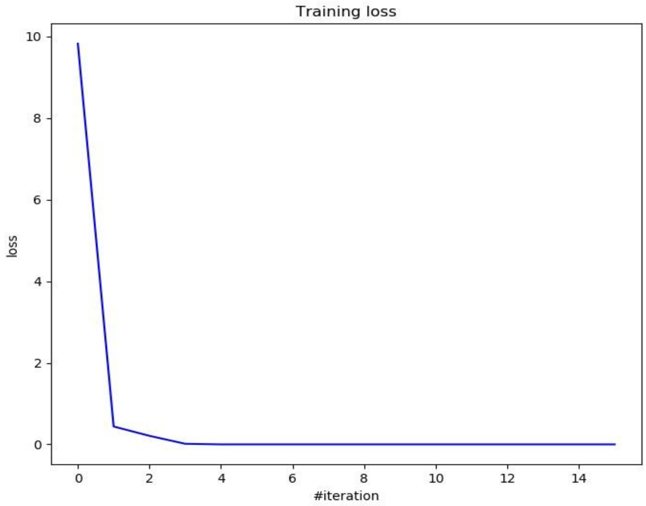
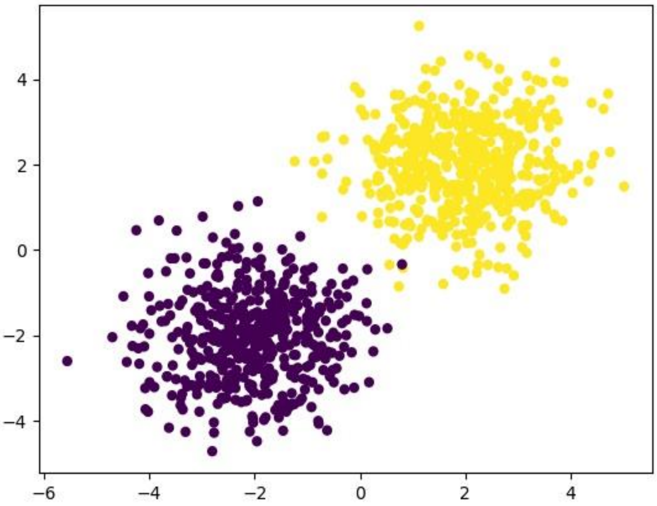
Toy example

There was 2 examples for test:.

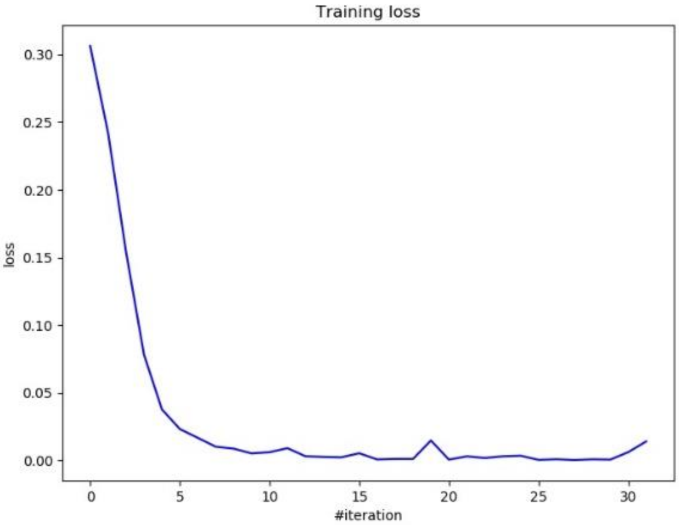
```
net = seq.Sequential()
net.add(linear.Linear(2, 4))
net.add(r.ReLU())
net.add(linear.Linear(4, 2))
net.add(softplus.SoftPlus())

criterion = nllu.ClassNLLCriterionUnstable()
```

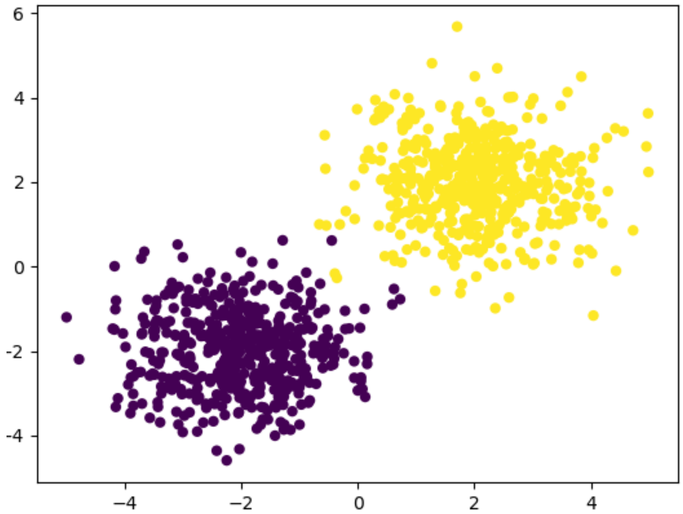
Plots:





```
net = seq.Sequential()
net.add(linear.Linear(2, 2))
net.add(softMax.SoftMax())

criterion = mse.MSECriterion()
```





