# Протоколы обучения нейронной сети

## Базовый DataSet = 796 изображений

Модель model\_new.h5

Epoch 1/70

10/10 - 307s - loss: 0.9769 - accuracy: 0.4595 - val\_loss: 0.7182 - val\_accuracy: 0.4938 - 307s/epoch - 31s/step

Epoch 2/70

10/10 - 299s - loss: 0.8874 - accuracy: 0.5340 - val\_loss: 0.6841 - val\_accuracy: 0.5562 - 299s/epoch - 30s/step

Epoch 3/70

10/10 - 299s - loss: 0.9008 - accuracy: 0.5566 - val\_loss: 0.6496 - val\_accuracy: 0.6438 - 299s/epoch - 30s/step

Epoch 4/70

10/10 - 307s - loss: 0.8504 - accuracy: 0.6156 - val\_loss: 0.6346 - val\_accuracy: 0.6250 - 307s/epoch - 31s/step

Epoch 5/70

10/10 - 309s - loss: 0.8299 - accuracy: 0.6906 - val\_loss: 0.6287 - val\_accuracy: 0.6750 - 309s/epoch - 31s/step

Epoch 6/70

10/10 - 299s - loss: 0.8011 - accuracy: 0.7055 - val\_loss: 0.5784 - val\_accuracy: 0.7312 - 299s/epoch - 30s/step

Epoch 7/70

10/10 - 306s - loss: 0.7673 - accuracy: 0.7563 - val\_loss: 0.5701 - val\_accuracy: 0.7063 - 306s/epoch - 31s/step

Epoch 8/70

10/10 - 307s - loss: 0.7516 - accuracy: 0.7875 - val\_loss: 0.5310 - val\_accuracy: 0.8125 - 307s/epoch - 31s/step

Epoch 9/70

10/10 - 301s - loss: 0.7171 - accuracy: 0.7961 - val\_loss: 0.5184 - val\_accuracy: 0.8250 - 301s/epoch - 30s/step

Epoch 10/70

10/10 - 299s - loss: 0.6948 - accuracy: 0.8252 - val\_loss: 0.5114 - val\_accuracy: 0.8188 - 299s/epoch - 30s/step

Epoch 11/70

10/10 - 306s - loss: 0.6846 - accuracy: 0.7781 - val\_loss: 0.5152 - val\_accuracy: 0.7937 - 306s/epoch - 31s/step

Epoch 12/70

10/10 - 299s - loss: 0.6622 - accuracy: 0.8317 - val\_loss: 0.4802 - val\_accuracy: 0.8500 - 299s/epoch - 30s/step

Epoch 13/70

10/10 - 299s - loss: 0.6362 - accuracy: 0.8414 - val\_loss: 0.4449 - val\_accuracy: 0.8625 - 299s/epoch - 30s/step

Epoch 14/70

10/10 - 307s - loss: 0.6437 - accuracy: 0.8469 - val\_loss: 0.4706 - val\_accuracy: 0.8625 - 307s/epoch - 31s/step

Epoch 15/70

10/10 - 300s - loss: 0.6070 - accuracy: 0.8641 - val\_loss: 0.4564 - val\_accuracy: 0.8875 - 300s/epoch - 30s/step

Epoch 16/70

10/10 - 299s - loss: 0.5822 - accuracy: 0.8641 - val\_loss: 0.4371 - val\_accuracy: 0.8875 - 299s/epoch - 30s/step

Epoch 17/70

10/10 - 309s - loss: 0.5821 - accuracy: 0.8562 - val\_loss: 0.4260 - val\_accuracy: 0.8813 - 309s/epoch - 31s/step

Epoch 18/70

10/10 - 307s - loss: 0.5506 - accuracy: 0.8969 - val\_loss: 0.4191 - val\_accuracy: 0.9125 - 307s/epoch - 31s/step

Epoch 19/70

10/10 - 300s - loss: 0.5510 - accuracy: 0.8673 - val\_loss: 0.4295 - val\_accuracy: 0.8500 - 300s/epoch - 30s/step

Epoch 20/70

10/10 - 309s - loss: 0.5420 - accuracy: 0.8687 - val\_loss: 0.4093 - val\_accuracy: 0.8750 - 309s/epoch - 31s/step

Epoch 21/70

10/10 - 300s - loss: 0.5118 - accuracy: 0.8932 - val\_loss: 0.3923 - val\_accuracy: 0.9000 - 300s/epoch - 30s/step

Epoch 22/70

10/10 - 301s - loss: 0.5142 - accuracy: 0.9061 - val\_loss: 0.3809 - val\_accuracy: 0.8875 - 301s/epoch - 30s/step

Epoch 23/70

10/10 - 301s - **loss: 0.5002 - accuracy: 0.8867** - val\_loss: 0.3669 - val\_accuracy: 0.8750 - 301s/epoch - 30s/step

Epoch 23: early stopping

Причина остановки – прошло 2 часа.

