Лабораторная работа номер 4

```
[6]  class CifarDataset(Dataset):
         def __init__(self, X, y, transform=None, p=0.0):
             assert X.size(0) == y.size(0)
             super(Dataset, self).__init__()
             self.X = X
             self.y = y
             self.transform = transform
             self.prob = p

         def __len__(self):
             return self.y.size(0)

         def __getitem__(self, index):
            x = self.X[index]
            if self.transform and np.random.random()<self.prob:
                x = self.transform(x.permute(2, 0, 1)/255.).permute(1, 2, 0)*255.
            y = self.y[index]
            return x, y

     transform = T.Compose([
         T.ColorJitter(brightness=0.1, contrast=0.1, saturation=0.2, hue=0.0),
         T.RandomAffine(degrees=15, translate=(0.1, 0.1), scale=(0.8, 1.2),
                        shear=5),
     ])

     Image.fromarray((transform(torch.Tensor(train_X[50]).permute(2, 0, 1)/255.).\
                     permute(1, 2, 0).numpy()*255.).astype(np.uint8)).\
                     resize((256, 256))
```

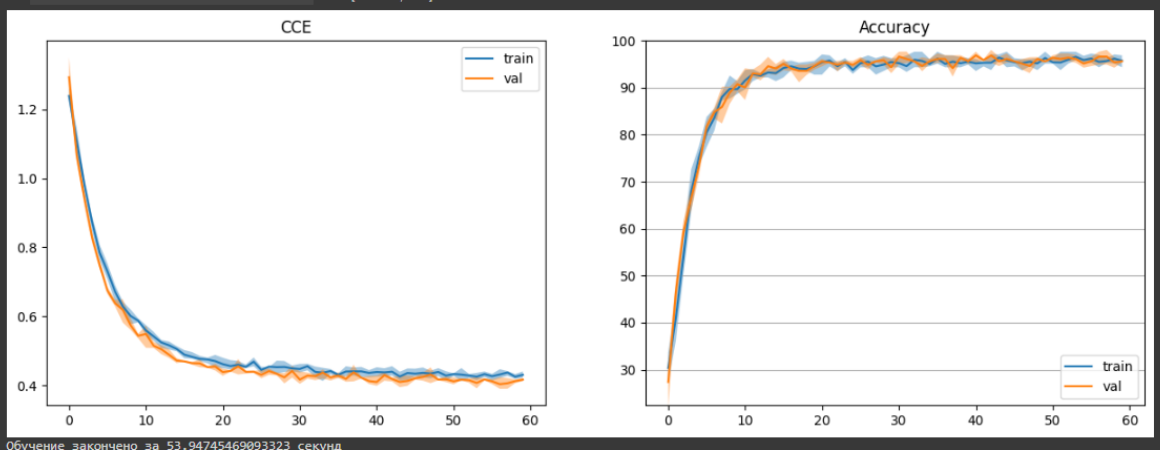
```
model = torch.hub.load("chenyaofo/pytorch-cifar-models",
                       "cifar100_resnet20",
                       #'cifar100_resnet20',
                       pretrained=True)
```

```
[12] print("Обучаемые параметры:")
     keep_last = 2
     total = len([*new_model.named_parameters()])
     params_to_update = []
     for i, (name, param) in enumerate(new_model.named_parameters()):
         if i < total - keep_last:
             param.requires_grad = False
         else:
             params_to_update.append(param)
             print("\t",name)
     summary(new_model, input_size=(32, 32, 3))
```

```
           BatchNorm2d-27          [-1, 32, 16, 16]              64
```

60 freeze

```
Эпоха: 60
Лучшая доля правильных ответов: 96.875
Текущая доля правильных ответов: 95.62026723225911
0%  0/720 [00:00<?, ?it/s]
```




```
Обучение закончено за 53.947454690093323 секунд
```

train

	precision	recall	f1-score	support
8	0.9861	0.9900	0.9880	500
33	0.9960	0.9860	0.9910	500
58	0.9920	0.9980	0.9950	500
accuracy			0.9913	1500
macro avg	0.9914	0.9913	0.9913	1500
weighted avg	0.9914	0.9913	0.9913	1500

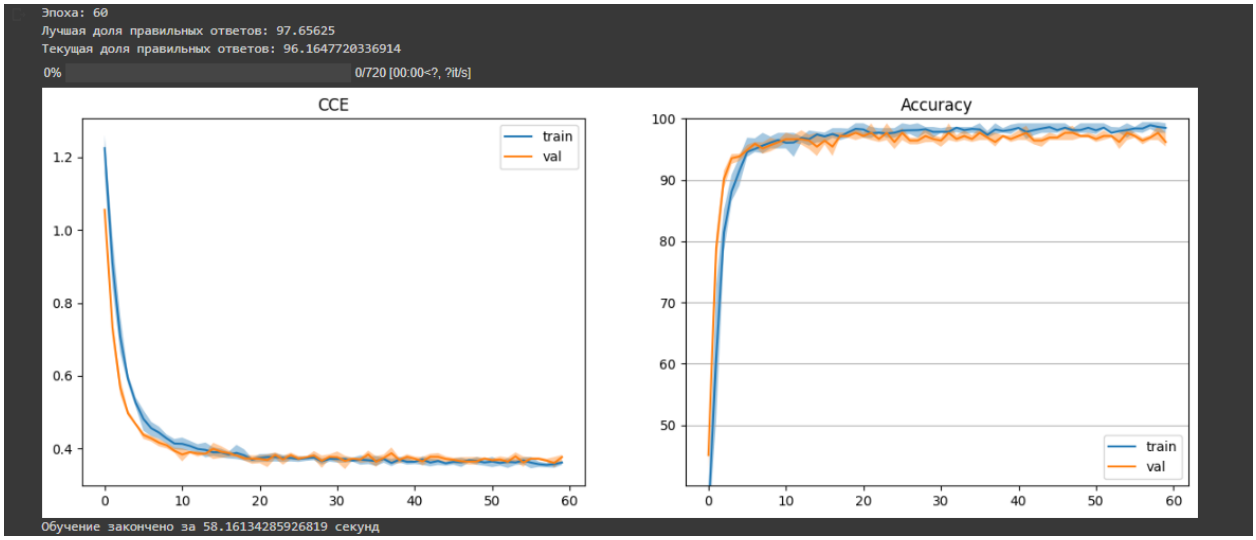
---

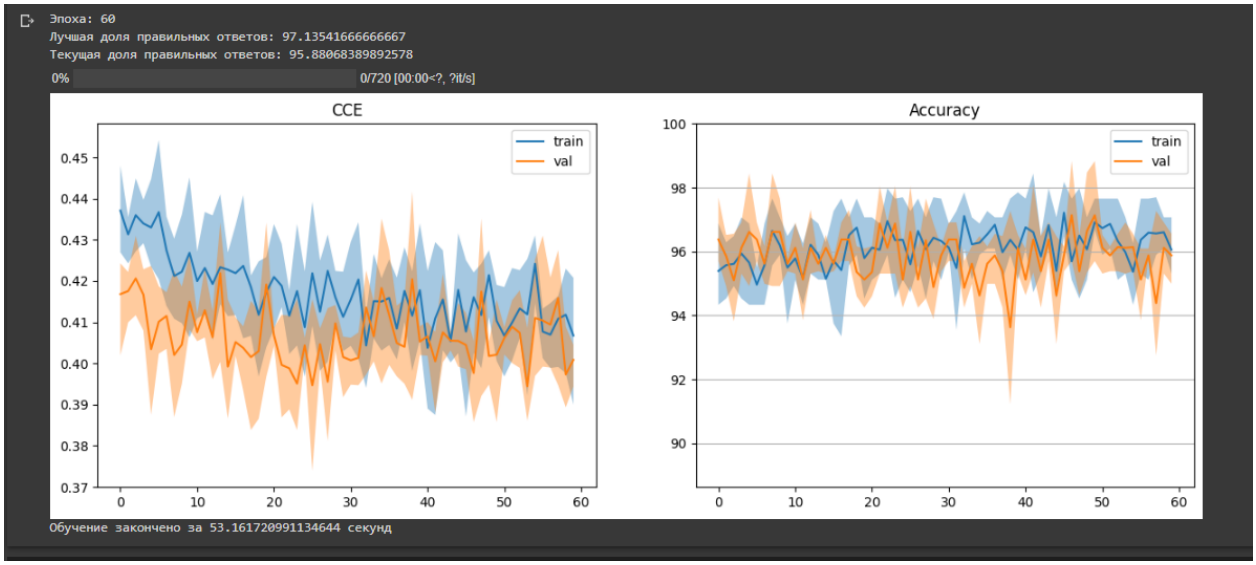
test

	precision	recall	f1-score	support
8	0.9417	0.9700	0.9557	100
33	0.9588	0.9300	0.9442	100
58	0.9700	0.9700	0.9700	100
accuracy			0.9567	300
macro avg	0.9568	0.9567	0.9566	300
weighted avg	0.9568	0.9567	0.9566	300

