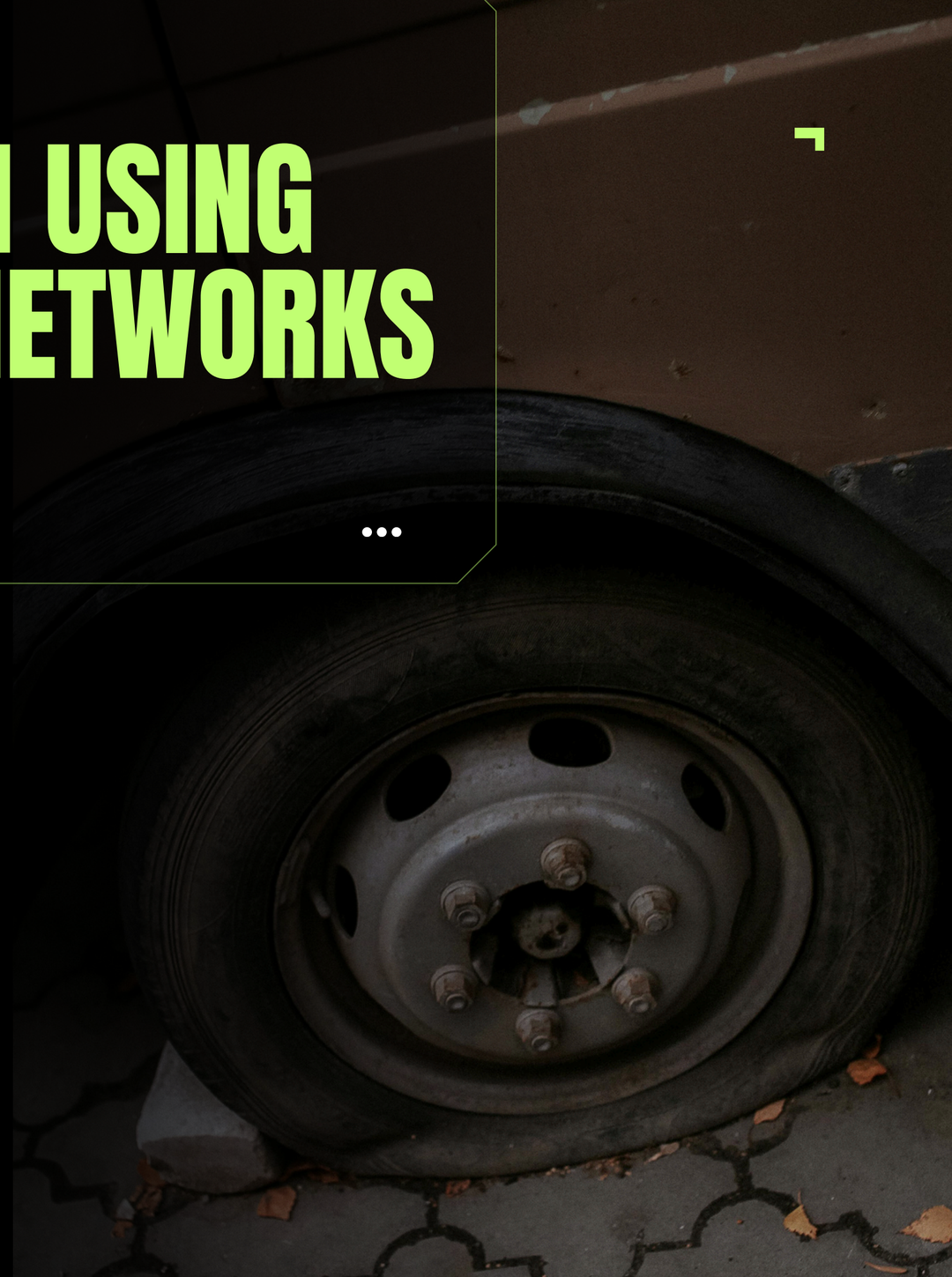
TIRE CONDITION DETECTION USING CONVOLUTIONAL NEURAL NETWORKS

DEEP LEARNING PROJECT



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WHY AUTOMATED TIRE INSPECTION?

