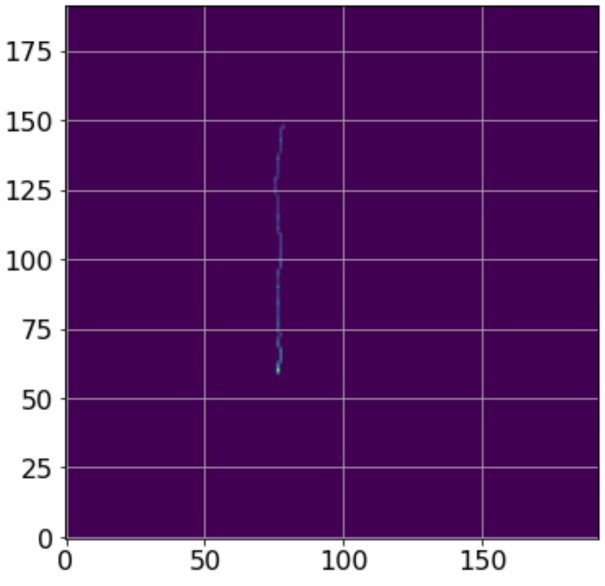
Project 5:
Challenge 1

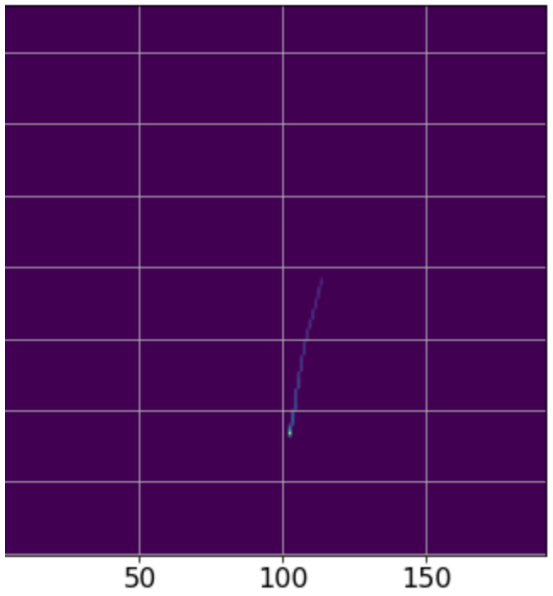
Challenge 1

Identify a particle species from its track in a detector
using the convolutional neural network method

