**Data Science Project**

**Topic: CNN**

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**Project Report**

**Using Convolutional Neural Network for Image Classification**

The goal of this project is to train a convolutional neural network (CNN) for image classification using the TensorFlow library. The dataset consists of images belonging to 5 classes and is stored in the directory r'C:\Users\dell\Desktop\training\_set\training\_set'. The images are preprocessed by loading them into a tf.data.Dataset object and resizing them to (224, 224). The dataset is then split into training and validation sets, with the training set taking up 80% of the data and the validation set taking up the remaining 20%.

The CNN model consists of three convolutional layers with increasing number of filters, followed by a max pooling layer, a flatten layer, a fully connected layer with 128 units, a dropout layer for regularization, and a final fully connected layer with 5 units for the 5 classes. The model is compiled with the Adam optimizer and categorical cross-entropy loss, and is trained for 5 epochs. The model's accuracy is monitored during training.

After training for 5 epochs, the model achieved an accuracy of 98.44% on the training set. To evaluate the model's performance on the validation set, the model.evaluate method was used and the model achieved a validation accuracy of 95.7%. This indicates that the model is performing well on both the training and validation sets, and is likely to generalize well to unseen data.

To further improve the model's performance, it may be worth considering trying out different hyperparameter settings, such as the number of filters in the convolutional layers, the number of units in the fully connected layers, the dropout rate, and the optimizer. It might also be helpful to try out data augmentation techniques, such as randomly flipping, rotating, or cropping the training images, to increase the diversity of the training data and potentially improve the model's generalization ability.