Digit classification

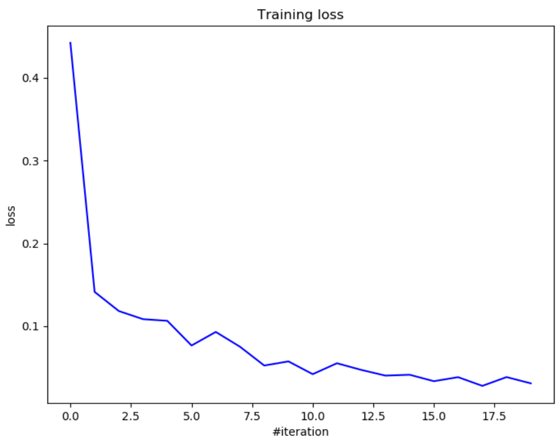
There was main.py file, where networks run. In Networks.py they are written.

One-hot encode the labels first. (in Dataset.py)

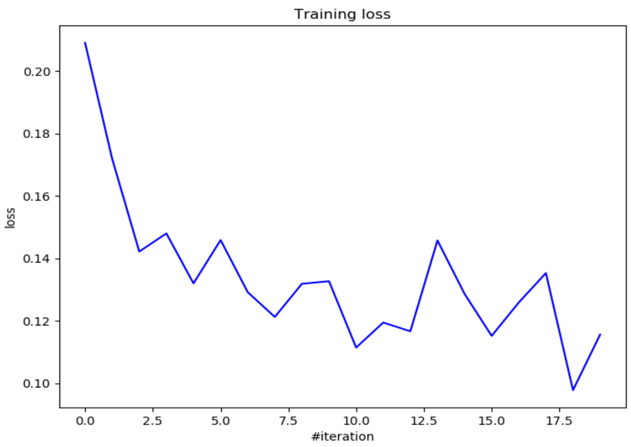
```
from sklearn.preprocessing import OneHotEncoder

onehot_encoder = OneHotEncoder(sparse=False)
    train_labels =
train_labels.reshape(len(train_labels), 1)
    train_labels =
onehot_encoder.fit_transform(train_labels)
```

Compare ReLU, ELU, LeakyReLU, SoftPlus activation functions. You would better pick the best optimizer params for each of them, but it is overkill for now. Use an architecture of your choice for the compa rison. (in networks.py)

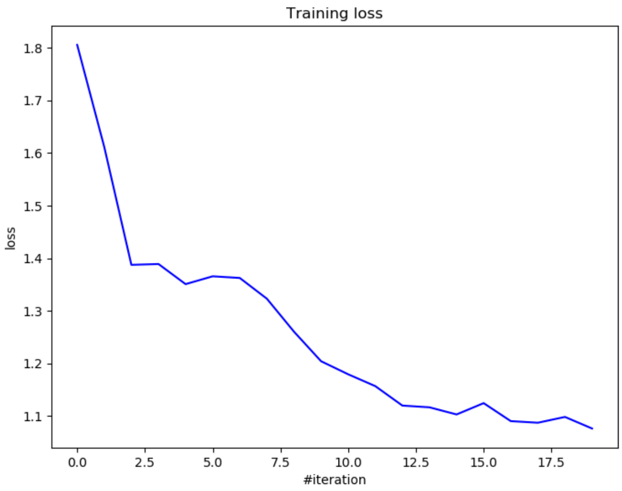
```
    ReLU_net = seq.Sequential()
    ReLU_net.add(linear.Linear(data_size, 100))
    ReLU_net.add(r.ReLU())
    ReLU_net.add(linear.Linear(100, 50))
    ReLU_net.add(r.ReLU())
    ReLU_net.add(linear.Linear(50, predict_size))
    ReLU_net.add(softMax.SoftMax())

    ELU_net = seq.Sequential()
    ELU_net.add(linear.Linear(data_size, predict_size))
    ELU_net.add(elu.ELU())
    ELU_net.add(softMax.SoftMax)

    LeakyReLU_net = seq.Sequential()
    LeakyReLU_net.add(linear.Linear(data_size, 400))
    LeakyReLU_net.add(leaky.LeakyReLU())
    LeakyReLU_net.add(linear.Linear(400, 250))
    LeakyReLU_net.add(leaky.LeakyReLU())
    LeakyReLU_net.add(linear.Linear(250, predict_size))
    LeakyReLU_net.add(leaky.LeakyReLU())
    LeakyReLU_net.add(softMax.SoftMax)

    SoftPlus_net = seq.Sequential()
    SoftPlus_net.add(linear.Linear(data_size, predict_size))
    SoftPlus_net.add(softPlus.SoftPlus())
    SoftPlus_net.add(softMax.SoftMax)
```