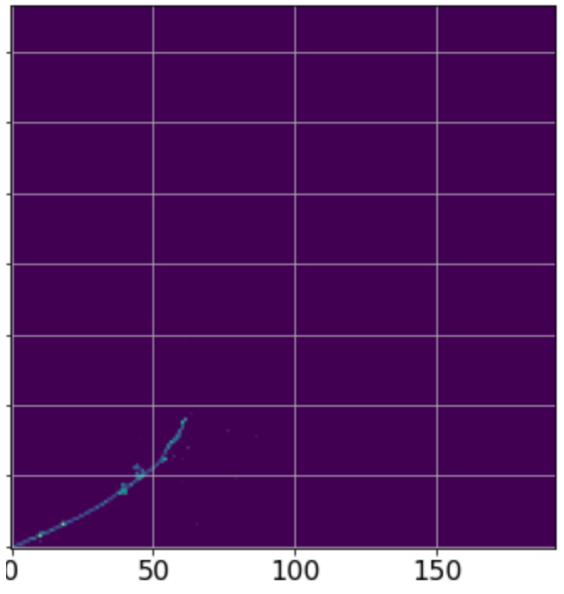
Muon



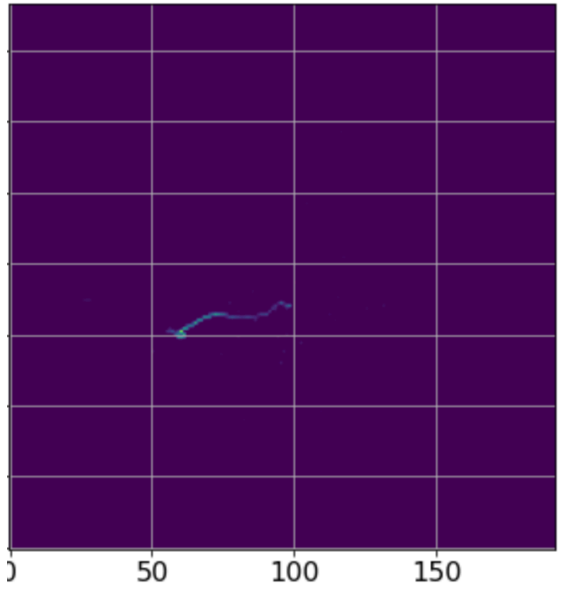
Proton



Electron



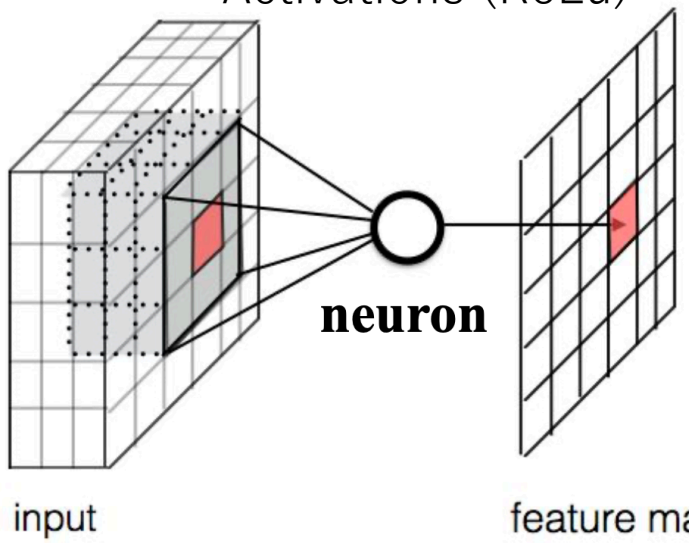
Photon



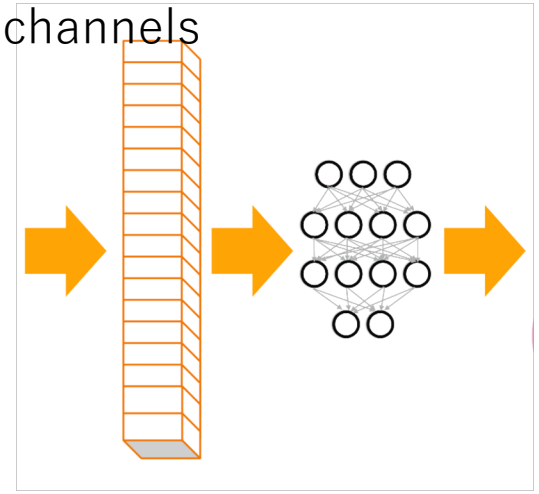
CNN algorithm used

Input feature: 1 image
(192 × 192 pixels)

10 convolutions
(Filter size: 3 pixels)
&
Activations (ReLu)



512 channels



Output feature:
4 variables

(From Terao-san's slide in 17/11/2020)

Data Set

Train_data : 360,000 images (each has 192 × 192 pixels)

