Neural networks in julia

Simple neural net

There is a thing for nets in LaTeX

NN set up

```
Dense(16,32,relu),
    Dense(32, 64, relu),
    Dense(64, 150),
    Dense(150,30),
    Dense(30, 1),
```

Trained of ~16000 randomly sellected exaples for 20 epochs on the same set

Results

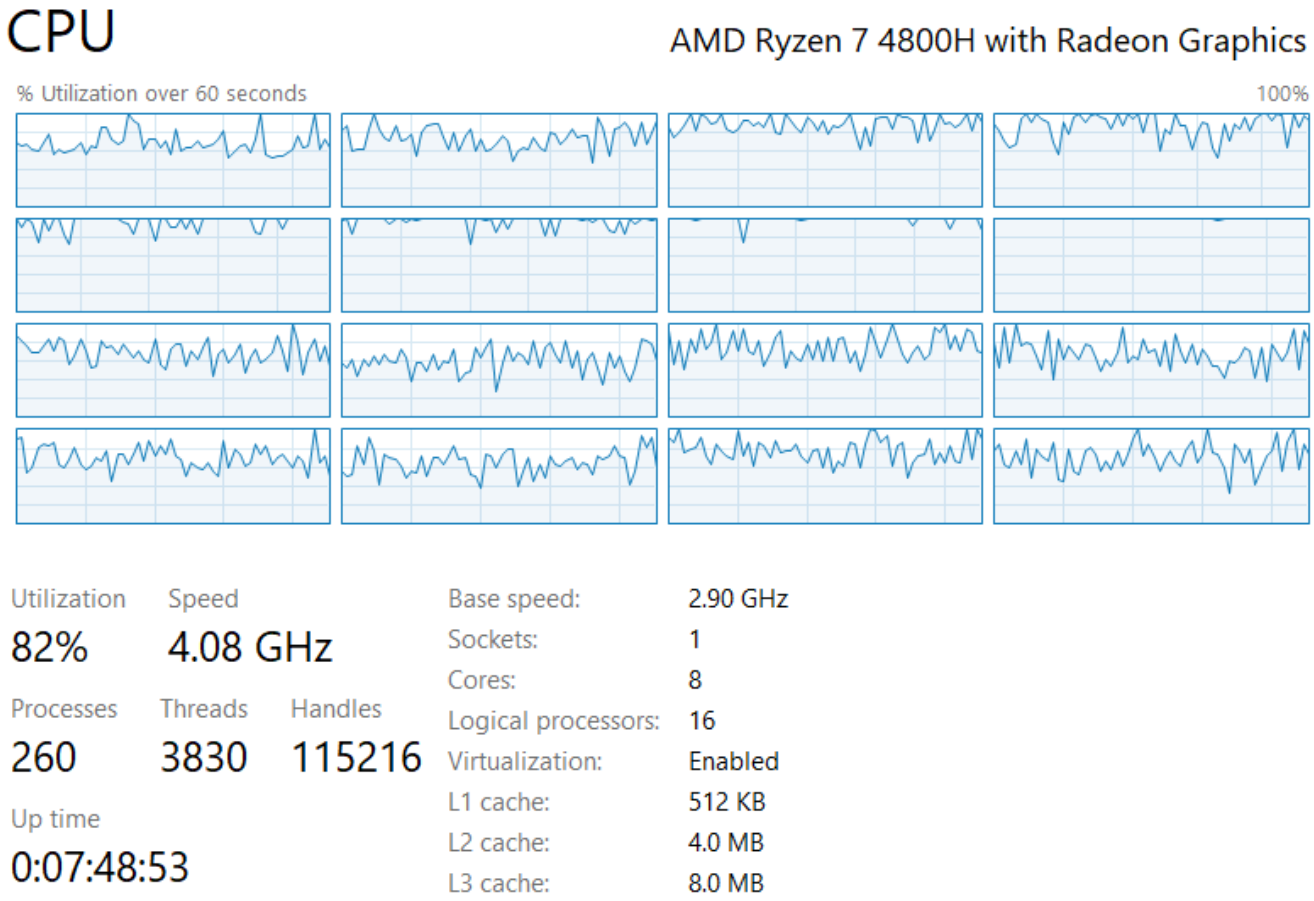
Tested on all available data

The lopsided error at extrema is explained by 32 or -32 not being included into the training set due to random selection

