

# MIDTERM PROJECT

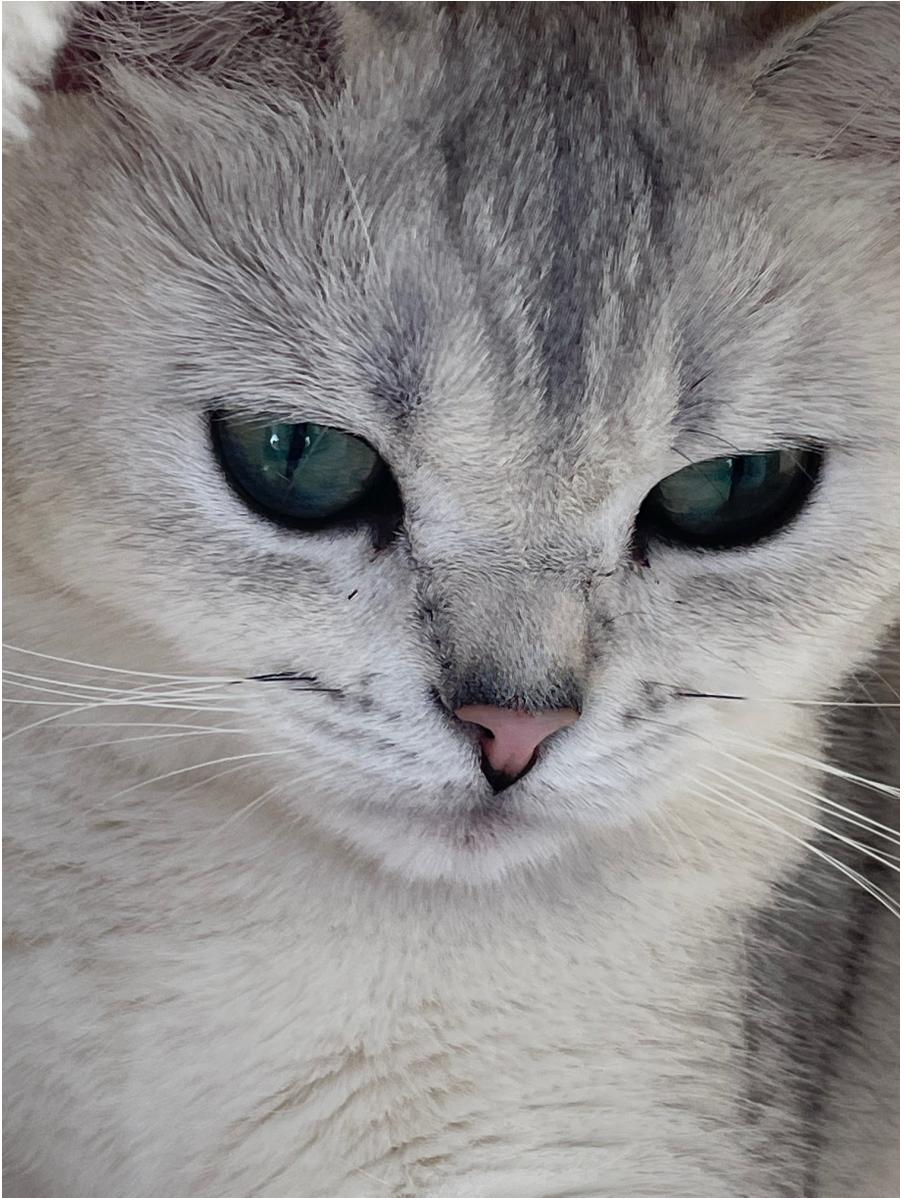
Face Classification for My Cats

Vikki

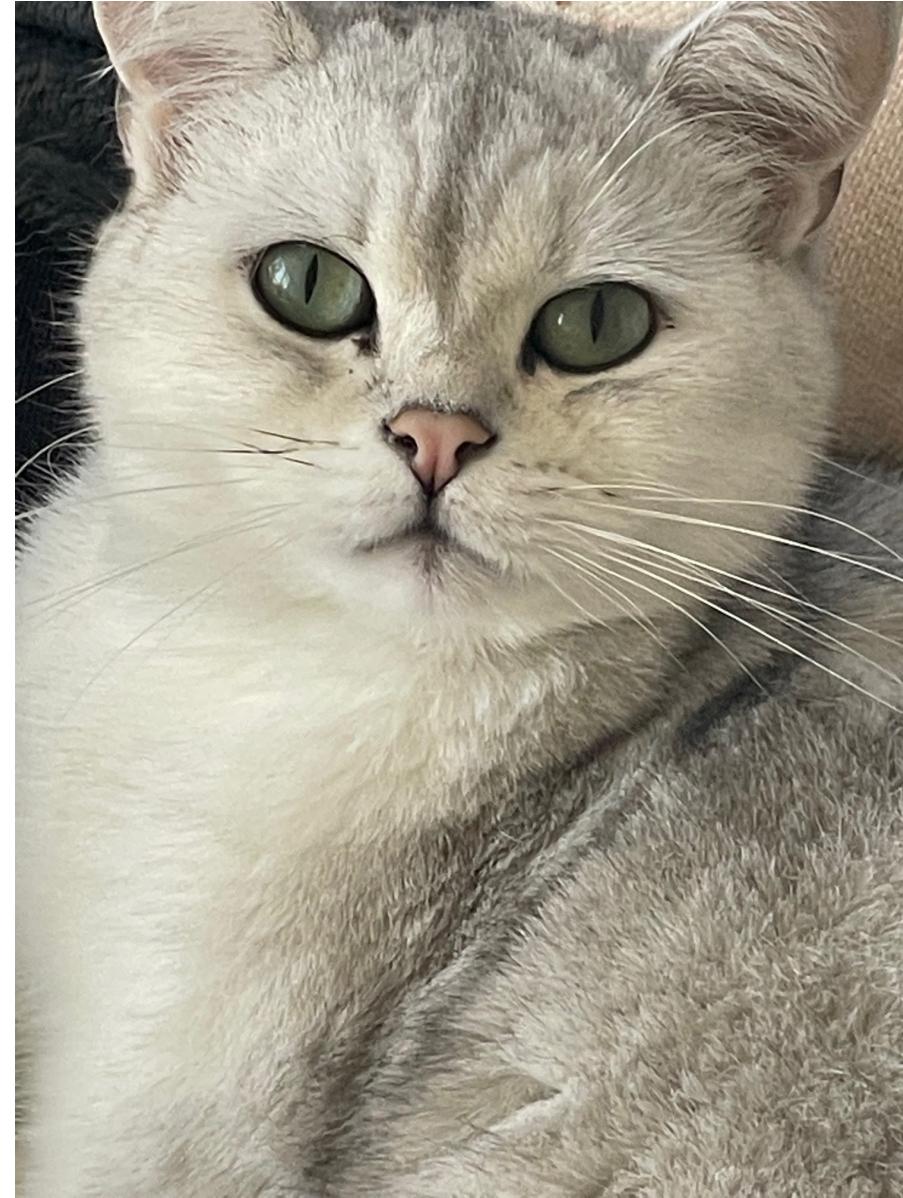


