fire1

September 30, 2024

```
[ ]: !pip install tensorflow
```

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from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call
drive.mount("/content/drive", force_remount=True).
```

```python
import os
os.listdir('/content/drive/My Drive/')
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```

```python
dataset_path='/content/drive/My Drive/Fire-Detection'
os.listdir(dataset_path)
```

```
['0', '1']
```

```python
from tensorflow.keras.preprocessing.image import ImageDataGenerator

# Define ImageDataGenerator for train and validation
datagen = ImageDataGenerator(
    rescale=1./255,  # Normalize the images
    validation_split=0.2  # Use 20% of images for validation
)

# Load training images
train_generator = datagen.flow_from_directory(
    dataset_path,  # Path to the folder in Google Drive
    target_size=(224, 224),  # Resize to 224x224
    batch_size=32,  # Batch size
    class_mode='binary',  # Binary classification (fire vs. non-fire)
    subset='training'  # 80% of data for training
```

```
    )

    # Load validation images
    validation_generator = datagen.flow_from_directory(
        dataset_path,  # Path to the folder in Google Drive
        target_size=(224, 224),
        batch_size=32,
        class_mode='binary',
        subset='validation'  # 20% of data for validation
    )
```

```
Found 521 images belonging to 2 classes.
Found 130 images belonging to 2 classes.
```

```python
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense,
 ↪Dropout

# Build the CNN model
model = Sequential([
    Conv2D(32, (3, 3), activation='relu', input_shape=(224, 224, 3)),  # First
 ↪convolutional layer
    MaxPooling2D(pool_size=(2, 2)),  # Max pooling layer

    Conv2D(64, (3, 3), activation='relu'),  # Second convolutional layer
    MaxPooling2D(pool_size=(2, 2)),  # Max pooling layer

    Conv2D(128, (3, 3), activation='relu'),  # Third convolutional layer
    MaxPooling2D(pool_size=(2, 2)),  # Max pooling layer

    Flatten(),  # Flatten the output
    Dense(128, activation='relu'),  # Fully connected layer
    Dropout(0.5),  # Dropout for regularization
    Dense(1, activation='sigmoid')  # Output layer for binary classification
])
```

```python
model.compile(
    optimizer='adam',  # Adam optimizer
    loss='binary_crossentropy',  # Loss function for binary classification
    metrics=['accuracy']  # Metric to evaluate
)
```

```python
# Train the model
history = model.fit(
    train_generator,  # Training data generator
    steps_per_epoch=train_generator.samples // train_generator.batch_size,  #
 ↪Steps per epoch
```

```
    epochs=10,   # Number of epochs (you can adjust this based on your needs)
    validation_data=validation_generator,   # Validation data generator
    validation_steps=validation_generator.samples // validation_generator.
 ↪batch_size   # Steps for validation
)
```