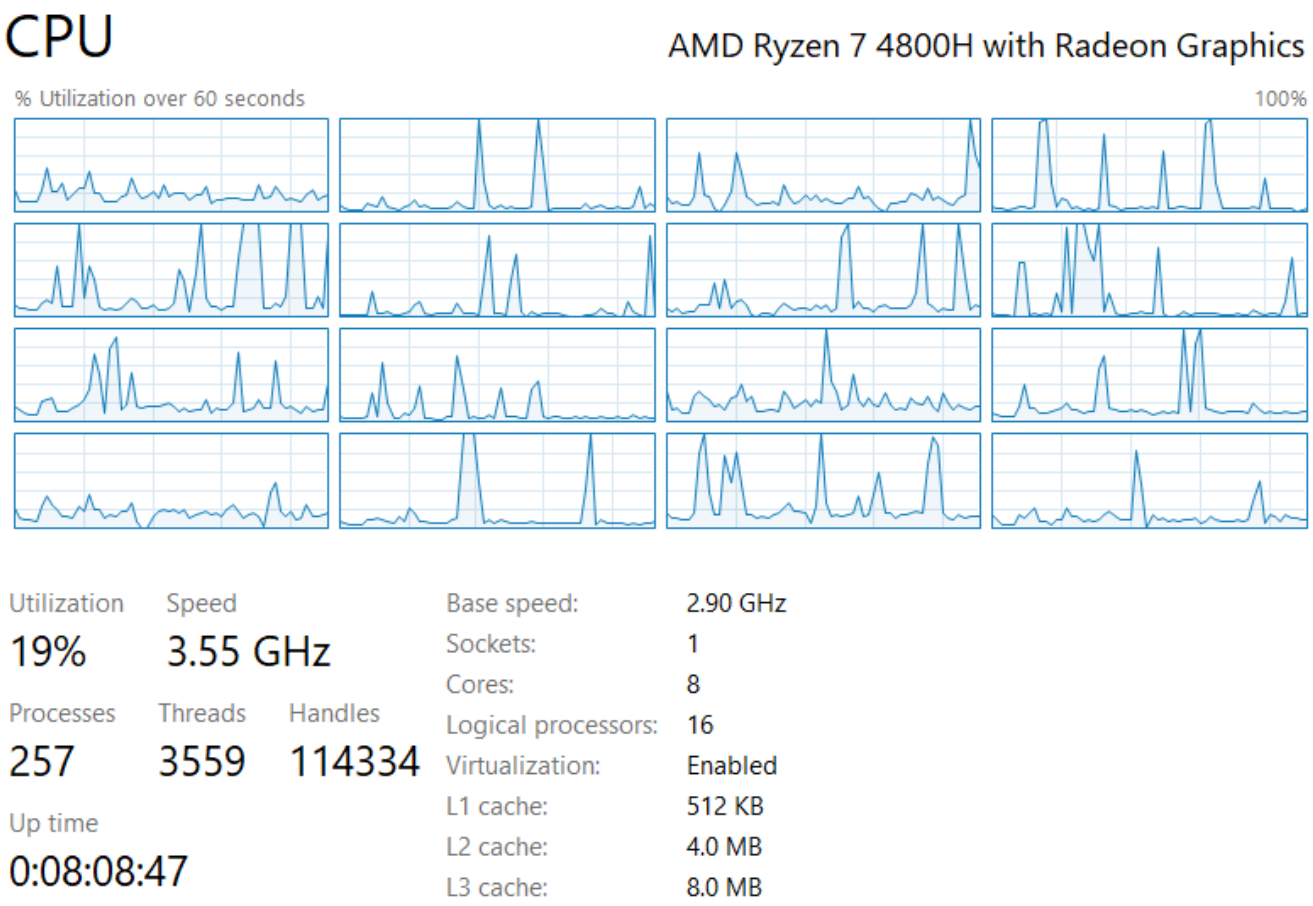
Noteworthy peculiarity when running

```
    model = build_model() |> gpu
    @epochs 20 Flux.train!(loss, ps, data, opt )
```

and gpu isn't set up cpu runns very fast i.e.



This doesn't happen when running a CNN
even though the code is virtually the same

