Final Term Assignment 1
Computer Vision and Pattern Recognition

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RESULT AND DISCUSSION

1. Effects of Different Optimizers:

The provided Python code demonstrates the effects of three different optimizers:

1. Stochastic Gradient Descent (SGD),
2. Adam
3. RMSprop.

The optimizer's role is to update the model's parameters during training in order to minimize the loss function and improve accuracy. The results show that RMSprop achieved the highest accuracy of around 73.3%, followed by Adam with 72.9%, and SGD with 70.9%.

Momentum in SGD:

SGD optimizer can be enhanced by incorporating momentum, which helps accelerate the learning process and avoid getting stuck in local minima during training. The momentum value used in this code is 0.9. A higher momentum value allows the optimizer to take bigger steps in the direction of the moving average of past gradients. It can be observed that SGD with momentum achieved better accuracy compared to basic SGD without momentum.

2. Impact of Regularizers in Conv2D Layers:

Regularization techniques like L1 and L2 are used to prevent overfitting in the model. The code demonstrates the effect of applying L2 regularization to the Conv2D layer with a strength of 0.001. This means that a penalty is applied to the model's weights based on the sum of the squares of their values.

Regularization helps in reducing the model's reliance on any single feature and results in better generalization to unseen data. The accuracy of the model with L2 regularization was comparable to that without regularization, which indicates that the dataset might not be prone to severe overfitting.

3. Comparison of Data Preprocessing vs. No Preprocessing:

The code provides a function "data_preprocessing(images)" which can be used to apply preprocessing techniques like data augmentation. As a result, the accuracy with data preprocessing was slightly lower (around 72.4%) compared to the accuracy without preprocessing (around 72.9%).

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