FOR QUALITY CONTROL

- Manual inspection is time-consuming and subjective
- Human error leads to inconsistent quality control

FOR SAFETY REASONS

- Flat tires cause accidents, injuries, and deaths
- Automated detection prevents dangerous conditions

DATASET & METHODOLOGY

DATASET

Total Images: 900 tire images
Classes: 3 categories (Flat, Full, No-tire)
Split: 80% training (720), 20% validation (180)
Resolution: 240×240 pixels
Format: RGB images (.jpg)

DATA AUGMENTATION

Rotation (±10°), zoom (±10%), horizontal flip
Pixel normalization to [0,1] range
automated train/validation split

CNN DESIGN & IMPLEMENTATION

ARCHITECTURE

nput: 240×240 images
Classification head with dropout regularization

MODEL ARCHITECTURE

KEY COMPONENTS

Conv2D layers: 32→64→128 filters
MaxPooling2D for spatial reduction
Dense layers: 128 units → 3 outputs

```
Trainable params: 12,938,819 (49.36 MB)
```

CONFIGURATION

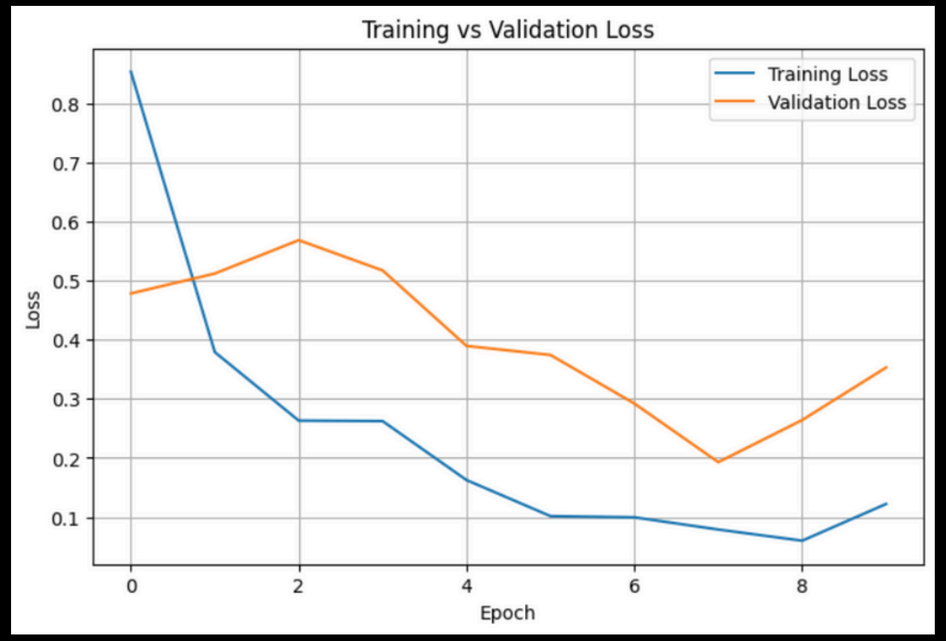
Optimizer: Adam
Loss: Categorical Crossentropy
Batch Size: 32