## Продолжение обучения

## Стартовая модель model\_new.h5

## Модель model\_new1.h5

Epoch 1/70

10/10 - 304s - loss: 0.4904 - accuracy: 0.9191 - val\_loss: 0.3606 - val\_accuracy: 0.9375 - 304s/epoch - 30s/step

Epoch 2/70

10/10 - 306s - loss: 0.4774 - accuracy: 0.9062 - val\_loss: 0.3835 - val\_accuracy: 0.8813 - 306s/epoch - 31s/step

Epoch 3/70

10/10 - 297s - loss: 0.4528 - accuracy: 0.9223 - val\_loss: 0.3595 - val\_accuracy: 0.9312 - 297s/epoch - 30s/step

Epoch 4/70

10/10 - 297s - loss: 0.4593 - accuracy: 0.9126 - val\_loss: 0.3208 - val\_accuracy: 0.9438 - 297s/epoch - 30s/step

Epoch 5/70

10/10 - 300s - loss: 0.4514 - accuracy: 0.9191 - val\_loss: 0.3357 - val\_accuracy: 0.9500 - 300s/epoch - 30s/step

Epoch 6/70

10/10 - 299s - loss: 0.4367 - accuracy: 0.9223 - val\_loss: 0.3189 - val\_accuracy: 0.9062 - 299s/epoch - 30s/step

Epoch 7/70

10/10 - 306s - loss: 0.4212 - accuracy: 0.9156 - val\_loss: 0.3200 - val\_accuracy: 0.9187 - 306s/epoch - 31s/step

Epoch 8/70

10/10 - 308s - loss: 0.4299 - accuracy: 0.9031 - val\_loss: 0.2850 - val\_accuracy: 0.9375 - 308s/epoch - 31s/step

Epoch 9/70

10/10 - 306s - loss: 0.3981 - accuracy: 0.9469 - val\_loss: 0.2970 - val\_accuracy: 0.9187 - 306s/epoch - 31s/step

Epoch 10/70

10/10 - 306s - **loss: 0.3979 - accuracy: 0.9281** - val\_loss: 0.2954 - val\_accuracy: 0.9312 - 306s/epoch - 31s/step

Epoch 10: early stopping

## Расширенный DataSet = 1668 изображений

Модель model\_new\_b.h5

Epoch 1/70

10/10 - 231s - loss: 1.1451 - accuracy: 0.4406 - val\_loss: 0.7664 - val\_accuracy: 0.4062 - 231s/epoch - 23s/step

Epoch 2/70

10/10 - 232s - loss: 1.0690 - accuracy: 0.4281 - val\_loss: 0.8315 - val\_accuracy: 0.4500 - 232s/epoch - 23s/step

Epoch 3/70

10/10 - 231s - loss: 1.0261 - accuracy: 0.5125 - val\_loss: 0.8090 - val\_accuracy: 0.4313 - 231s/epoch - 23s/step

Epoch 4/70

10/10 - 230s - loss: 1.0669 - accuracy: 0.4469 - val\_loss: 0.7921 - val\_accuracy: 0.4250 - 230s/epoch - 23s/step

Epoch 5/70

10/10 - 222s - loss: 1.0132 - accuracy: 0.4818 - val\_loss: 0.8108 - val\_accuracy: 0.4187 - 222s/epoch - 22s/step

Epoch 6/70

10/10 - 232s - loss: 0.9788 - accuracy: 0.4563 - val\_loss: 0.7608 - val\_accuracy: 0.4625 - 232s/epoch - 23s/step

Epoch 7/70

10/10 - 230s - loss: 0.9821 - accuracy: 0.4875 - val\_loss: 0.7157 - val\_accuracy: 0.5063 - 230s/epoch - 23s/step

Epoch 8/70

10/10 - 230s - loss: 0.9607 - accuracy: 0.4719 - val\_loss: 0.6953 - val\_accuracy: 0.5562 - 230s/epoch - 23s/step