# MY CATS:





Milky

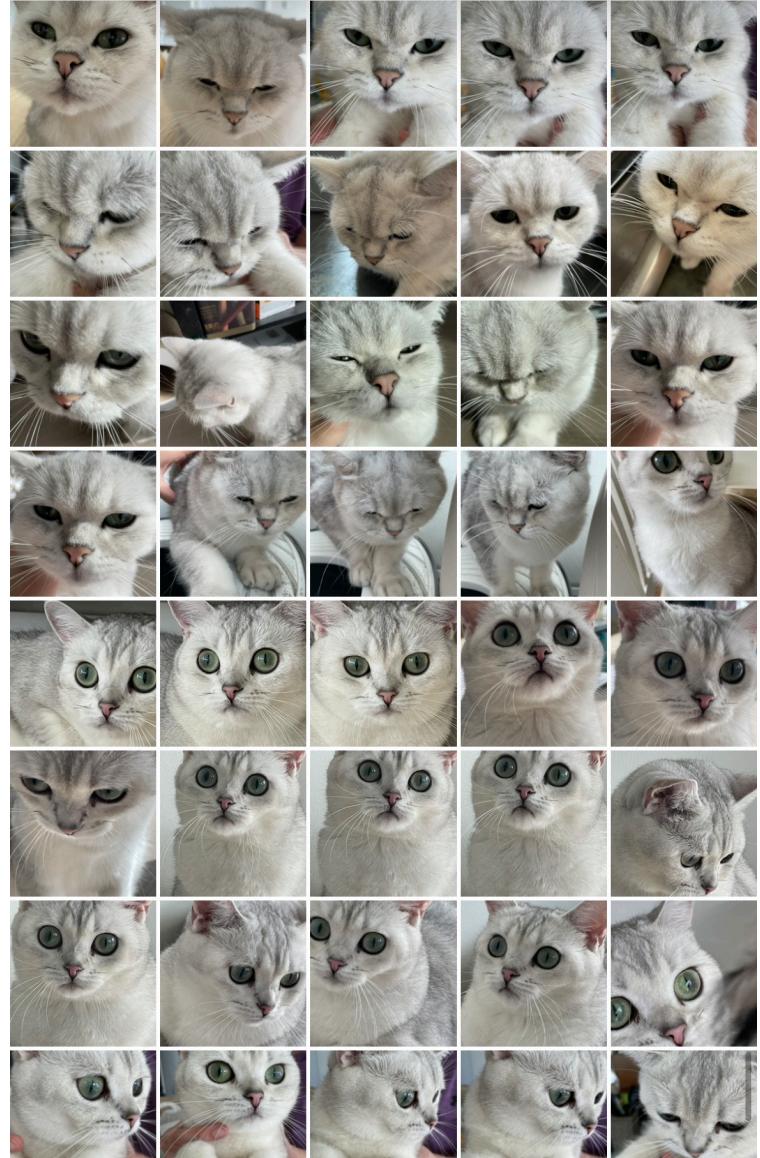
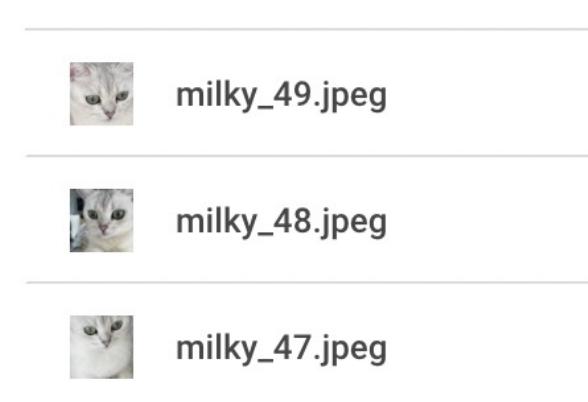