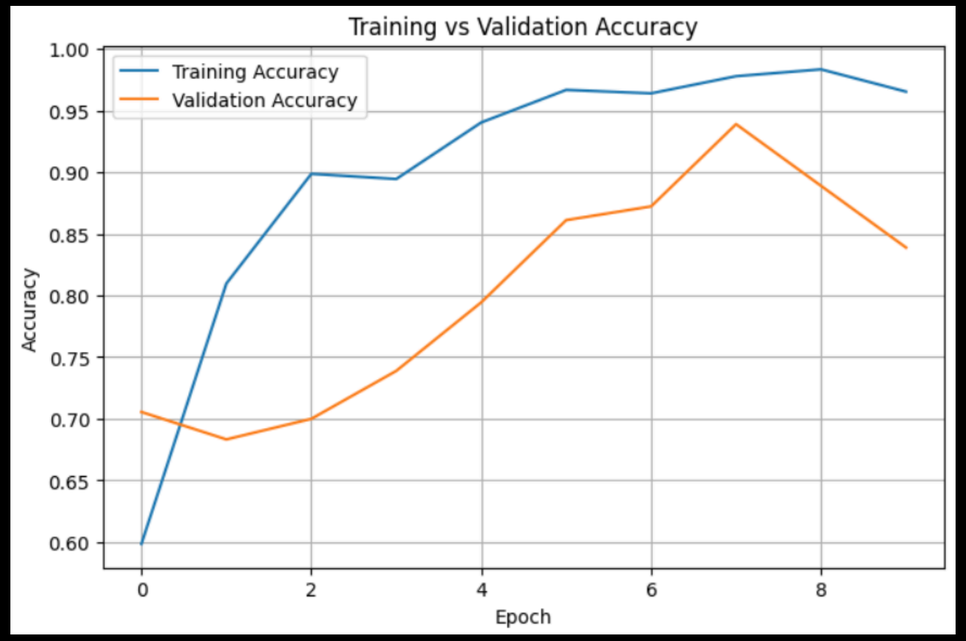
KEY ACHIEVEMENTS

```
Epoch 5/10
23/23 ━━━━━━━━━━━━━━━━━━━━ 20s 862ms/step - accuracy: 0.9403 - loss: 0.1625 - val_accuracy: 0.7944 - val_loss: 0.3894
Epoch 6/10
23/23 ━━━━━━━━━━━━━━━━━━━━ 21s 923ms/step - accuracy: 0.9667 - loss: 0.1016 - val_accuracy: 0.8611 - val_loss: 0.3741
Epoch 7/10
23/23 ━━━━━━━━━━━━━━━━━━━━ 23s 1s/step - accuracy: 0.9639 - loss: 0.0995 - val_accuracy: 0.8722 - val_loss: 0.2920
Epoch 8/10
23/23 ━━━━━━━━━━━━━━━━━━━━ 23s 998ms/step - accuracy: 0.9778 - loss: 0.0789 - val_accuracy: 0.9389 - val_loss: 0.1928
Epoch 9/10
23/23 ━━━━━━━━━━━━━━━━━━━━ 23s 979ms/step - accuracy: 0.9833 - loss: 0.0600 - val_accuracy: 0.8889 - val_loss: 0.2641
Epoch 10/10
23/23 ━━━━━━━━━━━━━━━━━━━━ 23s 974ms/step - accuracy: 0.9653 - loss: 0.1222 - val_accuracy: 0.8389 - val_loss: 0.3530
```

