BE - 53 Siddhesh Samgir

Deep Learning

Assignment No - 3

TSSM

Page No

Title - Use MNIST fashion Dataset & create a Classifier to classify fashion clothing into categories.

Objective - Student should be able to classify movie review into positive review & negative review IMDB Dataset.

Prerequisite -

1. Basic of programming language
2. Concept of classification
3. Concept of Deep Neural Network

What is classification?

Classification is a type of supervised learning in machine learning that involve categorizing data into predefined classes or categories based on set of feature or characteristics. It is used to predict the class of new, unseen data based on the pattern learned from the labelled training data.

In classification, a model is trained on a labeled dataset, where each data point has a known class label. The model learn to associate the input features with the corresponding class label & can then be used to classify new, unseen data.

e.g. we can use classification to identify whether an e-mail is spam or not based on its content & metadata, to

predict whether a patient has a disease based on their medical record & symptoms or to classify images into different categories on their visual feature.

Example - Classification is a common task in deep neural networks, where the goal is a predict the class of an input based on its feature. The MNIST dataset contains 60,000 training image & 10,000 testing image of handwritten digit from 0 to 9. Each image is a grayscale 28x28 pixel image, & the task is classify each image into one of the 10 classes corresponding to the 10 digit.

What is CNN -

Convolutional Neural Network (CNN,) are commonly used of image classification tool. & they are designed to automatically learn & extract feature from input image.

In a typical CNN architecture of image classification, there a several layers, including convolutional layers, pooling layer, & fully connected layer, here diagram of simple CNN architecture for the digit classification task.

The input to the network is an image of size 28x28 pixel, & the o/p is a probability distribution over 10 possible digit (0 to 9).

The pooling layers in the CNN downsample the feature maps, reducing the spatial dimensions of the data. This help to reduce the No. of

During training, the network learns the optimal value of the filter & parameter by minimizing a loss function. This is typical done using gradient descent or a similar optimization algorithms.

Image classification - CNN are commonly used for image classification tasks, such as identifying object in images & recognizing faces.

Object Detection - CNN can be used for object detection in image in image & video, which involve identifying the location of object in an image & drawing bounding boxes around them.

Semantic Segmentation - CNN can be used for semantic segmentation, which involve partitioning image into segment & assigning each segment label.

Natural language Processing - CNN can be used for natural language processing tasks, such as sentiment analysis & text classification.

Medical imaging - CNN are used in medical imaging for task such a diagnosing disease from x-ray & identifying tumour from MRI scans.

Autonomous Vehicle - CNN are used in autonomous for task such as object & detection & lane detection.

of the neuron in the network during training.
fully connected layer - take a flattened output
from the last pooling layer & perform classificat
task by o/p & probability distribution over the possible c

MNIST Dataset:

The MNIST fashion Dataset is a collection
of 70,000 grayscale images of 28 x 28 pixel.
representing 10 different categories of clothi
& accessories. the categories include T-sh
The dataset is often used as benchmark
for testing image classification algorithm, & it
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handwritten digit.

he MNIST fashion dataset is a collection of 70,000 The grayscale image of 28 x 28 pixel each. There image represent 10 different categories of clothing & accesories - with each category containing 7,000 image.

T-shirts/tops
Trousers
Pullover
Dresses
Coats
Sandals
Shirts
Sneakers
Bags
Ankle boots

The image were obtained from Zalandos online store & are preprocessed to be normalized & centered.

The MNIST fashion dataset is often as a used as a benchmarks for testing image classification & it considered a more challenging version of a original MNIST dataset which contains handwritten digit. The dataset is widely learning community for research & educational purpose.

Here are the general step of perform CNN on the MNIST fashion dataset -

- Import the necessary libraries, including TensorFlow, Keras, Numpy & Matplotlib
- Load the dataset using Keras's built in function keras.dataset, fashion_mnist.load_data(). This will provide the training & testing set while will be used to train & evaluate the CNN.
- Define the CNN architecture including the no of size of filter activation function & pooling layer. This can vary based on the specific problem being addressed.
- Compile the model by specifying the loss function, optimizer & evalution metric. common choice include categorical cross entropy. Adam optimizer & accuracy metric
- Train the CNN on the training set using the fit() function. specifying the no. of epoch & batch size.
- Use the trained model to make prediction on new image if desired using the predict() function

Conclusion -

In this way we can classify fashion clothing into categorie using CNN.