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Description automatically generated

Advanced

Artificial Intelligence

Report

Chosen Topic: Image Classification

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This project is about teaching a computer program to recognize handwritten numbers. Imagine you write a number on a piece of paper, and then you show it to a computer. This project is making a system that can look at your number and say, "Ah, that's a 3!" or "That's a 7!"

Here's a breakdown of what I did in each step:

Setting Up: I first gathered all the tools I needed, like TensorFlow (a big toolbox for machine learning) and other helpers for math and drawing graphs.

Getting the Numbers: I used a famous set of images called MNIST. This set has lots of small pictures, each showing a handwritten digit from 0 to 9. I divided these pictures into two groups: one to teach the computer (training set) and one to test how well it learned (testing set).

Building the Brain: I built a model, kind of like a small brain, that can learn from these images. This model has layers that can find patterns, remember them, and then use these patterns to identify the numbers.

Teaching the Model: I showed my model the training pictures over and over, each time letting it learn a little more about how each digit looks.

Checking the Learning: After teaching the model, I wanted to see how well it learned. I showed it the test pictures, the ones it hadn't seen before, and checked if it could recognize the digits correctly.

Improving and Experimenting: I tried different ways to make my model smarter. I changed some settings, like how it should think about the pictures and how much it should remember at once.

Visualizing Mistakes: I looked at some pictures the model got wrong. This helped me understand what kind of numbers it finds tricky.

Trying Advanced Techniques: I used some extra things, like data augmentation (changing the training pictures a bit each time so the model sees more variety) and transfer learning (using knowledge from a different but related task to help my model learn better).

Throughout this project, the goal was to make a computer program that can look at a handwritten number and identify it correctly, just like a human would do. I used images of numbers, taught a model to recognize them, tested its abilities, and tried different methods to make it as good as possible at this task.