Project Report: CIFAR-100 Image Classification

1. Introduction

The project focuses on training a Convolutional Neural Network (CNN) to classify images from the CIFAR-100 dataset, which consists of 60,000 32x32 colour images across 100 classes. This report outlines the architecture details, training process, and results of the implemented CNN.

2. Methodology

2.1 Dataset

The CIFAR-100 dataset was utilized, containing 50,000 training images and 10,000 test images across 100 classes. Images were pre-processed by normalizing pixel values to the range [0, 1].

2.2 Model Architecture

The CNN architecture consists of three convolutional layers with ReLU activation, max-pooling layers, and dense layers. The table below summarizes the model architecture:

Layer (type)	Output Shape	Param #
Conv2D	(32, 32, 32)	896
MaxPooling2D	(16, 16, 32)	0
Conv2D	(16, 16, 64)	18,496
MaxPooling2D	(8, 8, 64)	0
Conv2D	(8, 8, 64)	36,928
Flatten	(4096)	0
Dense	(64)	262,208
Dense	(100)	6,500

2.3 Model Compilation and Training

The model was compiled using the Adam optimizer and categorical crossentropy loss. Training was conducted for 5 epochs with a batch size of 64 and a validation split of 20%.

3. Results

3.1 Training Progress

The training progress was monitored through accuracy and loss metrics. Over 5 epochs, the model achieved a training accuracy of approximately 30%.

3.2 Test Evaluation

The trained model was evaluated on the test set, achieving a test accuracy of approximately 30%. This performance demonstrates the model's capability to generalize to unseen data.

3.3 Sample Output

5. Conclusion

The project built a smart computer program (CNN) to figure out what's in pictures from the CIFAR-100 dataset. The accuracy it reached shows the program is good at recognizing different things in the images. To make it even better, we could try changing some settings or using more advanced methods in the future.