Cookie



# THE DATASET

- The photo were taken only on the face, to avoid the influence of background information
- 50 images for each cat
- Random shuffle, 30 train, 10 validation, 10 test
- Using OS package, to create the following directory:
- Train/validation/test -> cookie/milky -> cookie\_i



# PREPROCESSING

- Rescale: 1/255, because RGB is in [0, 255]
- Resize: (192, 192, 3)
- Train batch size: 10, validation batch size: 4
- Data augmentation:
  - rotation\_range: 40
  - width\_shift\_range: 0.2
  - Height\_shift\_range: 0.2



# MY MODEL:

```
> Model: "sequential_2"
```

Layer (type)	Output Shape	Param #
<hr/>		
conv2d_8 (Conv2D)	(None, 190, 190, 32)	896
max_pooling2d_8 (MaxPooling 2D)	(None, 95, 95, 32)	0
conv2d_9 (Conv2D)	(None, 93, 93, 64)	18496
max_pooling2d_9 (MaxPooling 2D)	(None, 46, 46, 64)	0
conv2d_10 (Conv2D)	(None, 44, 44, 128)	73856
max_pooling2d_10 (MaxPooling 2D)	(None, 22, 22, 128)	0
conv2d_11 (Conv2D)	(None, 20, 20, 128)	147584
max_pooling2d_11 (MaxPooling 2D)	(None, 10, 10, 128)	0
flatten_2 (Flatten)	(None, 12800)	0
dense_4 (Dense)	(None, 512)	6554112
dense_5 (Dense)	(None, 2)	1026
<hr/>		
Total params:	6,795,970	
Trainable params:	6,795,970	
Non-trainable params:	0	

```
3  
4 model = models.Sequential()  
5 model.add(layers.Conv2D(32, (3, 3), activation='relu',  
6 input_shape=(192, 192, 3)))  
7 model.add(layers.MaxPooling2D((2, 2)))  
8  
9 model.add(layers.Conv2D(64, (3, 3), activation='relu'))  
10 model.add(layers.MaxPooling2D((2, 2)))  
11  
12 model.add(layers.Conv2D(128, (3, 3), activation='relu'))  
13 model.add(layers.MaxPooling2D((2, 2)))  
14  
15 model.add(layers.Conv2D(128, (3, 3), activation='relu'))  
16 model.add(layers.MaxPooling2D((2, 2)))  
17  
18 model.add(layers.Flatten())  
19 model.add(layers.Dense(512, activation='relu'))  
20 model.add(layers.Dense(2, activation='sigmoid'))
```