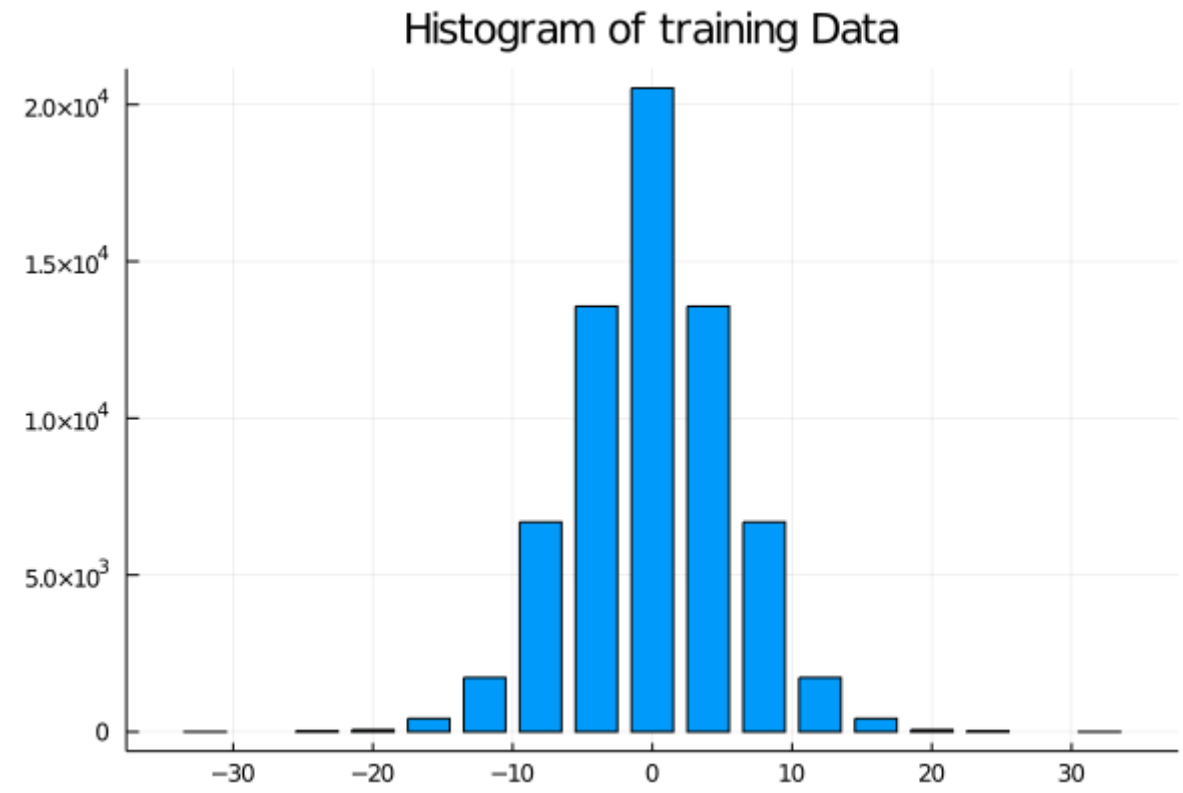


CNN

```
    Conv((2,2),1=>5,relu),
    Conv((2,2), 5=>3,pad=(1,1), relu),
    Conv((2,2), 3=>3,pad=(1,1), relu),
    Conv((2,2), 3=>5,relu),
    Conv((2,2), 5=>3,pad=(1,1), relu),
    Conv((2,2), 3=>3,pad=(1,1), relu),
    Conv((2,2), 3=>5,relu),
    Flux.flatten,
    Dense(125, 1),
```

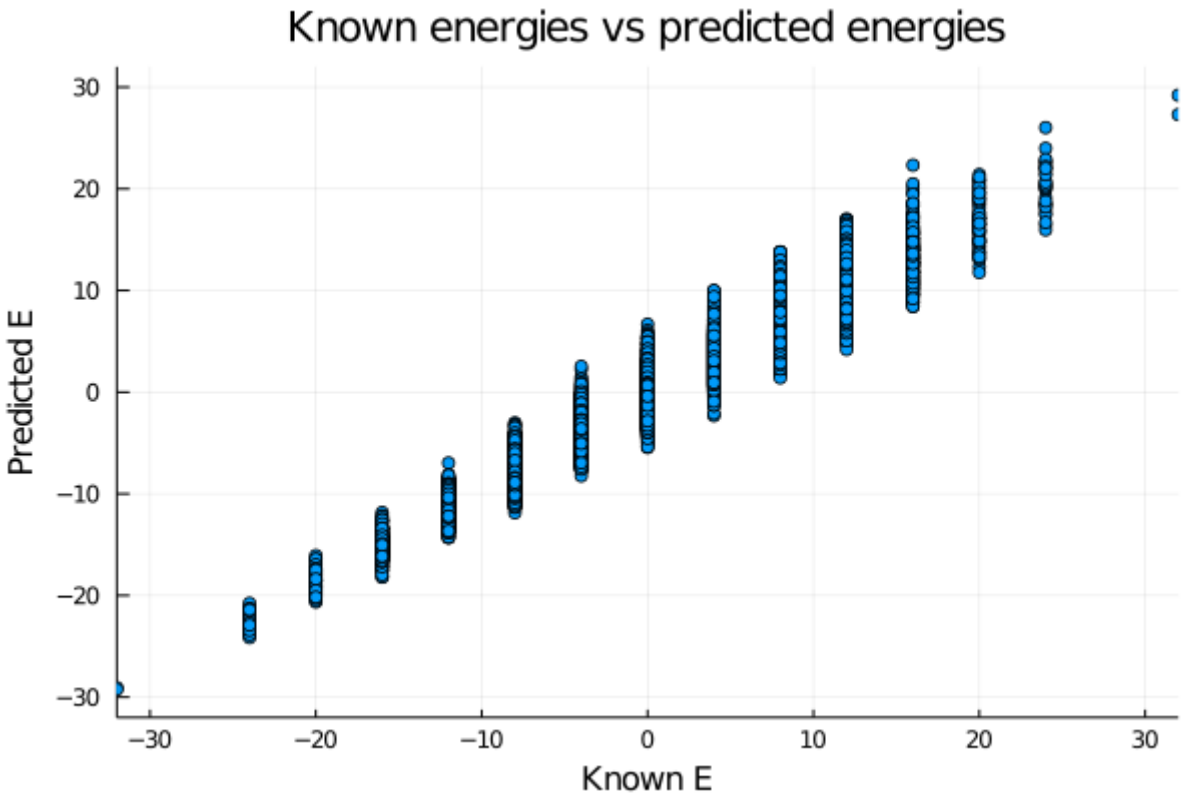
Trained on **Flat** energy distribution distribution of data

