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CNN

reference : https://medium.com/@chenycy/a-simple-convolutional-neural-network-cnn-classifier-based-on-real-images-084110d52c18

In [ ]:
```
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.optimizers import RMSprop
import os
import matplotlib.pyplot as plt
```

In [ ]:
```
# Define dataset path
dataset_path = "Car-Bike-Dataset"

# Image Data Generator
train_datagen = ImageDataGenerator(
    rescale=1.0/255,
    validation_split=0.2
)

train_generator = train_datagen.flow_from_directory(
    dataset_path,
    target_size=(150, 150),
    batch_size=20,
    class_mode='binary',
    subset='training'
)

validation_generator = train_datagen.flow_from_directory(
    dataset_path,
    target_size=(150, 150),
    batch_size=20,
    class_mode='binary',
    subset='validation'
)

# Build CNN model
model = keras.Sequential([
    tf.keras.layers.Conv2D(16, (3,3), activation='relu', input_shape=(150, 150, 3))
      tf.keras.layers.MaxPooling2D(2,2),
      tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
      tf.keras.layers.MaxPooling2D(2,2),
      tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
      tf.keras.layers.MaxPooling2D(2,2),
      tf.keras.layers.Flatten(),
      tf.keras.layers.Dense(512, activation='relu'),
      tf.keras.layers.Dense(1, activation='sigmoid')  # Binary classification (Car
])

# Compile model
model.compile(optimizer=RMSprop(learning_rate=1e-4), loss='binary_crossentropy', me

# Train model
history = model.fit(train_generator, epochs=10, validation_data=validation_generato

# Plot Accuracy & Loss Graphs
plt.figure(figsize=(12, 5))

# Plot Training & Validation Accuracy
plt.subplot(1, 2, 1)
plt.plot(history.history['accuracy'], label='Train Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
```

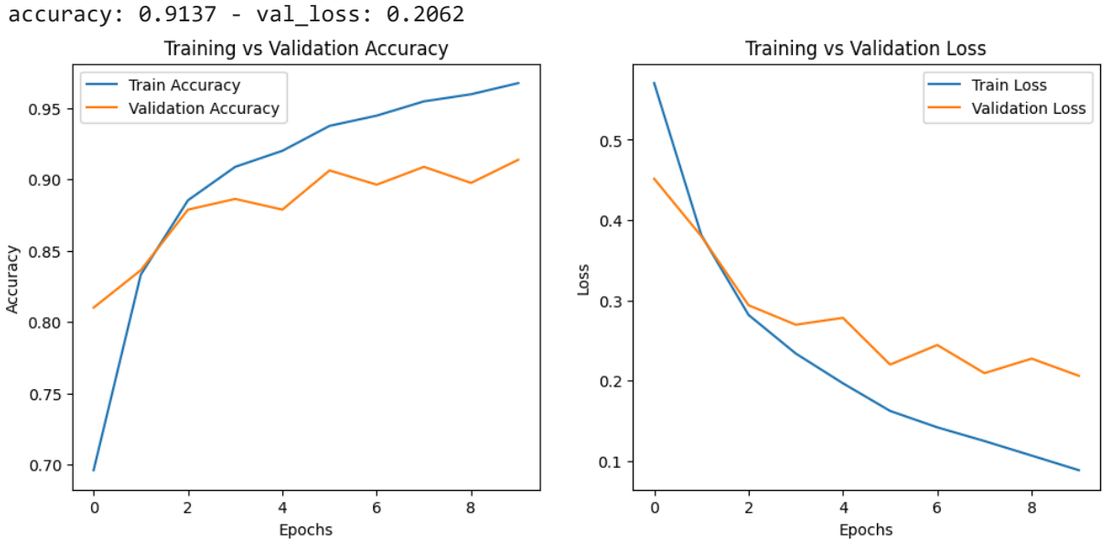
```
plt.title('Training vs Validation Accuracy')
plt.legend()

# Plot Training & Validation Loss
plt.subplot(1, 2, 2)
plt.plot(history.history['loss'], label='Train Loss')
plt.plot(history.history['val_loss'], label='Validation Loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.title('Training vs Validation Loss')
plt.legend()

# Show the plots
plt.show()

# Save the model for future use
model.save("car_bike_classifier.h5")
```

```
Found 3200 images belonging to 2 classes.
Found 800 images belonging to 2 classes.
Epoch 1/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 18s 111ms/step - accuracy: 0.6187 - loss: 0.6401 - val_
accuracy: 0.8100 - val_loss: 0.4515
Epoch 2/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 18s 110ms/step - accuracy: 0.8229 - loss: 0.4030 - val_
accuracy: 0.8363 - val_loss: 0.3800
Epoch 3/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 18s 110ms/step - accuracy: 0.8883 - loss: 0.2869 - val_
accuracy: 0.8788 - val_loss: 0.2941
Epoch 4/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 17s 107ms/step - accuracy: 0.9136 - loss: 0.2342 - val_
accuracy: 0.8863 - val_loss: 0.2698
Epoch 5/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 17s 107ms/step - accuracy: 0.9117 - loss: 0.2044 - val_
accuracy: 0.8788 - val_loss: 0.2784
Epoch 6/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 17s 109ms/step - accuracy: 0.9388 - loss: 0.1579 - val_
accuracy: 0.9062 - val_loss: 0.2202
Epoch 7/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 17s 107ms/step - accuracy: 0.9401 - loss: 0.1445 - val_
accuracy: 0.8963 - val_loss: 0.2446
Epoch 8/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 18s 109ms/step - accuracy: 0.9624 - loss: 0.1096 - val_
accuracy: 0.9087 - val_loss: 0.2095
Epoch 9/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 17s 106ms/step - accuracy: 0.9634 - loss: 0.1070 - val_
accuracy: 0.8975 - val_loss: 0.2276
Epoch 10/10
160/160 ━━━━━━━━━━━━━━━━━━━━ 17s 107ms/step - accuracy: 0.9695 - loss: 0.0902 - val_
accuracy: 0.9137 - val_loss: 0.2062
```




```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or `keras.
saving.save_model(model)`. This file format is considered legacy. We recommend using
instead the native Keras format, e.g. `model.save('my_model.keras')` or `keras.savin
g.save_model(model, 'my_model.keras')`.
```