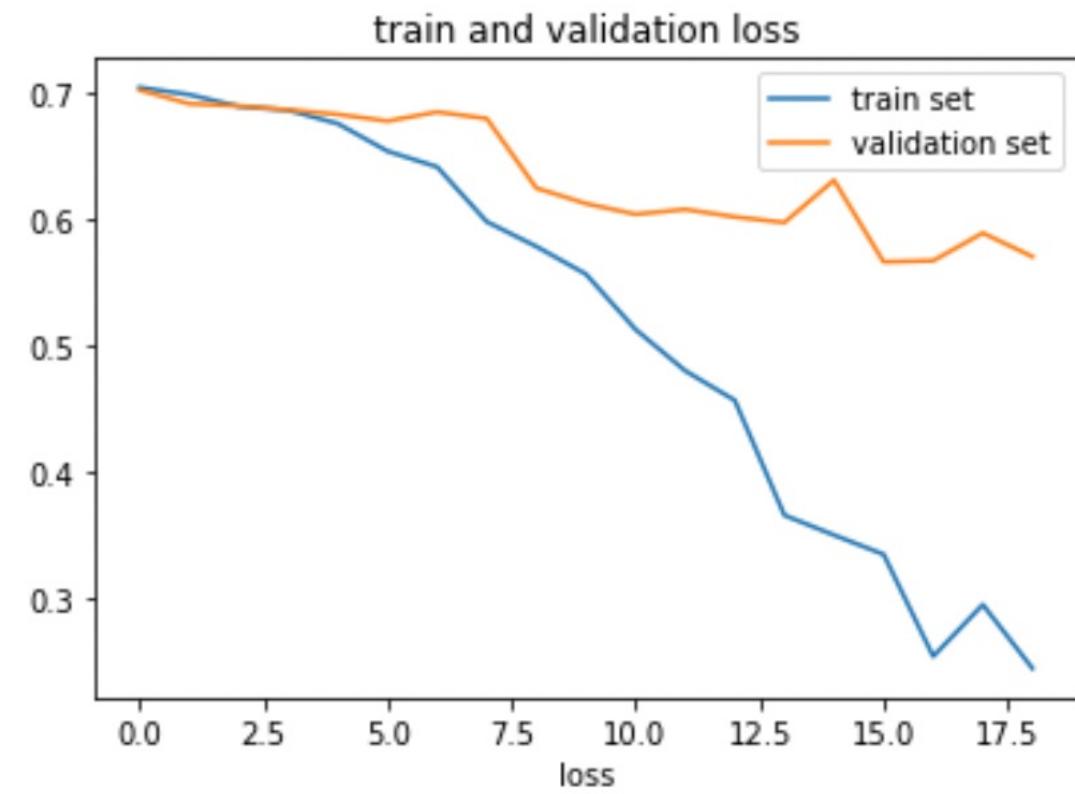
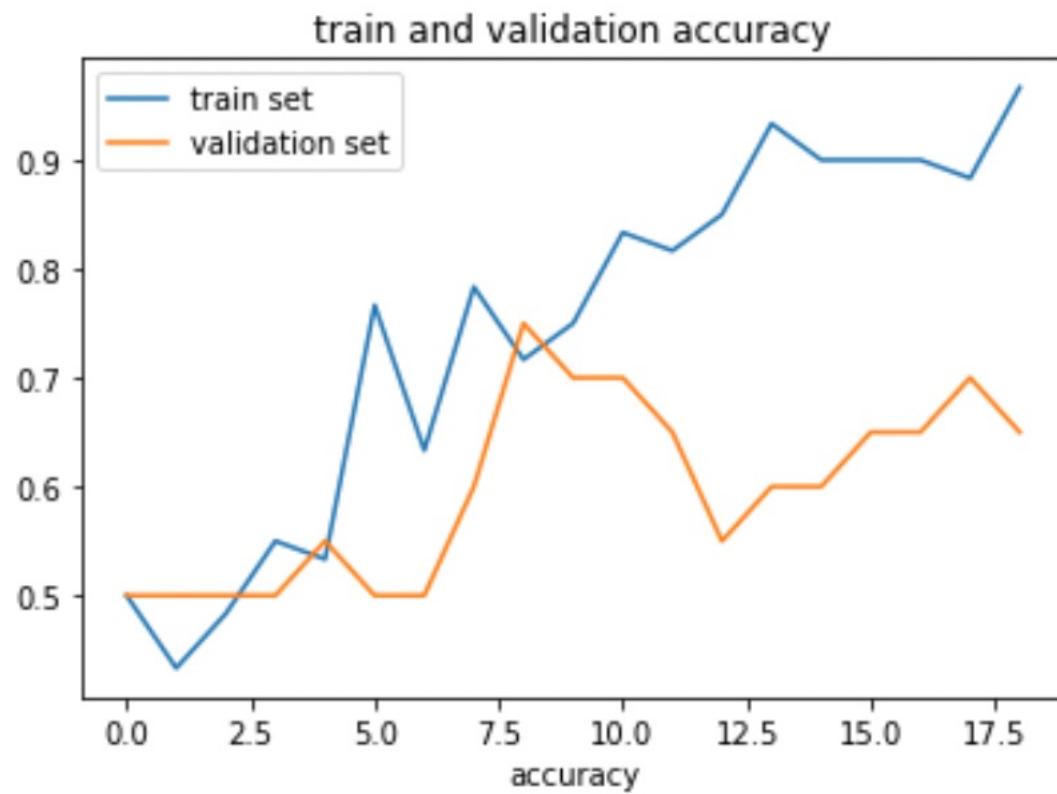