Epoch 9/70

10/10 - 229s - loss: 0.9250 - accuracy: 0.5250 - val\_loss: 0.6753 - val\_accuracy: 0.6000 - 229s/epoch - 23s/step

Epoch 10/70

10/10 - 222s - loss: 0.9174 - accuracy: 0.5677 - val\_loss: 0.6390 - val\_accuracy: 0.6313 - 222s/epoch - 22s/step

Epoch 11/70

10/10 - 223s - loss: 0.8709 - accuracy: 0.5974 - val\_loss: 0.6780 - val\_accuracy: 0.5625 - 223s/epoch - 22s/step

Epoch 12/70

10/10 - 230s - loss: 0.9096 - accuracy: 0.5344 - val\_loss: 0.6675 - val\_accuracy: 0.6125 - 230s/epoch - 23s/step

Epoch 13/70

10/10 - 223s - loss: 0.8464 - accuracy: 0.5809 - val\_loss: 0.6405 - val\_accuracy: 0.6375 - 223s/epoch - 22s/step

Epoch 14/70

10/10 - 229s - loss: 0.8303 - accuracy: 0.6469 - val\_loss: 0.6544 - val\_accuracy: 0.6500 - 229s/epoch - 23s/step

Epoch 15/70

10/10 - 229s - loss: 0.8120 - accuracy: 0.6469 - val\_loss: 0.5764 - val\_accuracy: 0.7312 - 229s/epoch - 23s/step

Epoch 16/70

10/10 - 230s - loss: 0.7849 - accuracy: 0.6969 - val\_loss: 0.5933 - val\_accuracy: 0.7125 - 230s/epoch - 23s/step

Epoch 17/70

10/10 - 229s - loss: 0.8124 - accuracy: 0.6656 - val\_loss: 0.5703 - val\_accuracy: 0.7188 - 229s/epoch - 23s/step

Epoch 18/70

10/10 - 222s - loss: 0.8041 - accuracy: 0.6271 - val\_loss: 0.5686 - val\_accuracy: 0.7500 - 222s/epoch - 22s/step

Epoch 19/70

10/10 - 222s - loss: 0.7829 - accuracy: 0.7228 - val\_loss: 0.5609 - val\_accuracy: 0.7750 - 222s/epoch - 22s/step

Epoch 20/70

10/10 - 228s - loss: 0.7576 - accuracy: 0.7188 - val\_loss: 0.5989 - val\_accuracy: 0.6750 - 228s/epoch - 23s/step

Epoch 21/70

10/10 - 229s - loss: 0.7550 - accuracy: 0.6781 - val\_loss: 0.5325 - val\_accuracy: 0.7625 - 229s/epoch - 23s/step

Epoch 22/70

10/10 - 222s - loss: 0.7414 - accuracy: 0.7228 - val\_loss: 0.5732 - val\_accuracy: 0.7125 - 222s/epoch - 22s/step

Epoch 23/70

10/10 - 222s - loss: 0.7453 - accuracy: 0.7228 - val\_loss: 0.5798 - val\_accuracy: 0.7063 - 222s/epoch - 22s/step

Epoch 24/70

10/10 - 231s - **loss: 0.7715 - accuracy: 0.6969** - val\_loss: 0.5713 - val\_accuracy: 0.7000 - 231s/epoch - 23s/step

Epoch 24: early stopping

## Продолжение обучения

## Стартовая модель model\_new\_b.h5

## Модель model\_new\_b1.h5

Epoch 1/70

10/10 - 223s - loss: 0.7123 - accuracy: 0.7195 - val\_loss: 0.5194 - val\_accuracy: 0.7563 - 223s/epoch - 22s/step

Epoch 2/70

10/10 - 222s - loss: 0.7040 - accuracy: 0.7888 - val\_loss: 0.5163 - val\_accuracy: 0.7750 - 222s/epoch - 22s/step

Epoch 3/70

10/10 - 220s - loss: 0.7086 - accuracy: 0.7525 - val\_loss: 0.5109 - val\_accuracy: 0.8062 - 220s/epoch - 22s/step

Epoch 4/70

10/10 - 228s - loss: 0.7023 - accuracy: 0.7219 - val\_loss: 0.5338 - val\_accuracy: 0.7437 - 228s/epoch - 23s/step

Epoch 5/70

10/10 - 228s - loss: 0.6908 - accuracy: 0.7437 - val\_loss: 0.5118 - val\_accuracy: 0.7500 - 228s/epoch - 23s/step

