

Exp 2

Test case

```
import tensorflow as tf
from tensorflow.keras import datasets, layers, models
import numpy as np

# Load Fashion-MNIST dataset
(train_images, train_labels), (test_images, test_labels) = datasets.fashion_mnist.load_data()

# Class names for reference
class_names = ['T-shirt', 'Trouser', 'Pullover', 'Dress', 'Coat',
               'Sandal', 'Shirt', 'Sneaker', 'Bag', 'Ankle boot']

# Normalize pixel values
train_images = train_images / 255.0
test_images = test_images / 255.0

# Reshape for CNN input
train_images = train_images.reshape((train_images.shape[0], 28, 28, 1))
test_images = test_images.reshape((test_images.shape[0], 28, 28, 1))

# Build CNN model
model = models.Sequential([
    layers.Conv2D(32, (3, 3), activation='relu', input_shape=(28, 28, 1)),
    layers.MaxPooling2D((2, 2)),
    layers.Conv2D(64, (3, 3), activation='relu'),
    layers.MaxPooling2D((2, 2)),
    layers.Flatten(),
    layers.Dense(64, activation='relu'),
    layers.Dense(10, activation='softmax')
])

# Compile model
model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])

# Train model (few epochs for demo)
model.fit(train_images, train_labels, epochs=3, validation_split=0.1, verbose=2)

# Predict on first 4 test samples
predictions = model.predict(test_images[:4])
predicted_labels = np.argmax(predictions, axis=1)

# Print results in table format
print("\n=== CNN Prediction Results (Add-On Experiment) ===")
print("Input Image\tTrue Label\tPredicted Label\tCorrect (Y/N)")

for i in range(4):
    true_label_name = class_names[test_labels[i]]
    predicted_label_name = class_names[predicted_labels[i]]
    correct = "Y" if predicted_labels[i] == test_labels[i] else "N"
    print(f"{true_label_name}\t{true_label_name}\t{predicted_label_name}\t{correct}")
```

Output:

```
** Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-labels-idx1-ubyte.gz
29515/29515 ————— 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-images-idx3-ubyte.gz
26421880/26421880 ————— 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-labels-idx1-ubyte.gz
5148/5148 ————— 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-images-idx3-ubyte.gz
4422102/4422102 ————— 0s 0us/step
/usr/local/lib/python3.11/dist-packages/keras/src/layers/convolutional/base_conv.py:113: UserWarning: Do not pass an `input`
super().__init__(activity_regularizer=activity_regularizer, **kwargs)
Epoch 1/3
1688/1688 - 52s - 31ms/step - accuracy: 0.8222 - loss: 0.4884 - val_accuracy: 0.8685 - val_loss: 0.3696
Epoch 2/3
```