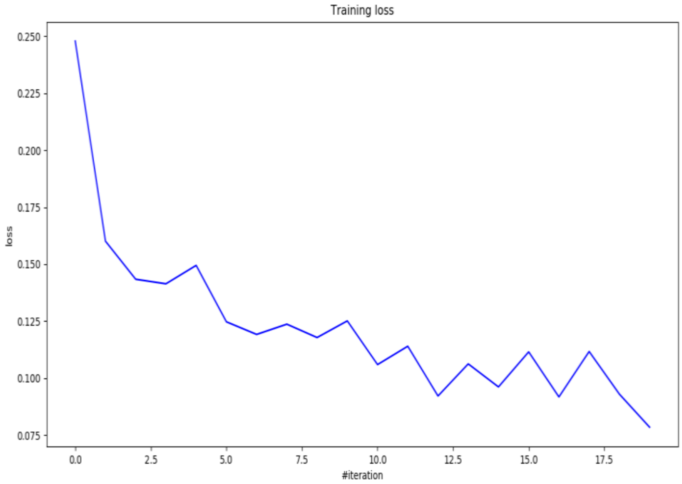
Loss plot for ReLU



Loss plot for ELU



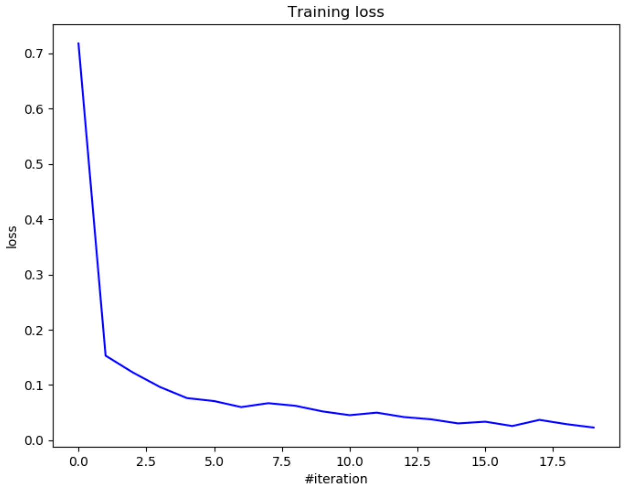
Loss plot for LeakyReLU



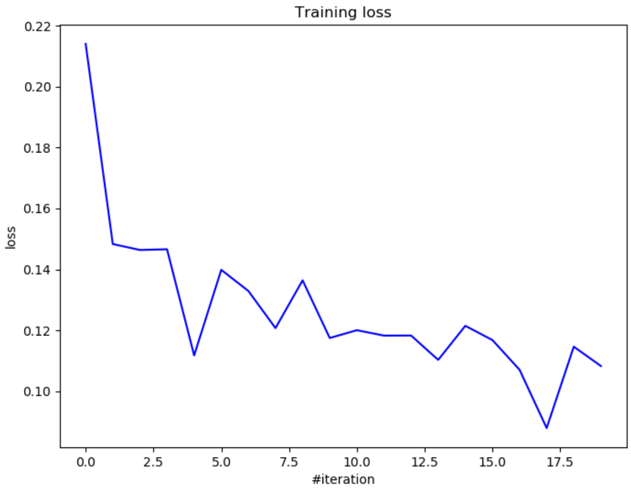
Loss plot for SoftPlus

Try inserting `BatchNormalization` **(folowed by** `ChannelwiseScaling`**) between** `Linear` **module and activation functions.**

```
ReLU_net = seq.Sequential()
ReLU_net.add(linear.Linear(data_size, 100))
ReLU_net.add(batch.BatchNormalization(0.3))
ReLU_net.add(batch.ChannelwiseScaling(100))
ReLU_net.add(r.ReLU())
ReLU_net.add(linear.Linear(100, predict_size))
ReLU_net.add(softMax.SoftMax())

ELU_net = seq.Sequential()
ELU_net.add(linear.Linear(data_size, predict_size))
ELU_net.add(batch.BatchNormalization())
ELU_net.add(batch.ChannelwiseScaling(predict_size))
ELU_net.add(elu.ELU())
ELU_net.add(softMax.SoftMax())
```