Epoch 6/70

10/10 - 222s - loss: 0.6958 - accuracy: 0.7525 - val\_loss: 0.4748 - val\_accuracy: 0.8062 - 222s/epoch - 22s/step

Epoch 7/70

10/10 - 229s - loss: 0.6547 - accuracy: 0.7750 - val\_loss: 0.4903 - val\_accuracy: 0.7812 - 229s/epoch - 23s/step

Epoch 8/70

10/10 - 230s - loss: 0.6558 - accuracy: 0.7563 - val\_loss: 0.4659 - val\_accuracy: 0.8375 - 230s/epoch - 23s/step

Epoch 9/70

10/10 - 230s - loss: 0.6488 - accuracy: 0.8156 - val\_loss: 0.4987 - val\_accuracy: 0.7937 - 230s/epoch - 23s/step

Epoch 10/70

10/10 - 229s - loss: 0.6382 - accuracy: 0.7719 - val\_loss: 0.4786 - val\_accuracy: 0.7875 - 229s/epoch - 23s/step

Epoch 11/70

10/10 - 231s - loss: 0.6570 - accuracy: 0.7656 - val\_loss: 0.4639 - val\_accuracy: 0.8062 - 231s/epoch - 23s/step

Epoch 12/70

10/10 - 221s - loss: 0.6400 - accuracy: 0.8086 - val\_loss: 0.4910 - val\_accuracy: 0.7937 - 221s/epoch - 22s/step

Epoch 13/70

10/10 - 229s - loss: 0.6108 - accuracy: 0.8250 - val\_loss: 0.4447 - val\_accuracy: 0.8438 - 229s/epoch - 23s/step

Epoch 14/70

10/10 - 230s - loss: 0.6009 - accuracy: 0.8219 - val\_loss: 0.4754 - val\_accuracy: 0.8375 - 230s/epoch - 23s/step

Epoch 15/70

10/10 - 230s - loss: 0.6238 - accuracy: 0.8031 - val\_loss: 0.4339 - val\_accuracy: 0.8250 - 230s/epoch - 23s/step

Epoch 16/70

10/10 - 229s - loss: 0.6240 - accuracy: 0.7625 - val\_loss: 0.4800 - val\_accuracy: 0.7937 - 229s/epoch - 23s/step

Epoch 17/70

10/10 - 230s - loss: 0.5802 - accuracy: 0.8375 - val\_loss: 0.4153 - val\_accuracy: 0.8562 - 230s/epoch - 23s/step

Epoch 18/70

10/10 - 230s - loss: 0.5569 - accuracy: 0.8562 - val\_loss: 0.4004 - val\_accuracy: 0.8625 - 230s/epoch - 23s/step

Epoch 19/70

10/10 - 230s - loss: 0.5599 - accuracy: 0.8438 - val\_loss: 0.3903 - val\_accuracy: 0.8625 - 230s/epoch - 23s/step

Epoch 20/70

10/10 - 223s - loss: 0.5831 - accuracy: 0.8317 - val\_loss: 0.4180 - val\_accuracy: 0.8375 - 223s/epoch - 22s/step

Epoch 21/70

10/10 - 223s - loss: 0.5541 - accuracy: 0.8317 - val\_loss: 0.4033 - val\_accuracy: 0.8813 - 223s/epoch - 22s/step

Epoch 22/70

10/10 - 231s - loss: 0.5367 - accuracy: 0.8875 - val\_loss: 0.4359 - val\_accuracy: 0.8313 - 231s/epoch - 23s/step

Epoch 23/70

10/10 - 231s - loss: 0.5597 - accuracy: 0.8469 - val\_loss: 0.4475 - val\_accuracy: 0.8188 - 231s/epoch - 23s/step

Epoch 24/70

10/10 - 231s - loss: 0.5724 - accuracy: 0.7937 - val\_loss: 0.4011 - val\_accuracy: 0.8438 - 231s/epoch - 23s/step

Epoch 25/70

10/10 - 222s - loss: 0.4912 - accuracy: 0.8779 - val\_loss: 0.3939 - val\_accuracy: 0.8625 - 222s/epoch - 22s/step

Epoch 26/70

10/10 - 231s - **loss: 0.5525 - accuracy: 0.8281** - val\_loss: 0.3695 - val\_accuracy: 0.8750 - 231s/epoch - 23s/step

