

```
from keras.models import Sequential
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
from keras.layers import Dense
from keras.models import model_from_json
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
batch_size = 32
```

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
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```
# All images will be rescaled by 1./255
train_datagen = ImageDataGenerator(rescale=1/255)
```

```
# Flow training images in batches of 128 using train_datagen generator
train_generator = train_datagen.flow_from_directory(
    'body', # This is the source directory for training images
    target_size=(200, 200), # All images will be resized to 200 x 200
    batch_size=batch_size,
    # Specify the classes explicitly
    classes = ['00-front','01-rear','02-side'],
    # Since we use categorical_crossentropy loss, we need categorical labels
    class_mode='categorical')
```

```
import tensorflow as tf
#cnn Model
model = tf.keras.models.Sequential([
    # Note the input shape is the desired size of the image 200x 200 with 3 bytes color
    # The first convolution
    tf.keras.layers.Conv2D(16, (3,3), activation='relu', input_shape=(200, 200, 3)),
    tf.keras.layers.MaxPooling2D(2, 2),
    # The second convolution
    tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # The third convolution
    tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # The fourth convolution
```

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tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
tf.keras.layers.MaxPooling2D(2,2),
# The fifth convolution
tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
tf.keras.layers.MaxPooling2D(2,2),
# Flatten the results to feed into a dense layer
tf.keras.layers.Flatten(),
# 128 neuron in the fully-connected layer
tf.keras.layers.Dense(128, activation='relu'),
# 5 output neurons for 5 classes with the softmax activation
tf.keras.layers.Dense(5, activation='softmax')
])

model.summary()

from tensorflow.keras.optimizers import RMSprop
early = tf.keras.callbacks.EarlyStopping(monitor='val_loss',patience=5)
model.compile(loss='categorical_crossentropy',
              optimizer=RMSprop(lr=0.001),
              metrics=['accuracy'])

total_sample=train_generator.n

n_epochs = 20

history = model.fit_generator(
    train_generator,
    steps_per_epoch=int(total_sample/batch_size),
    epochs=n_epochs,
    verbose=1)

model.save('body.h5')

acc = history.history['accuracy']

loss = history.history['loss']

```

```
epochs = range(1, len(acc) + 1)

# Train and validation accuracy
plt.plot(epochs, acc, 'b', label=' accuracy')

plt.title(' accuracy')
plt.legend()

plt.figure()

# Train and validation loss
plt.plot(epochs, loss, 'b', label=' loss')
plt.title(' loss')
plt.legend()
plt.show()
```