On training set:

Reading data

Size of training data = 60000

Size of Testing data = 10000

Size of training data = 48000

Size of validation data = 12000

[001/030] 310.06 sec(s) Train Acc: 0.971792 Loss: 0.002315 | Val Acc: 0.981500 loss: 0.004391

[002/030] 305.77 sec(s) Train Acc: 0.988333 Loss: 0.001094 | Val Acc: 0.987000 loss: 0.002650

[003/030] 305.63 sec(s) Train Acc: 0.990875 Loss: 0.000696 | Val Acc: 0.987083 loss: 0.002095

[004/030] 305.13 sec(s) Train Acc: 0.994771 Loss: 0.000450 | Val Acc: 0.987833 loss: 0.001566

[005/030] 305.32 sec(s) Train Acc: 0.995021 Loss: 0.000339 | Val Acc: 0.979583 loss: 0.001514

[006/030] 312.07 sec(s) Train Acc: 0.995354 Loss: 0.000271 | Val Acc: 0.988583 loss: 0.001059

[007/030] 306.48 sec(s) Train Acc: 0.997250 Loss: 0.000185 | Val Acc: 0.985500 loss: 0.000883

[008/030] 313.97 sec(s) Train Acc: 0.997854 Loss: 0.000142 | Val Acc: 0.990417 loss: 0.000685

[009/030] 307.70 sec(s) Train Acc: 0.997417 Loss: 0.000130 | Val Acc: 0.990250 loss: 0.000619

[010/030] 307.17 sec(s) Train Acc: 0.997479 Loss: 0.000113 | Val Acc: 0.987833 loss: 0.000603

[011/030] 306.01 sec(s) Train Acc: 0.997750 Loss: 0.000095 | Val Acc: 0.989750 loss: 0.000476

[012/030] 305.55 sec(s) Train Acc: 0.998042 Loss: 0.000076 | Val Acc: 0.989917 loss: 0.000384

[013/030] 305.44 sec(s) Train Acc: 0.998687 Loss: 0.000056 | Val Acc: 0.991250 loss: 0.000324

[014/030] 305.39 sec(s) Train Acc: 0.997979 Loss: 0.000065 | Val Acc: 0.988417 loss: 0.000378

[015/030] 305.46 sec(s) Train Acc: 0.998208 Loss: 0.000061 | Val Acc: 0.991083 loss: 0.000312

[016/030] 305.30 sec(s) Train Acc: 0.998313 Loss: 0.000054 | Val Acc: 0.991417 loss: 0.000274

[017/030] 305.54 sec(s) Train Acc: 0.998021 Loss: 0.000054 | Val Acc: 0.986667 loss: 0.000361

[018/030] 305.63 sec(s) Train Acc: 0.999000 Loss: 0.000030 | Val Acc: 0.993000 loss: 0.000194

[019/030] 307.03 sec(s) Train Acc: 0.998271 Loss: 0.000047 | Val Acc: 0.986583 loss: 0.000427

[020/030] 305.55 sec(s) Train Acc: 0.998625 Loss: 0.000037 | Val Acc: 0.992500 loss: 0.000204

[021/030] 306.05 sec(s) Train Acc: 0.998542 Loss: 0.000040 | Val Acc: 0.990333 loss: 0.000260

[022/030] 305.21 sec(s) Train Acc: 0.999062 Loss: 0.000025 | Val Acc: 0.988750 loss: 0.000342

[023/030] 305.85 sec(s) Train Acc: 0.998667 Loss: 0.000030 | Val Acc: 0.989000 loss: 0.000290

[024/030] 305.98 sec(s) Train Acc: 0.999208 Loss: 0.000023 | Val Acc: 0.991417 loss: 0.000218

[025/030] 305.39 sec(s) Train Acc: 0.999208 Loss: 0.000021 | Val Acc: 0.989667 loss: 0.000303

[026/030] 309.33 sec(s) Train Acc: 0.998583 Loss: 0.000035 | Val Acc: 0.987000 loss: 0.000348

[027/030] 306.87 sec(s) Train Acc: 0.999417 Loss: 0.000015 | Val Acc: 0.991667 loss: 0.000232