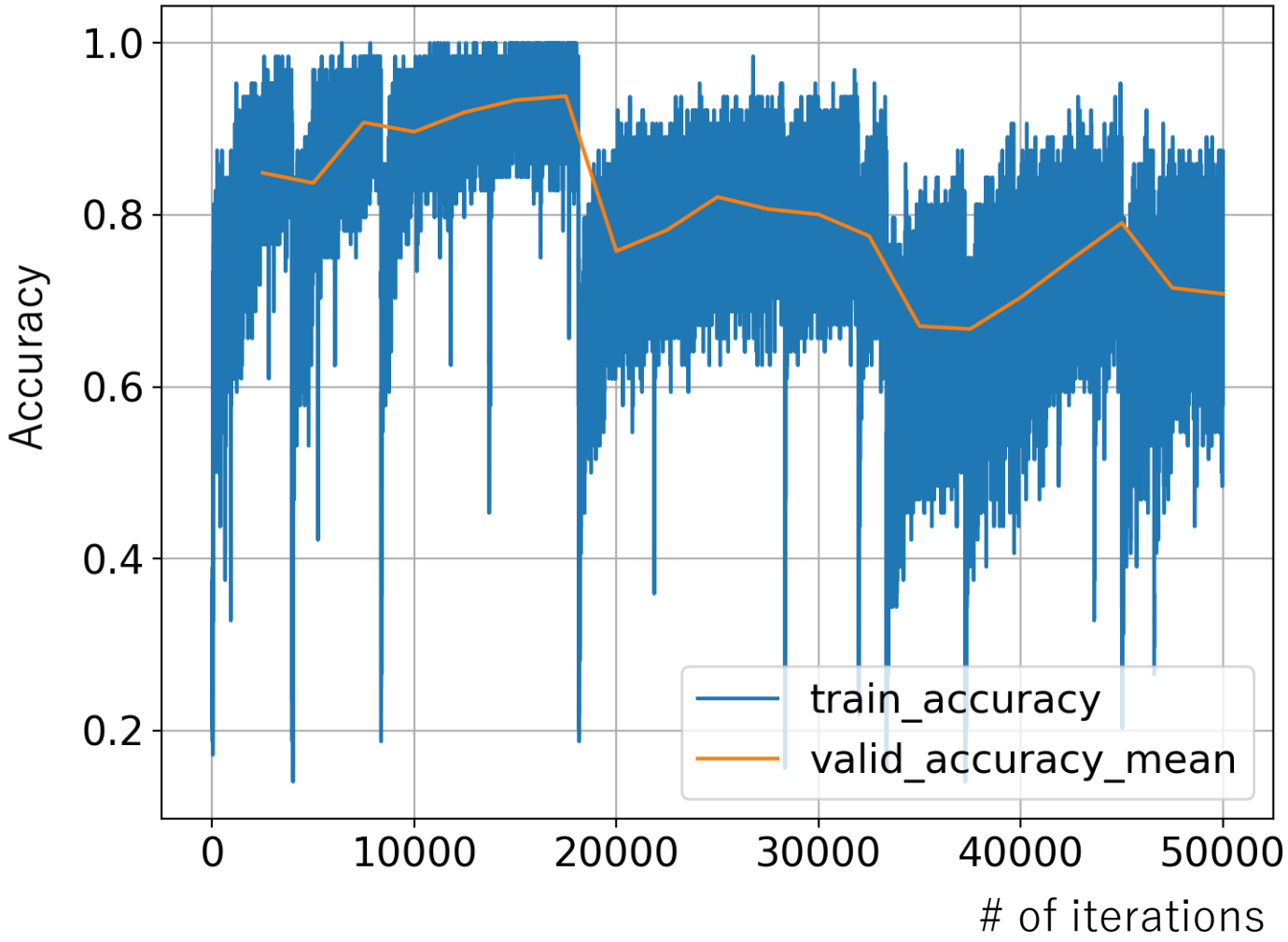
Average load time using DataLoader : 0.07 s for a batch of 64 images

Validation data : 40,000 images

Test data : 100,000 images

What is the best iteration steps ?