---

60 no freeze





train

	precision	recall	f1-score	support
8	0.9919	0.9820	0.9869	500
33	0.9860	0.9880	0.9870	500
58	0.9901	0.9980	0.9940	500
accuracy			0.9893	1500
macro avg	0.9893	0.9893	0.9893	1500
weighted avg	0.9893	0.9893	0.9893	1500

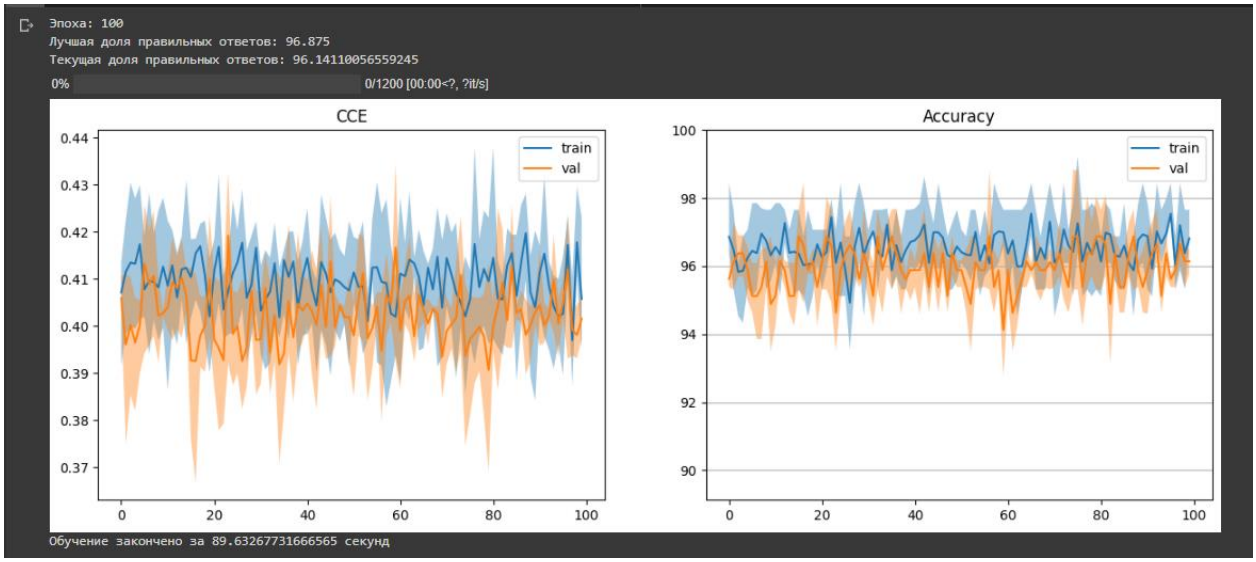
---

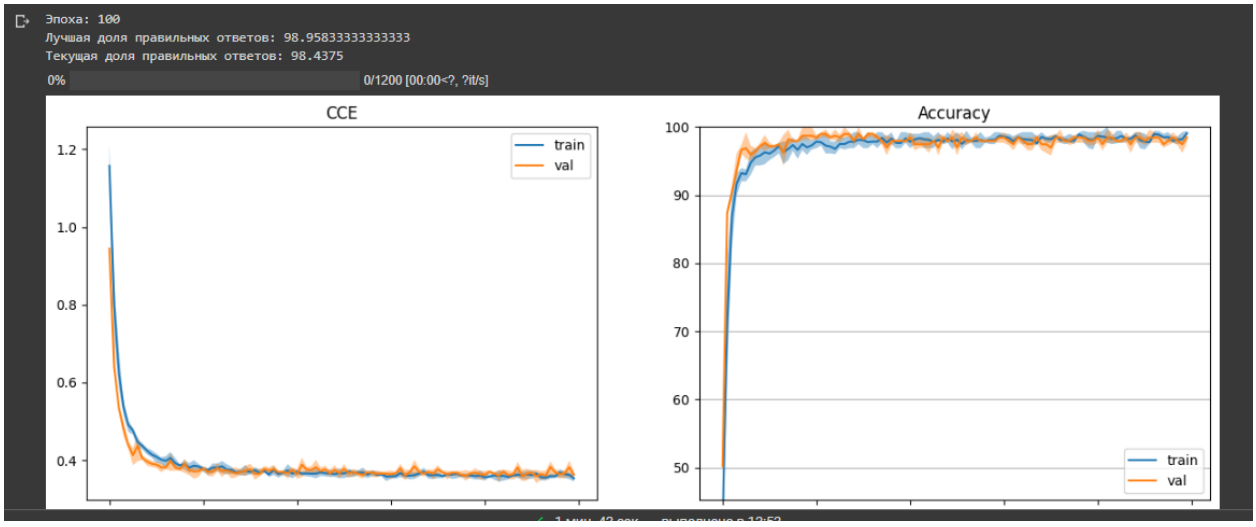
test

	precision	recall	f1-score	support
8	0.9697	0.9600	0.9648	100
33	0.9800	0.9800	0.9800	100
58	0.9703	0.9800	0.9751	100
accuracy			0.9733	300
macro avg	0.9733	0.9733	0.9733	300
weighted avg	0.9733	0.9733	0.9733	300

---

100 no-freeze





train

	precision	recall	f1-score	support
8	0.9920	0.9940	0.9930	500
33	1.0000	0.9900	0.9950	500
58	0.9921	1.0000	0.9960	500
accuracy			0.9947	1500
macro avg	0.9947	0.9947	0.9947	1500
weighted avg	0.9947	0.9947	0.9947	1500

