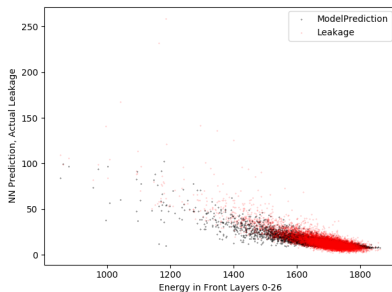
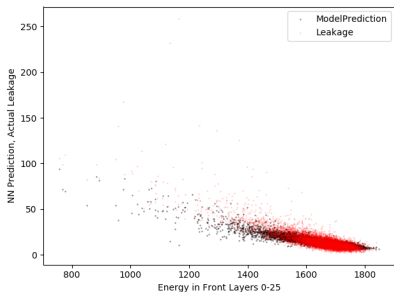
Including Front Layers 17,18,19,20



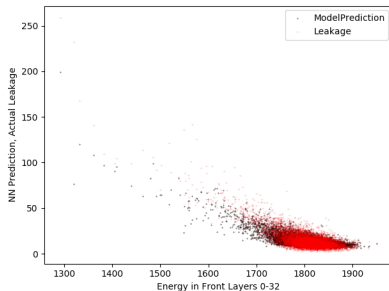
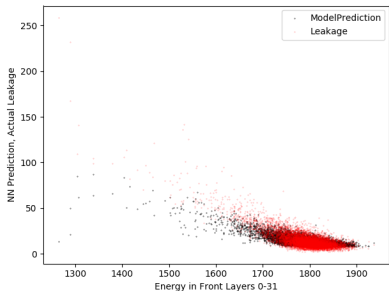
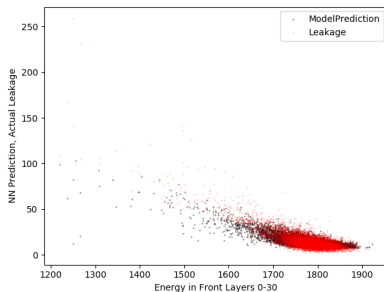
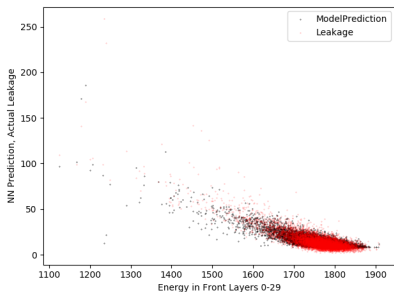
Including Front Layers 21,22,23,24



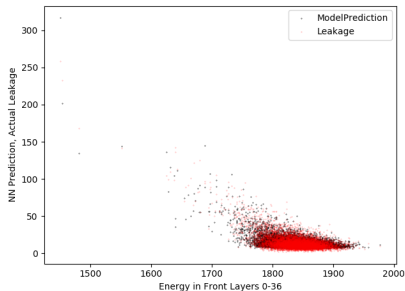
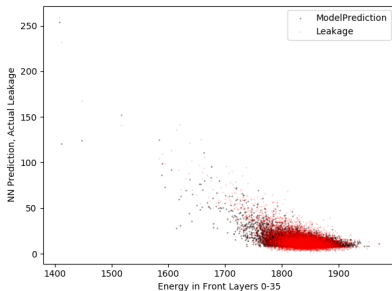
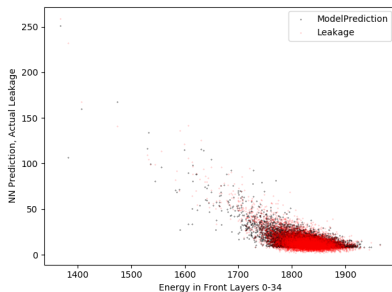
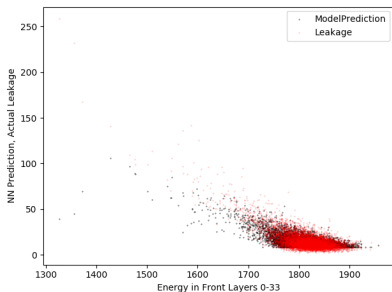
Including Front Layers 25,26,27,28



Including Front Layers 29,30,31,32



Including Front Layers 33,34,35,36



Including Front Layers 37,38,39,40