Peak Validation Accuracy: 93.89%
Stable Convergence: No severe overfitting

KEY ACHIEVEMENTS





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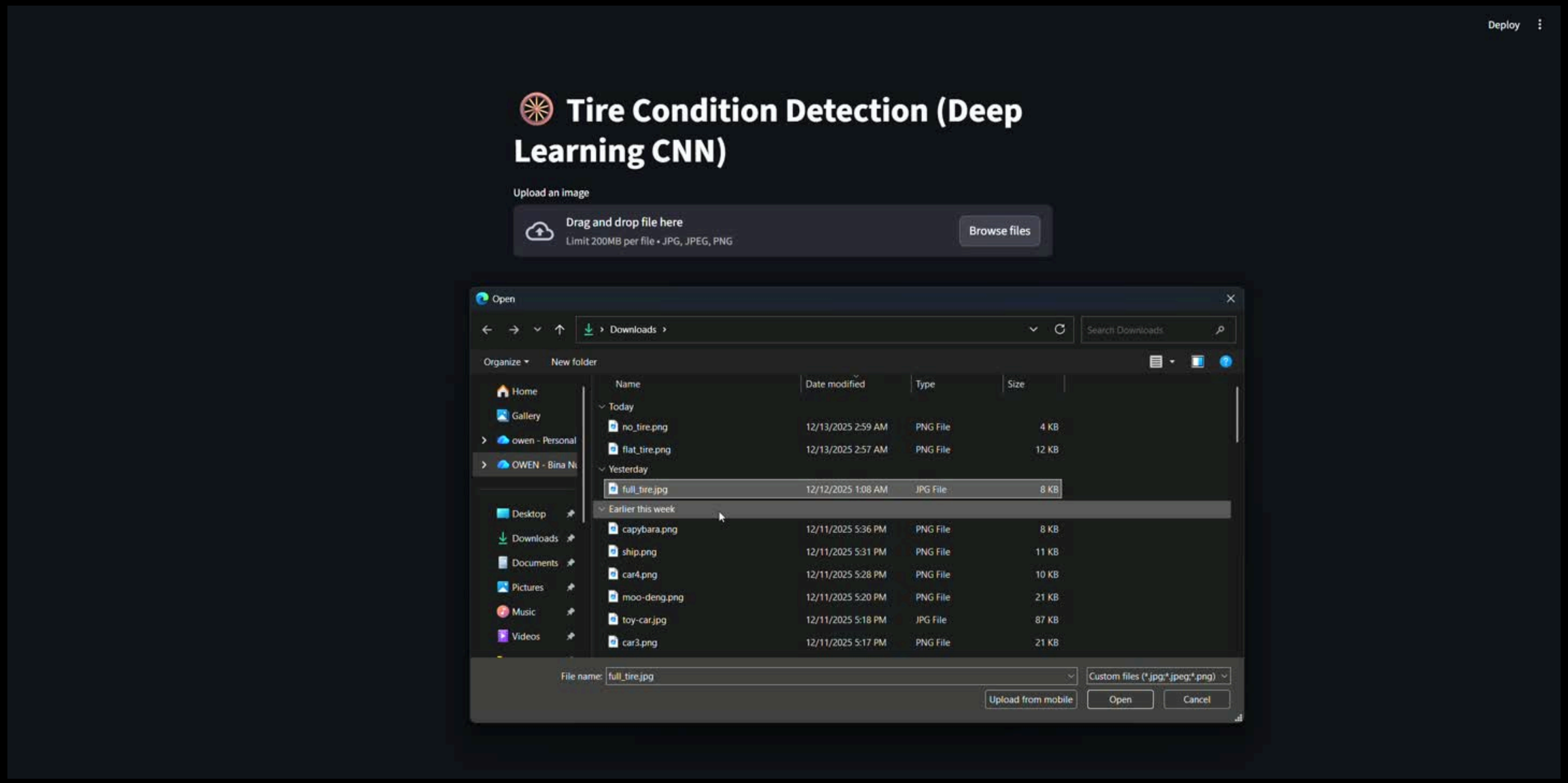
DEMO VIDEO


Deploy
Tire Condition Detection (Deep Learning CNN)
Upload an image
Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG
Browse files
Open
Downloads
Search Downloads
Organize
New folder
Home
Gallery
owen - Personal
OWEN - Bina Ni
Desktop
Downloads
Documents
Pictures
Music
Videos
Name
Date modified
Type
Size
Today
no_tire.png 12/13/2025 2:59 AM PNG File 4 KB
flat_tire.png 12/13/2025 2:57 AM PNG File 12 KB
Yesterday
full_tire.jpg 12/12/2025 1:08 AM JPG File 8 KB
Earlier this week
capybara.png 12/11/2025 5:36 PM PNG File 8 KB
ship.png 12/11/2025 5:31 PM PNG File 11 KB
car4.png 12/11/2025 5:28 PM PNG File 10 KB
moo-deng.png 12/11/2025 5:20 PM PNG File 21 KB
toy-car.jpg 12/11/2025 5:18 PM JPG File 87 KB
car3.png 12/11/2025 5:17 PM PNG File 21 KB
File name: full_tire.jpg
Custom files (*.jpg;*.jpeg;*.png)
Upload from mobile
Open
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