Experiment 1- Documentation

By - AMAN
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Introduction

This project focuses on recognizing handwritten digits using a dataset (likely MNIST). The notebook processes image and label files, converts them into a structured format, and prepares them for model training.

Prerequisites

- Python
- Google Colab (if running online)
- Required libraries: `numpy`, `matplotlib`, `time`

Steps Involved

1. Uploading Files

The dataset is uploaded using Google Colab's file upload function:

```
from google.colab import files
uploaded = files.upload()
```

2. Importing Libraries

Essential libraries for processing and visualization:

```
import numpy as np
import time
import matplotlib.pyplot as plt
%matplotlib inline
```

3. Converting Data Format

A function `convert()` processes image and label files into a CSV format:

```
def convert(imgf, labelf, outf, n):
    f = open(imgf, "rb")
    o = open(outf, "w")
    l = open(labelf, "rb")

    f.read(16)  # Skipping header bytes
    l.read(8)   # Skipping label metadata
    images = []

    for i in range(n):
        image = [ord(l.read(1))]  # Read label
        for j in range(28*28):    # Read pixel values
            image.append(ord(f.read(1)))
        images.append(image)

    for image in images:
        o.write(",".join(str(pix) for pix in image) + "\n")

    f.close()
    o.close()
    l.close()
```

This function reads binary image and label files, extracts pixel data, and saves them in CSV format for easier handling.

Conclusion

This notebook provides a foundation for handwritten digit recognition by preprocessing image and label data. Further steps could involve training a machine learning model using this structured data.