for 20 epochs

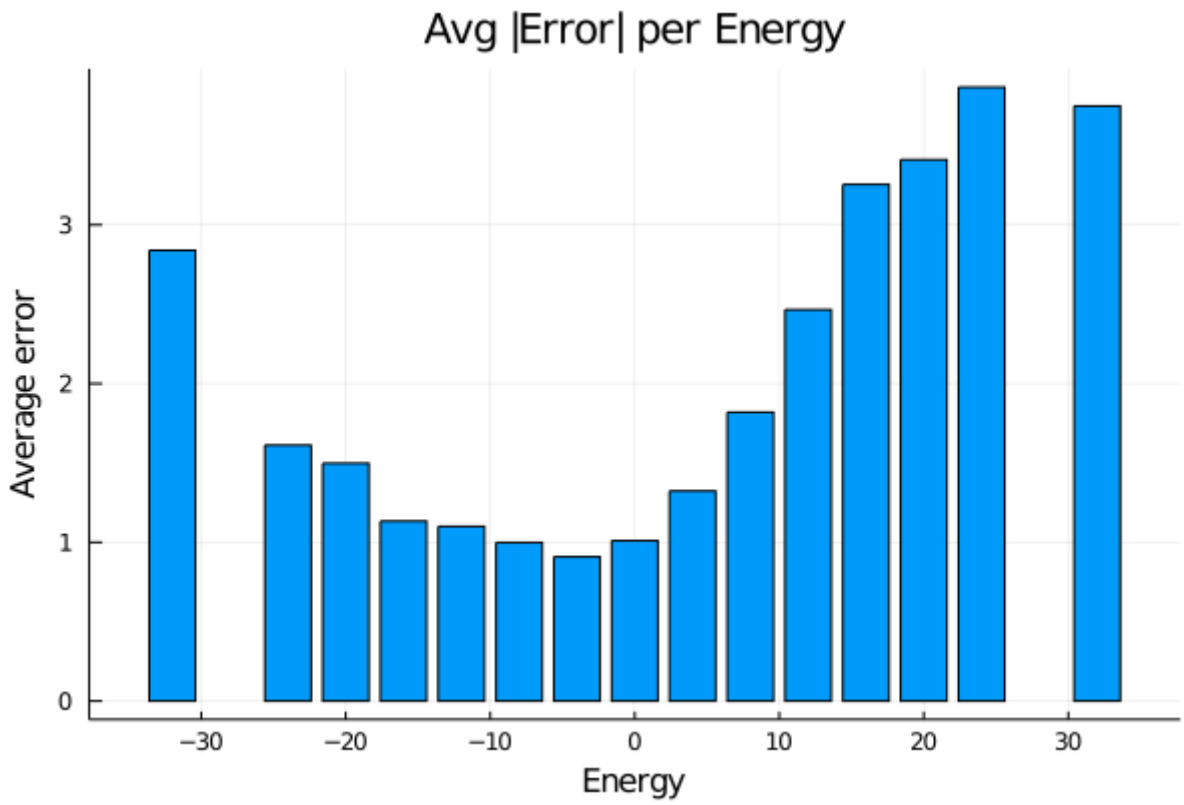


When evaluated over all data

the results are much worse



There is clearly less error on the boundareis where there were a lot of examples 32 and -32



Then repeated over **Random** data distribution

Finally, NN on random vs NN on random vs CNN on random vs CNN on flat