Image Classification Using CNN on FMNIST Dataset

Discover the power of Convolutional Neural Networks (CNN) in accurately classifying images using the Fashion-MNIST (FMNIST) dataset, achieving an impressive 91% accuracy.

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Introduction

- Briefly explain the significance of image classification
- Introduce the Fashion-MNIST (FMNIST) dataset: a comprehensive collection of clothing images

Convolutional Neural Networks (CNN)

- Explore the architecture of CNN and its wide-ranging applications in image classification
- Provide an overview of the layers commonly used in CNN models

Explaining the CNN architecture

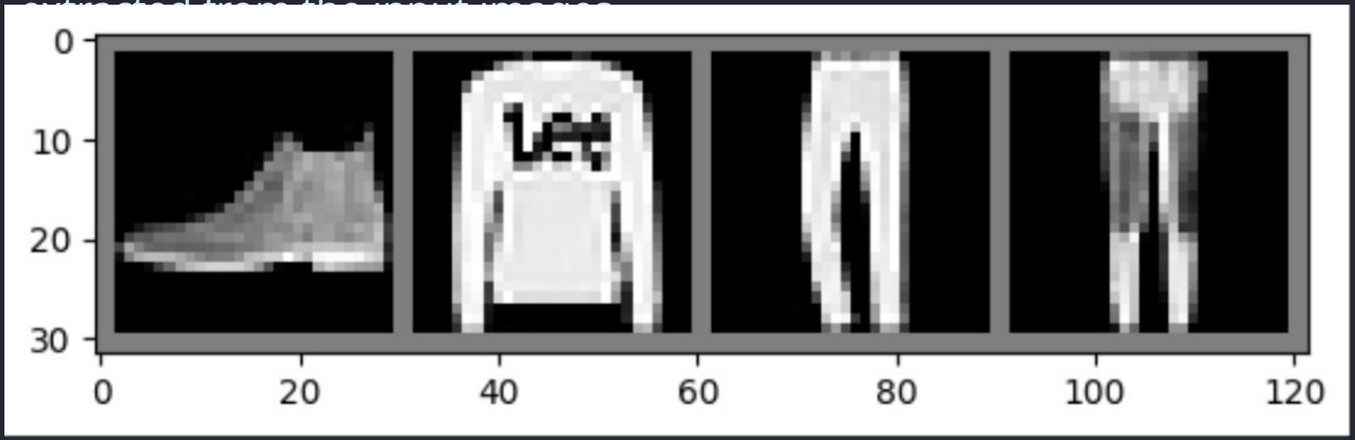
The CNN architecture consists of an input layer, hidden layers, and an output layer. Hidden layers typically include convolutional, pooling, and fully connected layers. These layers work together to extract features from the input images and classify them accurately.

In a CNN model, the convolutional layers detect various patterns and features in the input images through convolution operations, while the pooling layers downsample the feature maps to reduce computational complexity. The fully connected layers learn the high-level representations and make the final classifications based on the extracted features. By applying these layers sequentially, CNNs can achieve highly accurate image classification results.

The architecture of a CNN typically includes multiple convolutional layers, each followed by a pooling layer. The convolutional layers apply filters to the input images to extract different features, while the pooling layers reduce the dimensions of the feature maps. These layers are designed to progressively learn and extract more complex and meaningful patterns from the images, allowing the CNN to achieve better classification accuracy.

FMNIST Dataset

The FMNIST dataset, also known as Fashion-MNIST, is a popular benchmark dataset for image classification tasks. It consists of 60,000 training images and 10,000 testing images, with each image belonging to one of the 10 different clothing categories. The CNN model can be trained on this dataset to accurately classify the clothing items based on the features extracted from the input images.



Training and Evaluation

- Discuss the preprocessing steps involved in preparing the FMNIST dataset
- Show how a CNN model is trained on the preprocessed dataset
- Evaluate the model's performance using accuracy as a metric

Training-

Created with PyTorch, this CNN is trained for 5 epochs.

During training, the model's weights are updated using the backpropagation algorithm and the gradient descent optimizer. The loss function used is commonly cross-entropy loss, which helps to minimize the difference between the predicted and actual class labels. After the training process, the model's performance can be evaluated.

Results and Discussion

- Highlight the remarkable achievement of 91% accuracy on the FMNIST dataset
- Compare the results with existing models or benchmarks to showcase the effectiveness of CNN