# TRAINING THE MODEL:

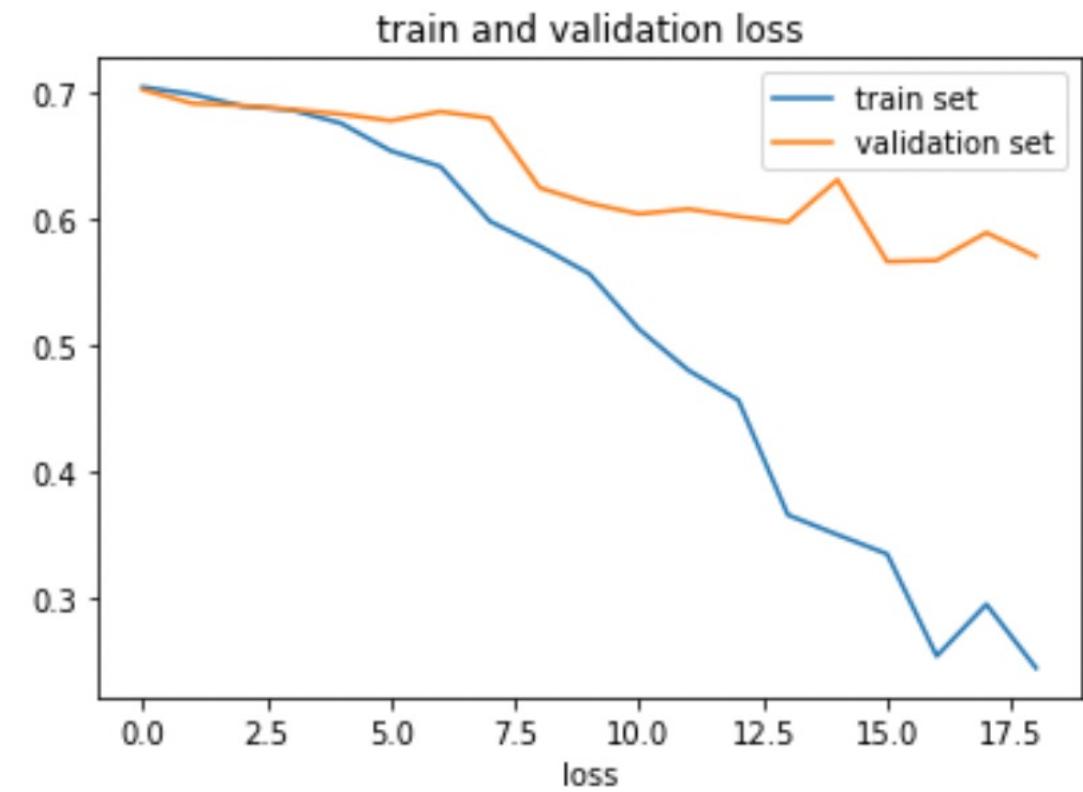
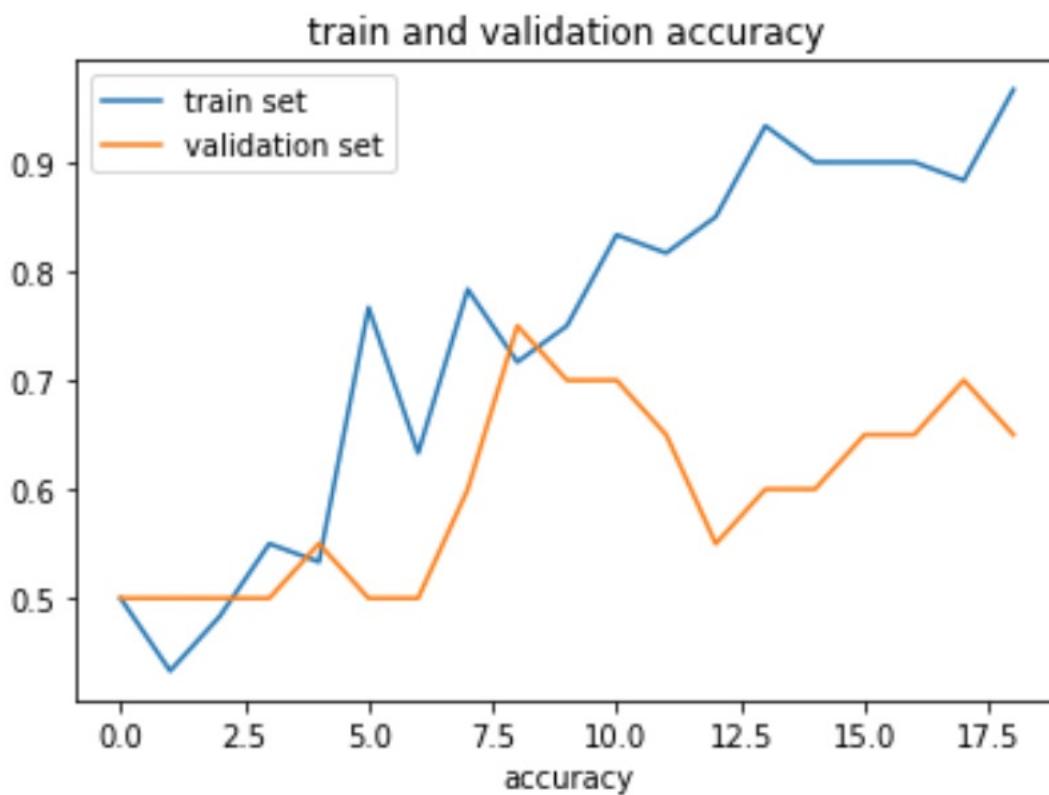
- Loss: binary cross entropy loss
- Optimizer: RMSprop with learning rate  $1^{^-4}$
- Early stopping based on the validation loss, stopping training when `val_loss` no longer decrease for three epoch
- Train the model for 20 epochs