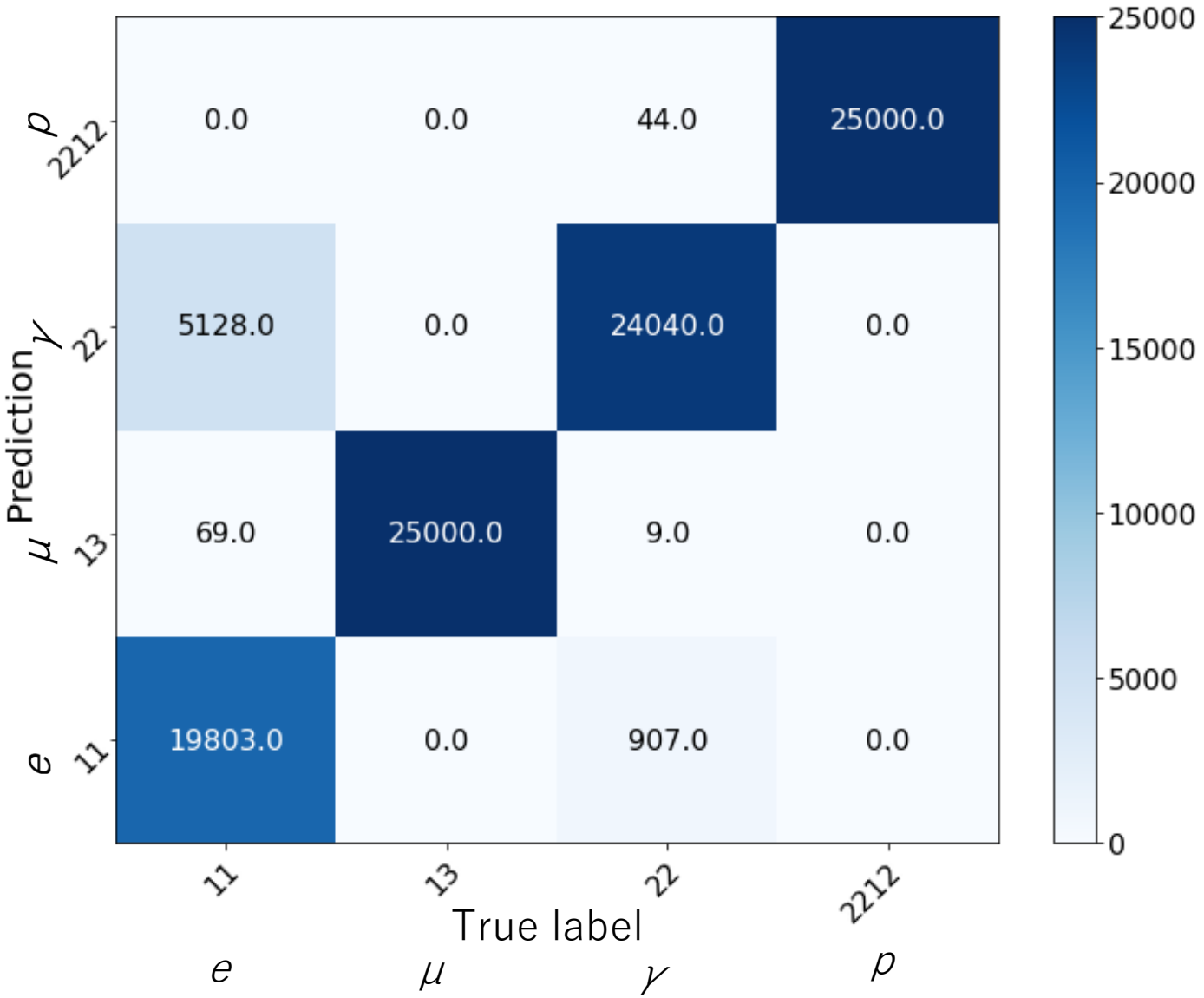
=> 17,500 steps



? Periodical up & down

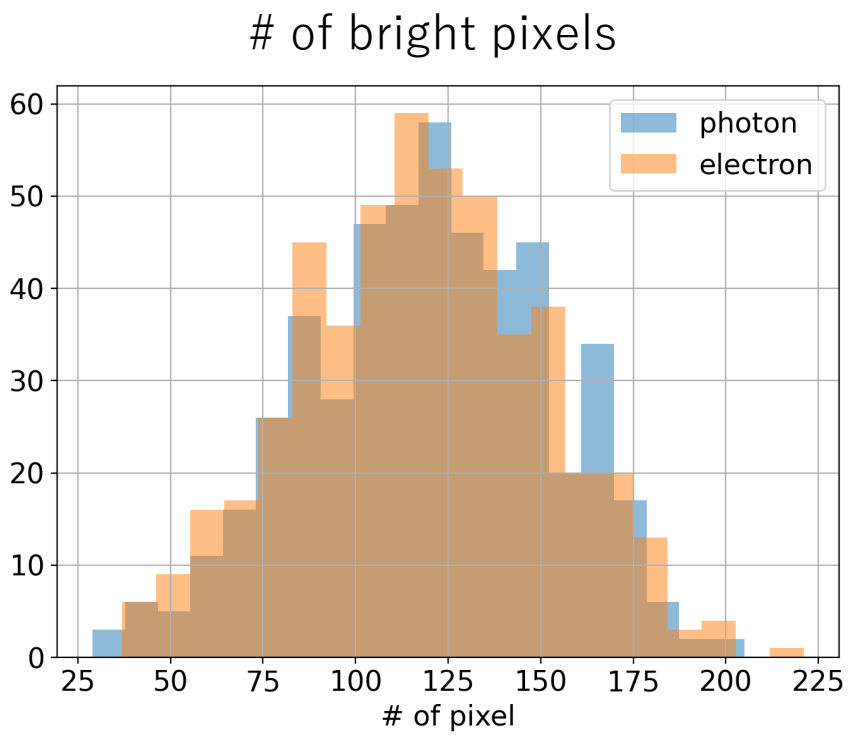
Confusion matrix

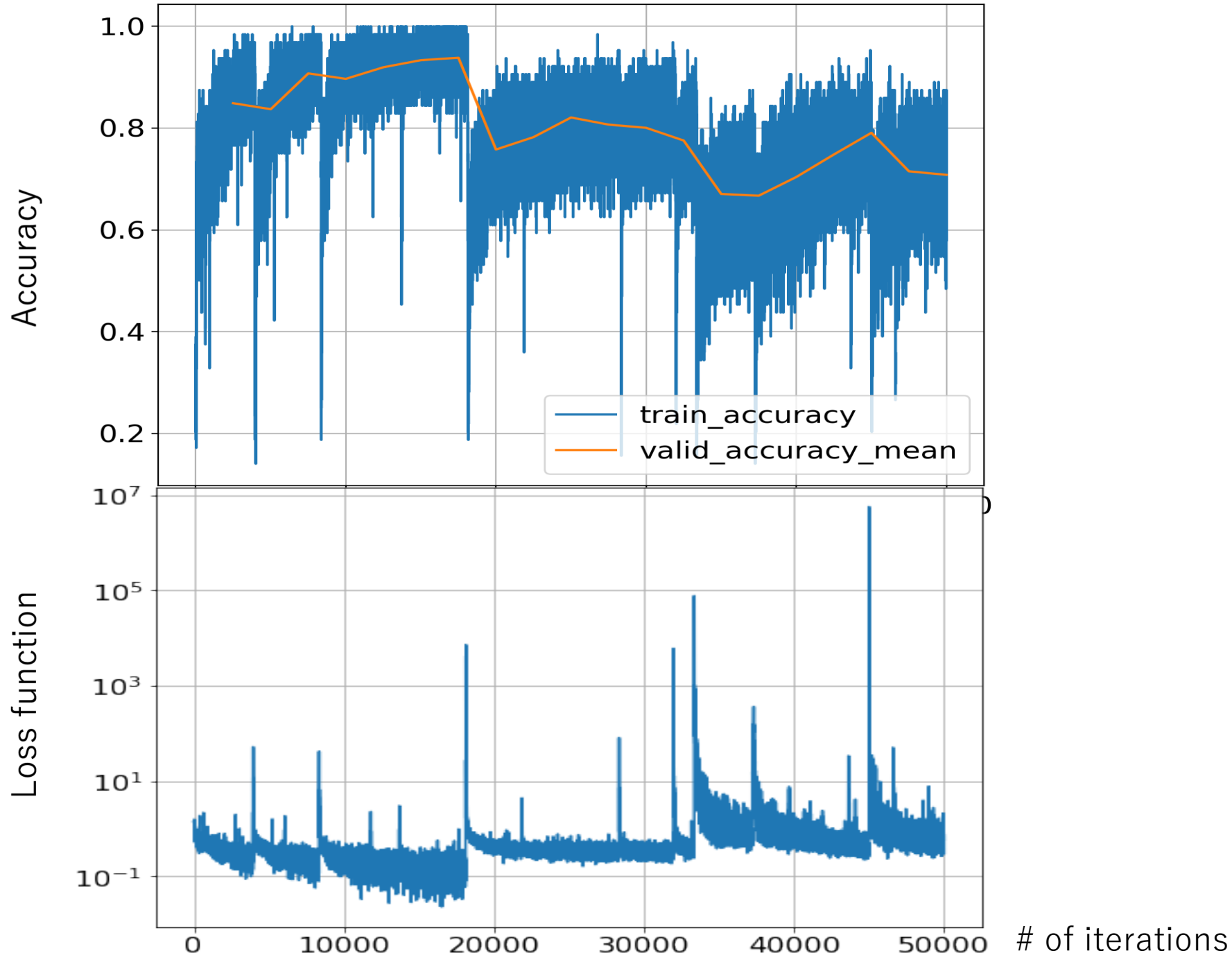
Accuracy : 94 %　(NN : after 17,500 iterations)



Electrons & photons tend to be confused.
-> photoelectron effect

How to distinguish b/w Electrons & photons ?




Accuracy
1.0
0.8
0.6
0.4
0.2
train_accuracy
valid_accuracy_mean
Loss function
10^{7}
10^{5}
10^{3}
10^{1}
10^{-1}
0
10000
20000
30000
40000
50000
# of iterations