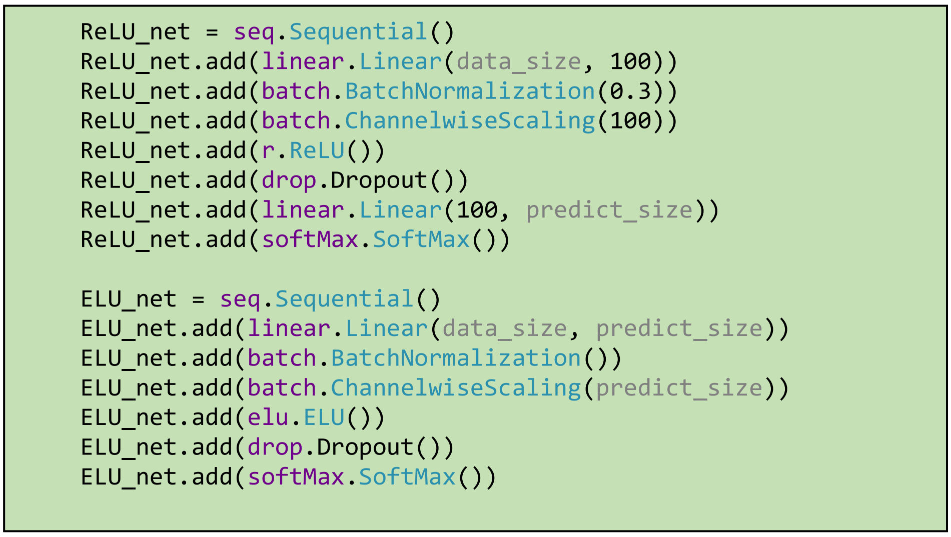


Loss plot for ReLU

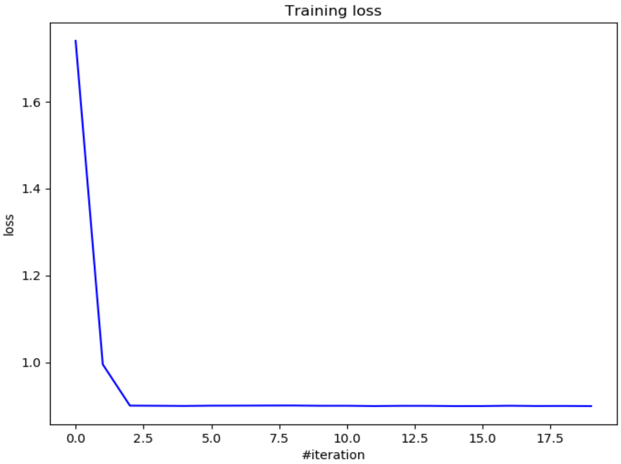


Loss plot for ELU

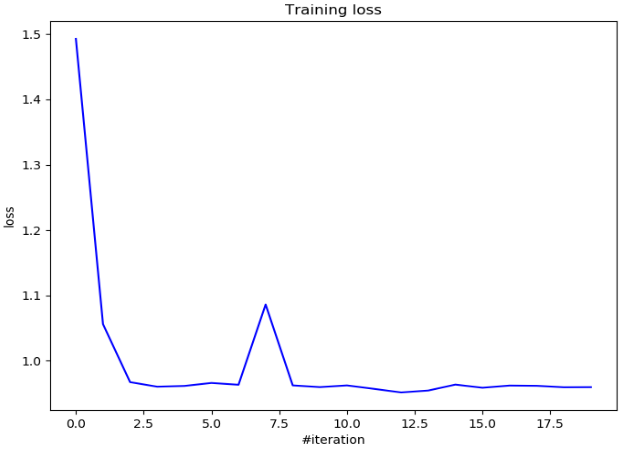
Dropout



```
ReLU_net = seq.Sequential()
ReLU_net.add(linear.Linear(data_size, 100))
ReLU_net.add(batch.BatchNormalization(0.3))
ReLU_net.add(batch.ChannelwiseScaling(100))
ReLU_net.add(r.ReLU())
ReLU_net.add(drop.Dropout())
ReLU_net.add(linear.Linear(100, predict_size))
ReLU_net.add(softMax.SoftMax())

ELU_net = seq.Sequential()
ELU_net.add(linear.Linear(data_size, predict_size))
ELU_net.add(batch.BatchNormalization())
ELU_net.add(batch.ChannelwiseScaling(predict_size))
ELU_net.add(elu.ELU())
ELU_net.add(drop.Dropout())
ELU_net.add(softMax.SoftMax())
```



Loss plot for ReLU



Loss plot for ELU