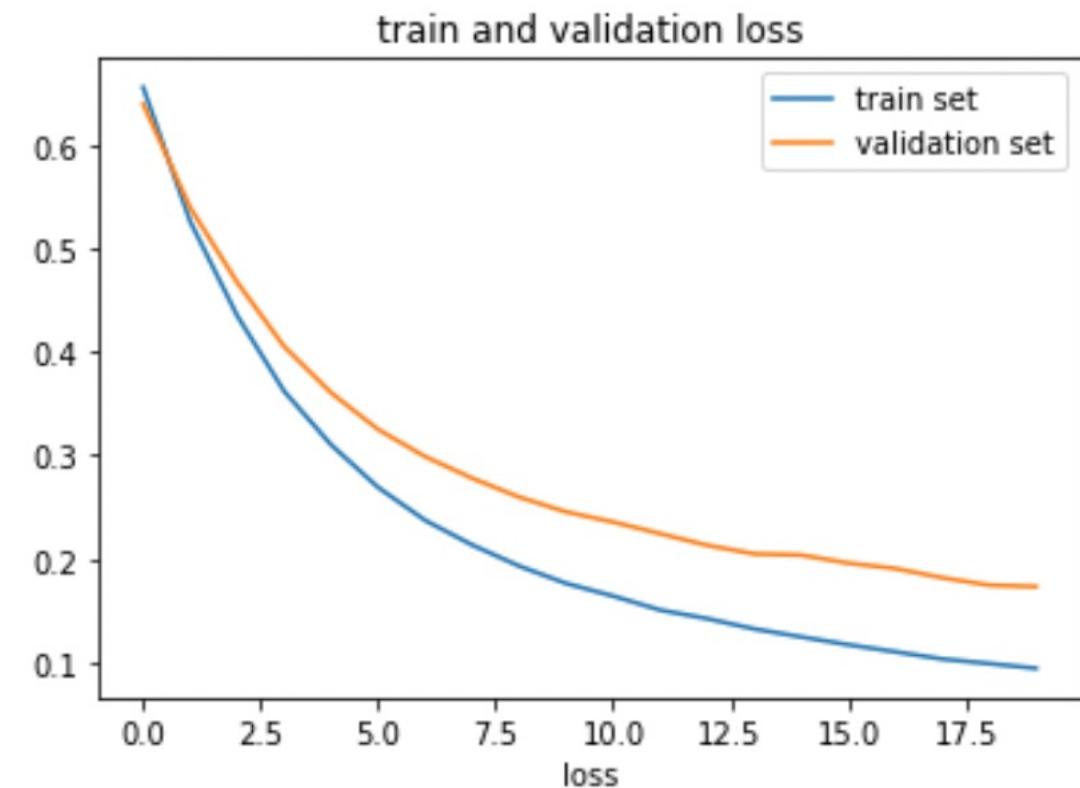
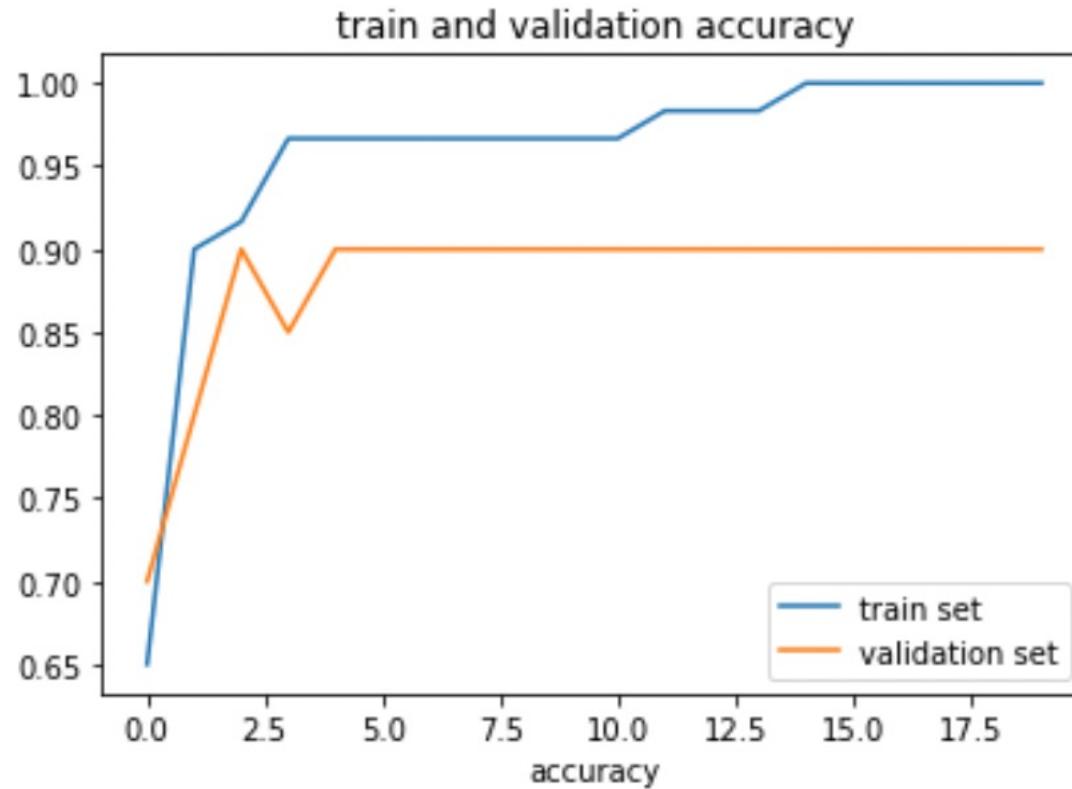
# MODEL1: MY MODEL WITH NO AUGMENTATION