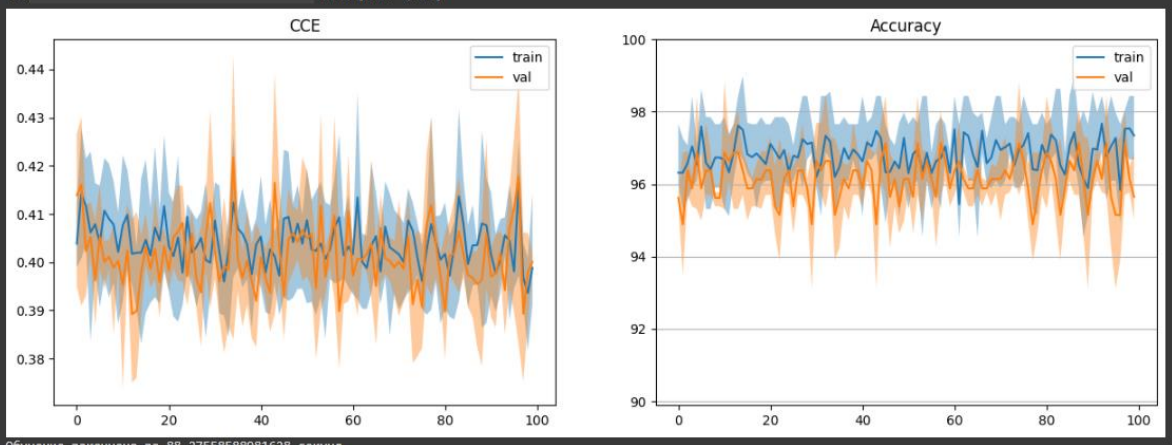
---

test

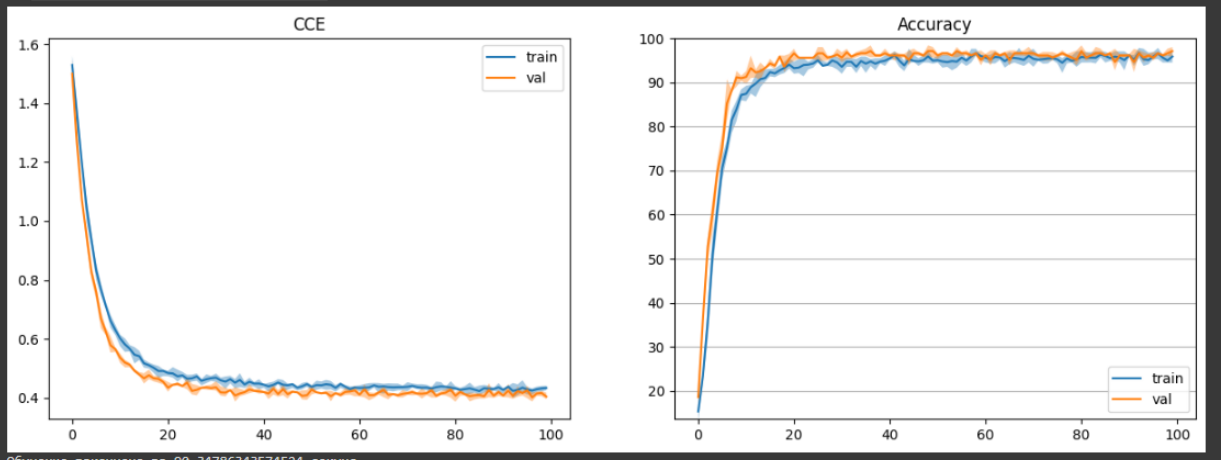
	precision	recall	f1-score	support
8	0.9800	0.9800	0.9800	100
33	0.9899	0.9800	0.9849	100
58	0.9703	0.9800	0.9751	100
accuracy			0.9800	300
macro avg	0.9801	0.9800	0.9800	300
weighted avg	0.9801	0.9800	0.9800	300

100 freeze

```
Эпоха: 100
Лучшая доля правильных ответов: 97.13541666666667
Текущая доля правильных ответов: 95.64393870035808
0%  0/1200 [00:00<?, ?it/s]
```




```
Обучение закончено за 88.27558588981628 секунд
Эпоха: 100
Лучшая доля правильных ответов: 97.13541666666667
Текущая доля правильных ответов: 97.13541666666667
0%  0/1200 [00:00<?, ?it/s]
```




```
Обучение закончено за 90.34786343574524 секунд
```

train

	precision	recall	f1-score	support
8	0.9763	0.9880	0.9821	500
33	0.9939	0.9760	0.9849	500
58	0.9901	0.9960	0.9930	500
accuracy			0.9867	1500
macro avg	0.9867	0.9867	0.9867	1500
weighted avg	0.9867	0.9867	0.9867	1500