```
Epoch 1/10
16/16                79s 4s/step -
accuracy: 0.7087 - loss: 0.9954 - val_accuracy: 0.8359 - val_loss: 0.4806
Epoch 2/10
16/16                3s 6ms/step -
accuracy: 0.9688 - loss: 0.1695 - val_accuracy: 0.5000 - val_loss: 1.0142
Epoch 3/10
16/16                74s 4s/step -
accuracy: 0.8232 - loss: 0.3562 - val_accuracy: 0.8281 - val_loss: 0.3758
Epoch 4/10
16/16                4s 6ms/step -
accuracy: 0.8750 - loss: 0.3285 - val_accuracy: 1.0000 - val_loss: 0.1628
Epoch 5/10
16/16                73s 4s/step -
accuracy: 0.8594 - loss: 0.3095 - val_accuracy: 0.8359 - val_loss: 0.3226
Epoch 6/10
16/16                5s 6ms/step -
accuracy: 0.8750 - loss: 0.3978 - val_accuracy: 1.0000 - val_loss: 0.1283
Epoch 7/10
16/16                70s 4s/step -
accuracy: 0.9062 - loss: 0.2631 - val_accuracy: 0.8281 - val_loss: 0.3375
Epoch 8/10
16/16                4s 7ms/step -
accuracy: 0.9375 - loss: 0.1706 - val_accuracy: 0.5000 - val_loss: 0.4688
Epoch 9/10
16/16                71s 4s/step -
accuracy: 0.9222 - loss: 0.1978 - val_accuracy: 0.9141 - val_loss: 0.2161
Epoch 10/10
16/16                3s 6ms/step -
accuracy: 0.8750 - loss: 0.2467 - val_accuracy: 1.0000 - val_loss: 0.1907
```

```python
# Evaluate the model
val_loss, val_accuracy = model.evaluate(validation_generator)
print(f"Validation Loss: {val_loss}, Validation Accuracy: {val_accuracy}")
```

```
5/5                6s 971ms/step -
accuracy: 0.9184 - loss: 0.2245
Validation Loss: 0.24641849100589752, Validation Accuracy: 0.9076923131942749
```
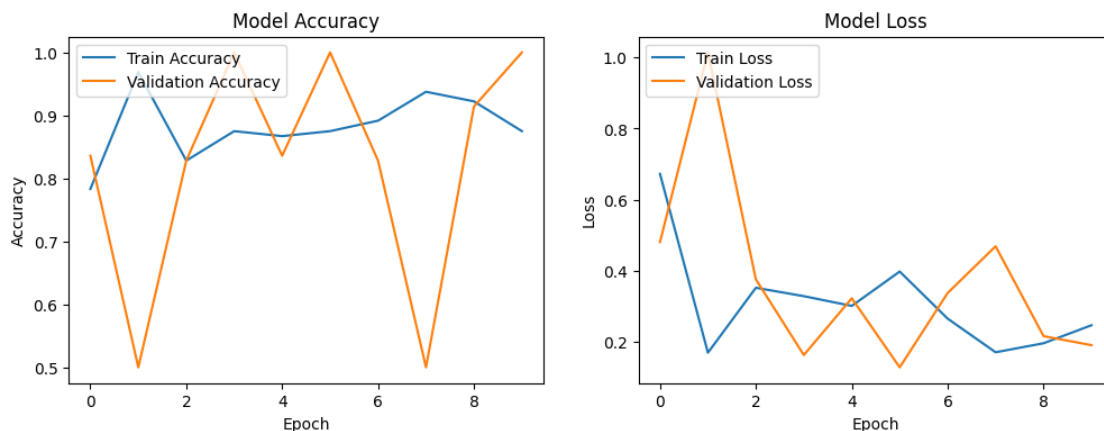
```python
import matplotlib.pyplot as plt
```

```python
# Plot training & validation accuracy values
plt.figure(figsize=(12, 4))
plt.subplot(1, 2, 1)
plt.plot(history.history['accuracy'], label='Train Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.title('Model Accuracy')
plt.ylabel('Accuracy')
plt.xlabel('Epoch')
plt.legend(loc='upper left')

# Plot training & validation loss values
plt.subplot(1, 2, 2)
plt.plot(history.history['loss'], label='Train Loss')
plt.plot(history.history['val_loss'], label='Validation Loss')
plt.title('Model Loss')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(loc='upper left')

plt.show()
```



```python
# Load an image for prediction (example)
from tensorflow.keras.preprocessing import image
import numpy as np

# Load an image
img_path = ''  # Change to the path of your image
img = image.load_img(img_path, target_size=(224, 224))  # Load and resize image
img_array = image.img_to_array(img)  # Convert to array
img_array = np.expand_dims(img_array, axis=0)  # Add batch dimension
img_array /= 255.0  # Normalize the image
```

```python
# Make predictions
prediction = model.predict(img_array)
predicted_class = 'Fire' if prediction[0][0] > 0.5 else 'Non-Fire'
print(f"Predicted class: {predicted_class}")
```

```
1/1                0s 63ms/step
Predicted class: Fire
```

[ ]: