

## Reasons How We achieve 91% Accuracy on Test Dataset

### 1. Model Architecture:

We built a model with 5 convolutional layers, incorporating a residual connection after every 2 layers. Unlike ResNet18, which was originally designed for ImageNet (images with a 224x224 dimension) and uses strided convolution for downsampling the feature maps at the beginning of each stage, we decide to maintain the original dimensions of the images in CIFAR-10 (32x32). Since the image size is already small, we avoided reducing the spatial dimensions through downsampling. Instead, we kept the feature map dimensions constant using same-padding convolutions, enabling the creation of deeper layers for better feature extraction.

### 2. Training Epochs:

The model improved progressively with the number of epochs. I trained it for 80 epochs, which allowed sufficient time for the model to learn and optimize its parameters.

### 3. Dataset and Overfitting:

CIFAR-10 consists of approximately 50,000 training samples. Given this dataset size, the use of 5 convolutional layers and residual connections did not pose a significant risk of overfitting, ensuring the model could generalize well.

### 4. Key Contribution of Residual Connections:

The most significant improvement came from the introduction of residual connections. These skip connections helped mitigate the vanishing gradient problem and enabled the network to learn deeper representations effectively. Adding residual skips boosted the accuracy from around 60% up to more than 90%, showcasing their pivotal role in the model's success.