[028/030] 305.92 sec(s) Train Acc: 0.998917 Loss: 0.000028 | Val Acc: 0.988083 loss: 0.000329

[029/030] 317.74 sec(s) Train Acc: 0.998979 Loss: 0.000024 | Val Acc: 0.990000 loss: 0.000266

[030/030] 306.92 sec(s) Train Acc: 0.999479 Loss: 0.000015 | Val Acc: 0.990333 loss: 0.000246

[001/030] 355.21 sec(s) Train Acc: 0.996833 Loss: 0.000080

[002/030] 371.56 sec(s) Train Acc: 0.998883 Loss: 0.000026

[003/030] 384.30 sec(s) Train Acc: 0.998633 Loss: 0.000030

[004/030] 385.82 sec(s) Train Acc: 0.999400 Loss: 0.000015

[005/030] 365.12 sec(s) Train Acc: 0.999217 Loss: 0.000019

[006/030] 363.27 sec(s) Train Acc: 0.999450 Loss: 0.000013

[007/030] 359.74 sec(s) Train Acc: 0.999483 Loss: 0.000012

[008/030] 371.77 sec(s) Train Acc: 0.999017 Loss: 0.000024

[009/030] 363.89 sec(s) Train Acc: 0.999283 Loss: 0.000016

[010/030] 362.18 sec(s) Train Acc: 0.999700 Loss: 0.000007

[011/030] 363.41 sec(s) Train Acc: 0.999767 Loss: 0.000007

[012/030] 362.23 sec(s) Train Acc: 0.999333 Loss: 0.000018

[013/030] 359.96 sec(s) Train Acc: 0.998867 Loss: 0.000026

[014/030] 368.05 sec(s) Train Acc: 0.999600 Loss: 0.000009

[015/030] 371.56 sec(s) Train Acc: 0.999550 Loss: 0.000011

[016/030] 366.33 sec(s) Train Acc: 0.999583 Loss: 0.000011

[017/030] 366.91 sec(s) Train Acc: 0.999717 Loss: 0.000006

[018/030] 357.30 sec(s) Train Acc: 0.999717 Loss: 0.000009

[019/030] 357.43 sec(s) Train Acc: 0.999133 Loss: 0.000020

[020/030] 357.95 sec(s) Train Acc: 0.999400 Loss: 0.000013

[021/030] 356.17 sec(s) Train Acc: 0.999250 Loss: 0.000016

[022/030] 357.16 sec(s) Train Acc: 0.999783 Loss: 0.000005

[023/030] 357.68 sec(s) Train Acc: 0.999933 Loss: 0.000002

[024/030] 359.40 sec(s) Train Acc: 0.999583 Loss: 0.000008

[025/030] 356.11 sec(s) Train Acc: 0.999417 Loss: 0.000016

[026/030] 358.55 sec(s) Train Acc: 0.999467 Loss: 0.000014

[027/030] 357.49 sec(s) Train Acc: 0.999750 Loss: 0.000005

[028/030] 358.45 sec(s) Train Acc: 0.999800 Loss: 0.000005

[029/030] 358.17 sec(s) Train Acc: 0.999550 Loss: 0.000010

[030/030] 355.98 sec(s) Train Acc: 0.999267 Loss: 0.000017

On testing set:

Size of Testing data = 10000

success

0.17 sec(s) Test Acc: 0.990300 Loss: 0.000275

Reading data

Size of training data = 60000

Size of Testing data = 10000

Size of training data = 48000

Size of validation data = 12000

[001/015] 354.63 sec(s) Train Acc: 0.972375 Loss: 0.002316 | Val Acc: 0.984167 loss: 0.004343

[002/015] 337.15 sec(s) Train Acc: 0.987896 Loss: 0.001098 | Val Acc: 0.986917 loss: 0.002806

[003/015] 333.48 sec(s) Train Acc: 0.991750 Loss: 0.000684 | Val Acc: 0.988583 loss: 0.001914

[004/015] 336.16 sec(s) Train Acc: 0.994542 Loss: 0.000471 | Val Acc: 0.985417 loss: 0.001707