Epoch 26: early stopping

## Изображения, выделенные детектором лиц DataSet = 934 изображений

## Модель model\_new\_bc.h5

Epoch 1/70

10/10 - 305s - loss: 0.9688 - accuracy: 0.6346 - val\_loss: 0.6985 - val\_accuracy: 0.6562 - 305s/epoch - 31s/step

Epoch 2/70

10/10 - 301s - loss: 0.9075 - accuracy: 0.6678 - val\_loss: 0.7682 - val\_accuracy: 0.6313 - 301s/epoch - 30s/step

Epoch 3/70

10/10 - 299s - loss: 0.8828 - accuracy: 0.6678 - val\_loss: 0.7136 - val\_accuracy: 0.6687 - 299s/epoch - 30s/step

Epoch 4/70

10/10 - 300s - loss: 0.8874 - accuracy: 0.6545 - val\_loss: 0.7352 - val\_accuracy: 0.6438 - 300s/epoch - 30s/step

Epoch 5/70

10/10 - 313s - loss: 0.8697 - accuracy: 0.6219 - val\_loss: 0.6978 - val\_accuracy: 0.6250 - 313s/epoch - 31s/step

Epoch 6/70

10/10 - 301s - loss: 0.8275 - accuracy: 0.6578 - val\_loss: 0.6151 - val\_accuracy: 0.6812 - 301s/epoch - 30s/step

Epoch 7/70

10/10 - 303s - loss: 0.8108 - accuracy: 0.6645 - val\_loss: 0.6348 - val\_accuracy: 0.6562 - 303s/epoch - 30s/step

Epoch 8/70

10/10 - 313s - loss: 0.8022 - accuracy: 0.6656 - val\_loss: 0.5906 - val\_accuracy: 0.6750 - 313s/epoch - 31s/step

Epoch 9/70

10/10 - 313s - loss: 0.7614 - accuracy: 0.6719 - val\_loss: 0.6785 - val\_accuracy: 0.6062 - 313s/epoch - 31s/step

Epoch 10/70

10/10 - 320s - loss: 0.7309 - accuracy: 0.6938 - val\_loss: 0.6630 - val\_accuracy: 0.6375 - 320s/epoch - 32s/step

Epoch 11/70

10/10 - 301s - **loss: 0.7790 - accuracy: 0.6478** - val\_loss: 0.5789 - val\_accuracy: 0.6812 - 301s/epoch - 30s/step

## Epoch 11: early stopping

## Продолжение обучения

## Стартовая модель model\_new\_bc.h5

## Модель model\_new\_bc1.h5

Epoch 1/70

10/10 - 319s - loss: 0.7359 - accuracy: 0.6777 - val\_loss: 0.5492 - val\_accuracy: 0.7125 - 319s/epoch - 32s/step

Epoch 2/70

10/10 - 307s - loss: 0.7250 - accuracy: 0.6512 - val\_loss: 0.5423 - val\_accuracy: 0.7000 - 307s/epoch - 31s/step

Epoch 3/70

10/10 - 320s - loss: 0.6968 - accuracy: 0.6812 - val\_loss: 0.5194 - val\_accuracy: 0.7188 - 320s/epoch - 32s/step

Epoch 4/70

10/10 - 319s - loss: 0.6754 - accuracy: 0.6938 - val\_loss: 0.4984 - val\_accuracy: 0.7312 - 319s/epoch - 32s/step

Epoch 5/70

10/10 - 318s - loss: 0.6553 - accuracy: 0.7250 - val\_loss: 0.5754 - val\_accuracy: 0.6625 - 318s/epoch - 32s/step

Epoch 6/70

10/10 - 318s - loss: 0.6455 - accuracy: 0.6906 - val\_loss: 0.4830 - val\_accuracy: 0.7375 - 318s/epoch - 32s/step

Epoch 7/70

10/10 - 320s - loss: 0.6471 - accuracy: 0.6969 - val\_loss: 0.5326 - val\_accuracy: 0.6875 - 320s/epoch - 32s/step

Epoch 8/70

10/10 - 309s - loss: 0.6425 - accuracy: 0.7010 - val\_loss: 0.4475 - val\_accuracy: 0.7625 - 309s/epoch - 31s/step

Epoch 9/70

10/10 - 306s - loss: 0.5931 - accuracy: 0.7475 - val\_loss: 0.4730 - val\_accuracy: 0.7125 - 306s/epoch - 31s/step