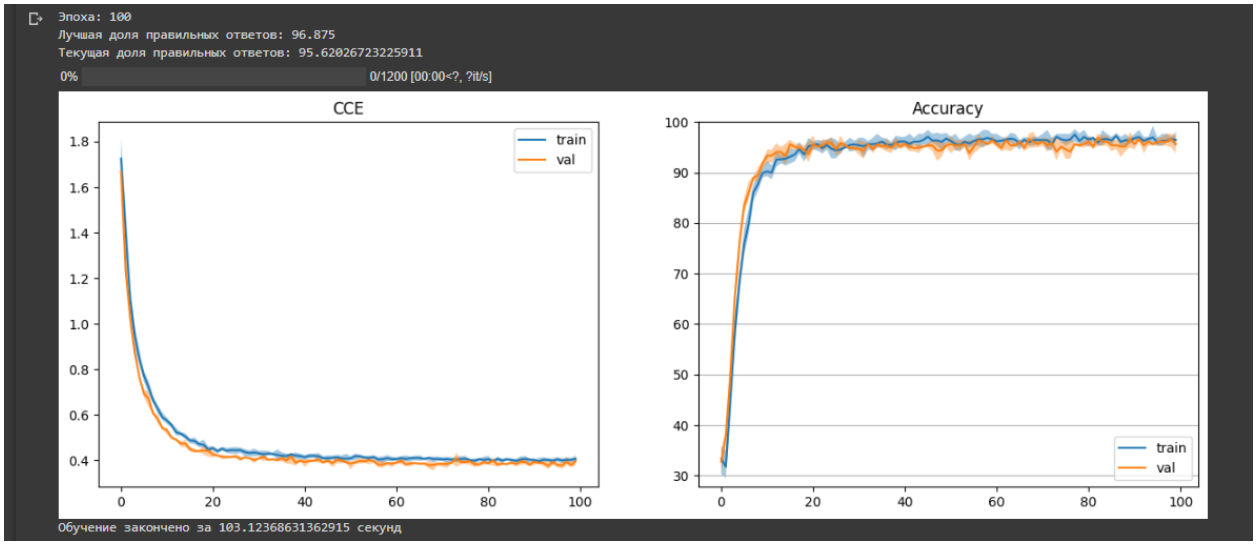
---

test

	precision	recall	f1-score	support
8	0.9796	0.9600	0.9697	100
33	0.9510	0.9700	0.9604	100
58	0.9700	0.9700	0.9700	100
accuracy			0.9667	300
macro avg	0.9669	0.9667	0.9667	300
weighted avg	0.9669	0.9667	0.9667	300

---

100 no freeze 1e



train

	precision	recall	f1-score	support
8	0.9780	0.9800	0.9790	500
33	0.9858	0.9740	0.9799	500
58	0.9881	0.9980	0.9930	500
accuracy			0.9840	1500
macro avg	0.9840	0.9840	0.9840	1500
weighted avg	0.9840	0.9840	0.9840	1500

---

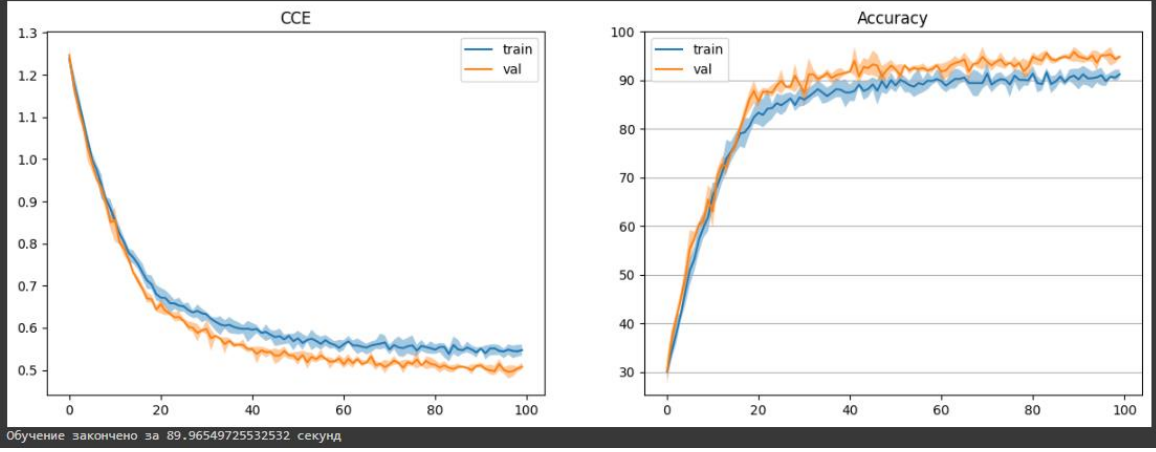
test

	precision	recall	f1-score	support
8	0.9792	0.9400	0.9592	100
33	0.9798	0.9700	0.9749	100
58	0.9524	1.0000	0.9756	100
accuracy			0.9700	300
macro avg	0.9704	0.9700	0.9699	300
weighted avg	0.9704	0.9700	0.9699	300

---

100 freeze 1e

```
Эпоха: 100
Лучшая доля правильных ответов: 95.83333333333333
Текущая доля правильных ответов: 94.83901723225911
0%  0/1200 [00:00<?, ?it/s]
```




```
Обучение закончено за 89.96549725532532 секунд
```

```
train
              precision    recall  f1-score   support

           8     0.9138    0.8900    0.9017       500
          33     0.8979    0.9320    0.9146       500
          58     0.9393    0.9280    0.9336       500

    accuracy                         0.9167      1500
   macro avg     0.9170    0.9167    0.9166      1500
weighted avg     0.9170    0.9167    0.9166      1500

--------------------------------------------------
test
              precision    recall  f1-score   support

           8     0.9135    0.9500    0.9314       100
          33     0.9780    0.8900    0.9319       100
          58     0.9524    1.0000    0.9756       100

    accuracy                         0.9467       300
   macro avg     0.9480    0.9467    0.9463       300
weighted avg     0.9480    0.9467    0.9463       300
```