[005/015] 340.25 sec(s) Train Acc: 0.995125 Loss: 0.000353 | Val Acc: 0.991250 loss: 0.001423

[006/015] 333.46 sec(s) Train Acc: 0.995208 Loss: 0.000274 | Val Acc: 0.988750 loss: 0.001009

[007/015] 332.65 sec(s) Train Acc: 0.996667 Loss: 0.000207 | Val Acc: 0.992417 loss: 0.000761

[008/015] 334.01 sec(s) Train Acc: 0.996875 Loss: 0.000165 | Val Acc: 0.992750 loss: 0.000648

[009/015] 341.84 sec(s) Train Acc: 0.998417 Loss: 0.000112 | Val Acc: 0.993583 loss: 0.000498

[010/015] 360.88 sec(s) Train Acc: 0.997667 Loss: 0.000116 | Val Acc: 0.990333 loss: 0.000520

[011/015] 372.57 sec(s) Train Acc: 0.998500 Loss: 0.000085 | Val Acc: 0.990500 loss: 0.000430

[012/015] 363.83 sec(s) Train Acc: 0.997042 Loss: 0.000106 | Val Acc: 0.987583 loss: 0.000502

[013/015] 349.02 sec(s) Train Acc: 0.998250 Loss: 0.000068 | Val Acc: 0.991750 loss: 0.000309

[014/015] 346.66 sec(s) Train Acc: 0.997604 Loss: 0.000078 | Val Acc: 0.988417 loss: 0.000390

[015/015] 351.22 sec(s) Train Acc: 0.998354 Loss: 0.000055 | Val Acc: 0.991750 loss: 0.000244

Size of Testing data = 10000

success

0.17 sec(s) Test Acc: 0.991200 Loss: 0.000286

Reading data

Size of training data = 60000

Size of Testing data = 10000

Size of training data = 48000

Size of validation data = 12000

Validation loss decreased (0.000035 --> 0.000085). Saving model ...

[001/015] 316.52 sec(s) Train Acc: 0.997687 Loss: 0.000051 | Val Acc: 0.997333 loss: 0.000085

Validation loss decreased (0.000085 --> 0.000077). Saving model ...

[002/015] 316.26 sec(s) Train Acc: 0.997479 Loss: 0.000051 | Val Acc: 0.997250 loss: 0.000077

Validation loss decreased (0.000077 --> 0.000066). Saving model ...

[003/015] 317.27 sec(s) Train Acc: 0.998417 Loss: 0.000035 | Val Acc: 0.998250 loss: 0.000066

Validation loss decreased (0.000066 --> 0.000056). Saving model ...

[004/015] 317.94 sec(s) Train Acc: 0.998208 Loss: 0.000039 | Val Acc: 0.998250 loss: 0.000056

EarlyStopping counter: 1 out of 3

[005/015] 317.31 sec(s) Train Acc: 0.997896 Loss: 0.000046 | Val Acc: 0.988167 loss: 0.000326

Validation loss decreased (0.000056 --> 0.000045). Saving model ...

[006/015] 316.92 sec(s) Train Acc: 0.998750 Loss: 0.000031 | Val Acc: 0.998917 loss: 0.000045

EarlyStopping counter: 1 out of 3

[007/015] 319.07 sec(s) Train Acc: 0.998354 Loss: 0.000038 | Val Acc: 0.998667 loss: 0.000048

EarlyStopping counter: 2 out of 3

[008/015] 326.72 sec(s) Train Acc: 0.998500 Loss: 0.000035 | Val Acc: 0.998583 loss: 0.000050

EarlyStopping counter: 3 out of 3

[009/015] 342.86 sec(s) Train Acc: 0.998604 Loss: 0.000032 | Val Acc: 0.997417 loss: 0.000068

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

Validation loss decreased (0.000045 --> 0.000041). Saving model ...

[001/015] 326.24 sec(s) Train Acc: 0.997875 Loss: 0.000044 | Val Acc: 0.998750 loss: 0.000041

EarlyStopping counter: 1 out of 3

[002/015] 327.19 sec(s) Train Acc: 0.998125 Loss: 0.000039 | Val Acc: 0.998167 loss: 0.000053

Validation loss decreased (0.000041 --> 0.000036). Saving model ...