Epoch 10/70

10/10 - 305s - loss: 0.6075 - accuracy: 0.7209 - val\_loss: 0.4605 - val\_accuracy: 0.7437 - 305s/epoch - 30s/step

Epoch 11/70

10/10 - 316s - loss: 0.5568 - accuracy: 0.7688 - val\_loss: 0.5003 - val\_accuracy: 0.6875 - 316s/epoch - 32s/step

Epoch 12/70

10/10 - 318s - loss: 0.5778 - accuracy: 0.7125 - val\_loss: 0.4658 - val\_accuracy: 0.7250 - 318s/epoch - 32s/step

Epoch 13/70

10/10 - 319s - **loss: 0.5791 - accuracy: 0.7437** - val\_loss: 0.4663 - val\_accuracy: 0.7563 - 319s/epoch - 32s/step

Epoch 13: early stopping

## Продолжение обучения

## Стартовая модель model\_new\_bc1.h5

## Модель model\_new\_bc2.h5

Epoch 1/70

10/10 - 309s - loss: 0.5573 - accuracy: 0.7774 - val\_loss: 0.4255 - val\_accuracy: 0.7625 - 309s/epoch - 31s/step

Epoch 2/70

10/10 - 321s - loss: 0.5718 - accuracy: 0.7312 - val\_loss: 0.4253 - val\_accuracy: 0.7688 - 321s/epoch - 32s/step

Epoch 3/70

10/10 - 316s - loss: 0.5439 - accuracy: 0.7875 - val\_loss: 0.4683 - val\_accuracy: 0.7188 - 316s/epoch - 32s/step

Epoch 4/70

10/10 - 306s - loss: 0.5247 - accuracy: 0.7774 - val\_loss: 0.4722 - val\_accuracy: 0.7500 - 306s/epoch - 31s/step

Epoch 5/70

10/10 - 304s - loss: 0.5248 - accuracy: 0.7508 - val\_loss: 0.4136 - val\_accuracy: 0.8188 - 304s/epoch - 30s/step

Epoch 6/70

10/10 - 305s - loss: 0.5258 - accuracy: 0.7641 - val\_loss: 0.3819 - val\_accuracy: 0.8125 - 305s/epoch - 31s/step

Epoch 7/70

10/10 - 304s - loss: 0.5018 - accuracy: 0.8040 - val\_loss: 0.3982 - val\_accuracy: 0.7875 - 304s/epoch - 30s/step

Epoch 8/70

10/10 - 306s - loss: 0.4556 - accuracy: 0.8372 - val\_loss: 0.4148 - val\_accuracy: 0.8188 - 306s/epoch - 31s/step

Epoch 9/70

10/10 - 318s - loss: 0.4606 - accuracy: 0.8156 - val\_loss: 0.3661 - val\_accuracy: 0.8250 - 318s/epoch - 32s/step

Epoch 10/70

10/10 - 317s - loss: 0.4563 - accuracy: 0.8156 - val\_loss: 0.3648 - val\_accuracy: 0.8125 - 317s/epoch - 32s/step

Epoch 11/70

10/10 - 303s - loss: 0.4771 - accuracy: 0.8073 - val\_loss: 0.3966 - val\_accuracy: 0.7937 - 303s/epoch - 30s/step

Epoch 12/70

10/10 - 306s - loss: 0.4683 - accuracy: 0.8306 - val\_loss: 0.3418 - val\_accuracy: 0.8562 - 306s/epoch - 31s/step

Epoch 13/70

10/10 - 323s - loss: 0.4559 - accuracy: 0.8438 - val\_loss: 0.3432 - val\_accuracy: 0.8313 - 323s/epoch - 32s/step

Epoch 14/70

10/10 - 325s - loss: 0.4899 - accuracy: 0.8156 - val\_loss: 0.3553 - val\_accuracy: 0.8375 - 325s/epoch - 33s/step

Epoch 15/70

10/10 - 322s - loss: 0.4320 - accuracy: 0.8625 - val\_loss: 0.3572 - val\_accuracy: 0.8250 - 322s/epoch - 32s/step

Epoch 16/70

10/10 - 302s - loss: 0.4399 - accuracy: 0.8306 - val\_loss: 0.3740 - val\_accuracy: 0.8188 - 302s/epoch - 30s/step

Epoch 17/70

10/10 - 314s - **loss: 0.4101 - accuracy: 0.8375** - val\_loss: 0.3314 - val\_accuracy: 0.8500 - 314s/epoch - 31s/step

Epoch 17: early stopping