# MODEL2: MY MODEL WITH AUGMENTATION



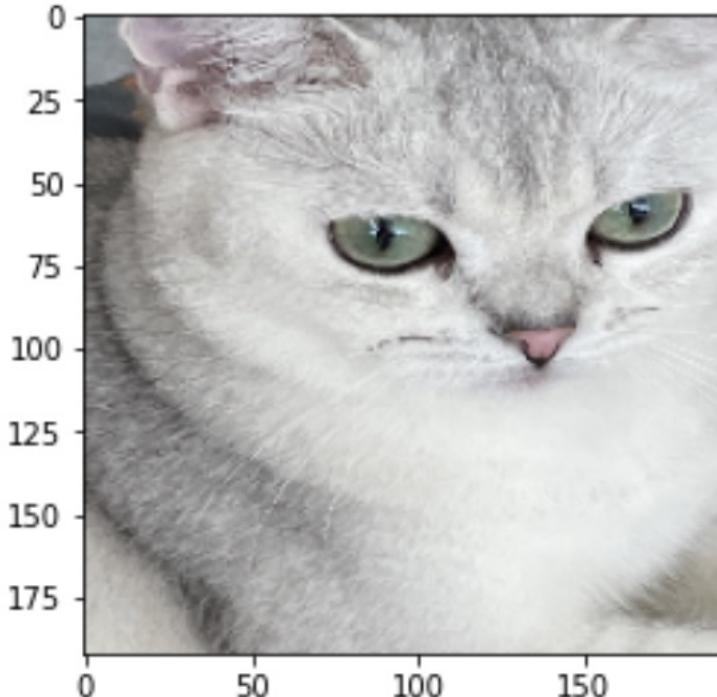
# MODEL3: MOBILENETV2 WITH MY DENSE NO AUGMENTATION



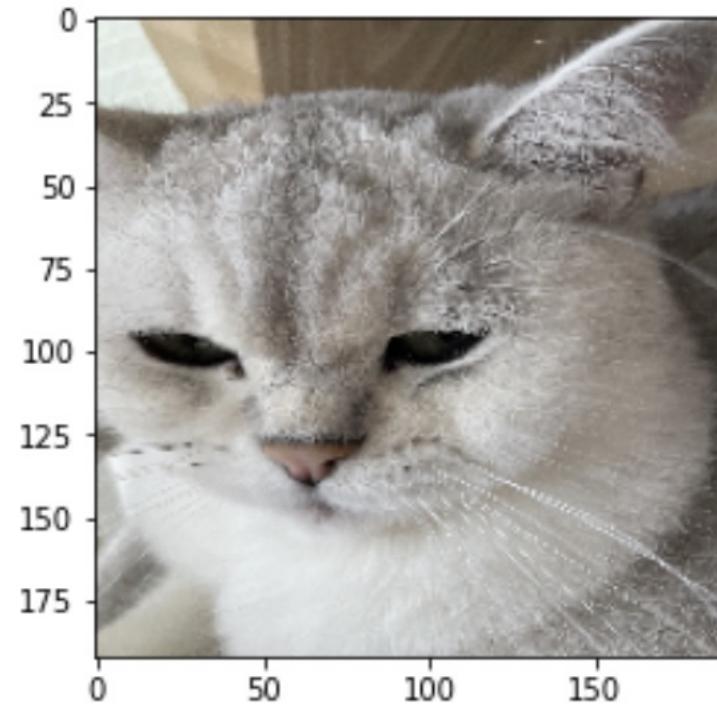
# PERFORMANCE ON THE TEST SET

- Accuracy on the test set is: 0.95
- Some examples:

The true label is: milky  
The prediction label is: milky



The true label is: cookie  
The prediction label is: cookie

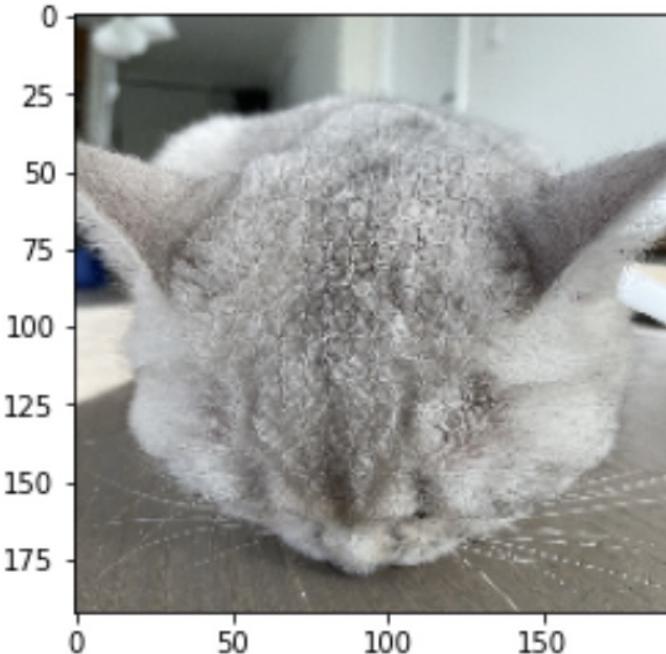


# PERFORMANCE ON THE TEST SET

- Accuracy on the test set is: 0.95
- Some examples:

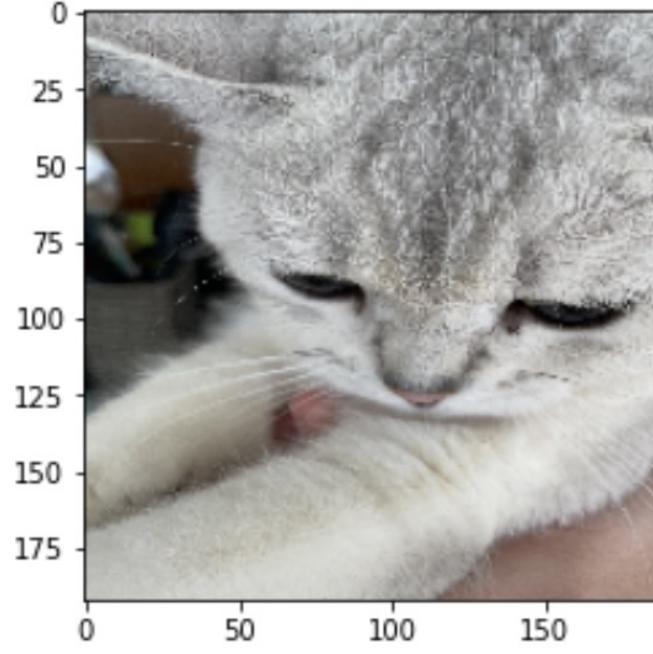
The true label is: milky

The prediction label is: milky



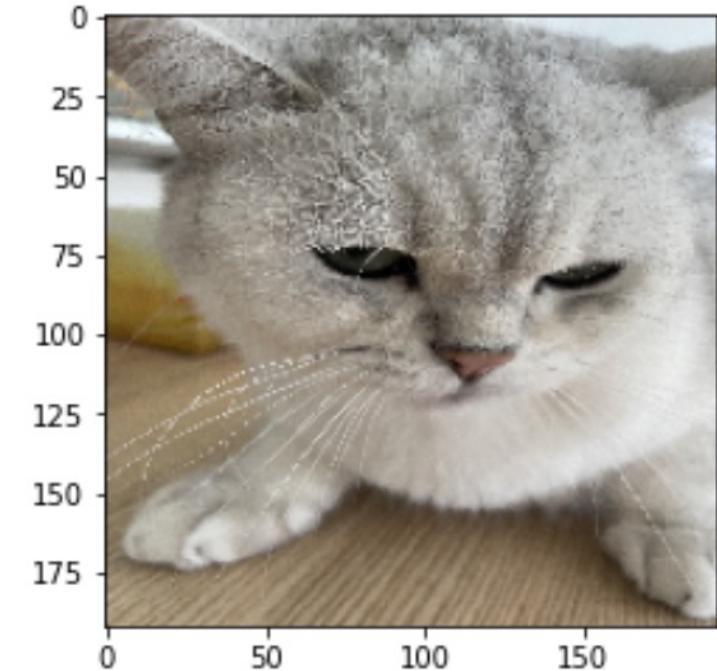
The true label is: milky

The prediction label is: cookie



The true label is: cookie

The prediction label is: cookie



# APPLICATIONS:

- Can be used for family with multi-pets, to monitor the the performance of each pet.
- Improvement: reduce the number of dataset that is required to train the model