[003/015] 329.90 sec(s) Train Acc: 0.998437 Loss: 0.000033 | Val Acc: 0.999167 loss: 0.000036

EarlyStopping counter: 1 out of 3

[004/015] 329.18 sec(s) Train Acc: 0.998437 Loss: 0.000032 | Val Acc: 0.999083 loss: 0.000037

EarlyStopping counter: 2 out of 3

[005/015] 319.24 sec(s) Train Acc: 0.998854 Loss: 0.000029 | Val Acc: 0.998000 loss: 0.000064

EarlyStopping counter: 3 out of 3

[006/015] 319.02 sec(s) Train Acc: 0.998479 Loss: 0.000032 | Val Acc: 0.997250 loss: 0.000078

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 318.95 sec(s) Train Acc: 0.998646 Loss: 0.000029 | Val Acc: 0.998833 loss: 0.000040

EarlyStopping counter: 2 out of 3

[002/015] 324.23 sec(s) Train Acc: 0.998854 Loss: 0.000021 | Val Acc: 0.998417 loss: 0.000044

Validation loss decreased (0.000036 --> 0.000034). Saving model ...

[003/015] 323.58 sec(s) Train Acc: 0.998896 Loss: 0.000026 | Val Acc: 0.999000 loss: 0.000034

EarlyStopping counter: 1 out of 3

[004/015] 326.90 sec(s) Train Acc: 0.998771 Loss: 0.000025 | Val Acc: 0.999083 loss: 0.000038

Validation loss decreased (0.000034 --> 0.000030). Saving model ...

[005/015] 334.30 sec(s) Train Acc: 0.998792 Loss: 0.000026 | Val Acc: 0.999083 loss: 0.000030

EarlyStopping counter: 1 out of 3

[006/015] 323.65 sec(s) Train Acc: 0.998583 Loss: 0.000027 | Val Acc: 0.998667 loss: 0.000040

EarlyStopping counter: 2 out of 3

[007/015] 324.07 sec(s) Train Acc: 0.998854 Loss: 0.000029 | Val Acc: 0.998083 loss: 0.000049

EarlyStopping counter: 3 out of 3

[008/015] 324.57 sec(s) Train Acc: 0.999208 Loss: 0.000019 | Val Acc: 0.995417 loss: 0.000112

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 325.47 sec(s) Train Acc: 0.998875 Loss: 0.000025 | Val Acc: 0.998167 loss: 0.000051

Validation loss decreased (0.000030 --> 0.000028). Saving model ...

[002/015] 325.38 sec(s) Train Acc: 0.998062 Loss: 0.000041 | Val Acc: 0.999083 loss: 0.000028

EarlyStopping counter: 1 out of 3

[003/015] 319.97 sec(s) Train Acc: 0.998708 Loss: 0.000027 | Val Acc: 0.998500 loss: 0.000042

EarlyStopping counter: 2 out of 3

[004/015] 319.20 sec(s) Train Acc: 0.999021 Loss: 0.000019 | Val Acc: 0.997917 loss: 0.000063

EarlyStopping counter: 3 out of 3

[005/015] 318.99 sec(s) Train Acc: 0.998625 Loss: 0.000030 | Val Acc: 0.998250 loss: 0.000056

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 319.16 sec(s) Train Acc: 0.998542 Loss: 0.000028 | Val Acc: 0.999167 loss: 0.000034

EarlyStopping counter: 2 out of 3

[002/015] 318.69 sec(s) Train Acc: 0.998729 Loss: 0.000025 | Val Acc: 0.997417 loss: 0.000074

Validation loss decreased (0.000028 --> 0.000020). Saving model ...

