ML Lab

Lab 14 - Submission

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Branch: CSE

Sem: V

Section: C

Screenshots:

```
Classes: ['paper', 'rock', 'scissors']
Total images: 2188
Training images: 1750
Test images: 438
```

```
RPS_CNN(
  (conv_block): Sequential(
    (0): Conv2d(3, 16, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (1): ReLU()
    (2): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
    (3): Conv2d(16, 32, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (4): ReLU()
    (5): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
    (6): Conv2d(32, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (7): ReLU()
    (8): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
  )
  (fc): Sequential(
    (0): Flatten(start_dim=1, end_dim=-1)
    (1): Linear(in_features=16384, out_features=256, bias=True)
    (2): ReLU()
    (3): Dropout(p=0.3, inplace=False)
    (4): Linear(in_features=256, out_features=3, bias=True)
  )
)
```

```
Epoch 1/10, Loss = 0.6832
Epoch 2/10, Loss = 0.2241
Epoch 3/10, Loss = 0.1154
Epoch 4/10, Loss = 0.0533
Epoch 5/10, Loss = 0.0359
Epoch 6/10, Loss = 0.0288
Epoch 7/10, Loss = 0.0081
Epoch 8/10, Loss = 0.0094
Epoch 9/10, Loss = 0.0145
Epoch 10/10, Loss = 0.0262
Training complete!
```

```
Test Accuracy: 98.40%
```

```
Randomly selected images:
Image 1: /content/dataset/paper/eaOtD5yLQHTuFTz3.png
Image 2: /content/dataset/scissors/nHMXDFvdVQ8Vb0F7.png

Player 1 shows: paper
Player 2 shows: scissors

RESULT: Player 2 wins! scissors beats paper
```

```
Randomly selected images:
Image 1: /content/dataset/scissors/kC1AoCFrvaMKlTDk.png
Image 2: /content/dataset/scissors/SMQFKEq55U7752xf.png

Player 1 shows: scissors
Player 2 shows: scissors

RESULT: Draw
```

Analysis Questions

1) Introduction

- The objective of this lab was to design, train, and evaluate a Convolutional Neural Network (CNN).
- It classified images of hand gestures into rock, paper, or scissors.

2) Model Architecture

- Convolution Layers with 3 blocks.
- Each block reduces the image size from 128×128 down to 16×16.

3) Training & Performance

- 10 Epochs with Learning Rate of 0.001.
- Final Test Accuracy was 98.4%.

4) Conclusion & Analysis

- The CNN achieved 98% accuracy in classifying rock, paper, and scissors gestures.
- Challenges included ensuring correct input dimensions and preventing overfitting.
