DIP ASSIGNMENT 5

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1 Introduction:

The assignment focuses on employing a K-Nearest Neighbors (KNN) classifier with deep features extracted from a pre-trained neural network and fine-tuning the last layer of this network for enhanced image classification accuracy.

2 Methodology:

Dataset and Preprocessing: To create a dataset, the class to create dataset was created from an image file which comprised training and test images. images were transformed by normalization and resizing.

KNN Classifier Setup: A KNN classifier with k=3 was used for classifying images. The classifier operates on the deep features, leveraging their rich information.

Pre-Trained Model The chosen pre-trained model, "vision transform **vit_b_16**" was utilized to extract deep features from images. Features were obtained from the model's last fully connected layer, providing a robust representation of the image data.

Fine-Tuning Approach: The last layer of the pre-trained model was fine-tuned using the dataset at hand after adding a fully connected layer for getting prediction for training. After freezing the hidden layer and just training last layer. The model was finetuned then the fully connected layer was removed. This step aimed to adapt the model more closely to the specific characteristics of the dataset. Now getting the features after passing the images, KNN classifier was applied and accuracy was obtained.

3 Results:

Classification Accuracy: The accuracy of the image classification was calculated for both the KNN classifier with deep features and the post fine-tuning model.

PreTrained model accuracy: **99%**

FineTuned model accuracy: **99%**

4 Conclusion

The assignment demonstrates the efficacy of using deep features for image classification and the potential improvements achievable through fine-tuning. Both the model achieved the 99% accuracy as vit_b_16 is trained on very huge dataset of on ImageNet-1K.