[003/015] 1426.01 sec(s) Train Acc: 0.999333 Loss: 0.000013 | Val Acc: 0.999583 loss: 0.000020

EarlyStopping counter: 1 out of 3

[004/015] 317.23 sec(s) Train Acc: 0.998854 Loss: 0.000028 | Val Acc: 0.995500 loss: 0.000131

EarlyStopping counter: 2 out of 3

[005/015] 322.65 sec(s) Train Acc: 0.998896 Loss: 0.000026 | Val Acc: 0.997667 loss: 0.000079

EarlyStopping counter: 3 out of 3

[006/015] 325.42 sec(s) Train Acc: 0.999062 Loss: 0.000023 | Val Acc: 0.999583 loss: 0.000023

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 321.68 sec(s) Train Acc: 0.999375 Loss: 0.000016 | Val Acc: 0.998250 loss: 0.000055

EarlyStopping counter: 2 out of 3

[002/015] 322.51 sec(s) Train Acc: 0.999354 Loss: 0.000017 | Val Acc: 0.999417 loss: 0.000028

EarlyStopping counter: 3 out of 3

[003/015] 325.50 sec(s) Train Acc: 0.999167 Loss: 0.000020 | Val Acc: 0.998833 loss: 0.000030

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 322.07 sec(s) Train Acc: 0.998812 Loss: 0.000026 | Val Acc: 0.999250 loss: 0.000021

Validation loss decreased (0.000020 --> 0.000013). Saving model ...

[002/015] 324.07 sec(s) Train Acc: 0.999146 Loss: 0.000016 | Val Acc: 0.999667 loss: 0.000013

EarlyStopping counter: 1 out of 3

[003/015] 324.18 sec(s) Train Acc: 0.999313 Loss: 0.000017 | Val Acc: 0.999500 loss: 0.000019

EarlyStopping counter: 2 out of 3

[004/015] 320.12 sec(s) Train Acc: 0.999208 Loss: 0.000021 | Val Acc: 0.998917 loss: 0.000030

EarlyStopping counter: 3 out of 3

[005/015] 319.68 sec(s) Train Acc: 0.999083 Loss: 0.000019 | Val Acc: 0.999750 loss: 0.000020

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 319.19 sec(s) Train Acc: 0.998812 Loss: 0.000025 | Val Acc: 0.999083 loss: 0.000032

EarlyStopping counter: 2 out of 3

[002/015] 319.06 sec(s) Train Acc: 0.999042 Loss: 0.000020 | Val Acc: 0.997917 loss: 0.000044

EarlyStopping counter: 3 out of 3

[003/015] 319.38 sec(s) Train Acc: 0.999250 Loss: 0.000017 | Val Acc: 0.999833 loss: 0.000015

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 319.27 sec(s) Train Acc: 0.999062 Loss: 0.000021 | Val Acc: 0.998417 loss: 0.000038

EarlyStopping counter: 2 out of 3

[002/015] 319.29 sec(s) Train Acc: 0.998938 Loss: 0.000019 | Val Acc: 0.999917 loss: 0.000019

EarlyStopping counter: 3 out of 3

[003/015] 319.34 sec(s) Train Acc: 0.999250 Loss: 0.000015 | Val Acc: 0.999417 loss: 0.000014

Early stopping

refreshing counter: 3 --> 0

refreshing early\_stop flag: False

EarlyStopping counter: 1 out of 3

[001/015] 319.09 sec(s) Train Acc: 0.999208 Loss: 0.000015 | Val Acc: 0.999250 loss: 0.000022

EarlyStopping counter: 2 out of 3

[002/015] 319.29 sec(s) Train Acc: 0.999125 Loss: 0.000018 | Val Acc: 0.999500 loss: 0.000019

EarlyStopping counter: 3 out of 3

[003/015] 326.49 sec(s) Train Acc: 0.999313 Loss: 0.000013 | Val Acc: 0.999167 loss: 0.000033

Early stopping

Size of Testing data = 10000

success

0.17 sec(s) Test Acc: 0.994300 Loss: 0.000143

Size of Testing data = 20

success

the predicted numbers:

[0 1 2 3 3 3 4 4 5 5 6 6 6 7 7 8 8 8 9 9]

the true patterns of number:

[0 1 2 3 3 3 4 4 5 5 6 6 6 7 7 8 8 8 9 9]

1.31 sec(s) Test Acc: 1.000000 Loss: 0.000307