**Data Collection and Preprocessing Phase**

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| Date | 15 June 2025 |
| Team ID | SWTID1749820017 |
| Project Title | Dog Breed Identification using Transfer Learning |
| Maximum Marks | 6 Marks |

**Preprocessing**

The images will be preprocessed by resizing, normalizing, augmenting, denoising, adjusting contrast, detecting edges, converting color space, cropping, batch normalizing, and whitening data. These steps will enhance data quality, promote model generalization, and improve convergence during neural network training, ensuring robust and efficient performance across various computer vision tasks.

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| **Section** | **Description** |
| Data Overview | Give an overview of the data, which you’re going to use in your project. |
| Resizing | Resize images to a specified target size. |
| Normalization | Normalize pixel values to a specific range. |
| Data Augmentation | Apply augmentation techniques such as flipping, rotation, shifting, zooming, or shearing. |
| Denoising | Apply denoising filters to reduce noise in the images. |
| Edge Detection | Apply edge detection algorithms to highlight prominent edges in the images. |
| Color Space Conversion | Convert images from one color space to another. |
| Image Cropping | Crop images to focus on the regions containing objects of interest. |
| Batch Normalization | Apply batch normalization to the input of each layer in the neural network. |
| **Data Preprocessing Code Screenshots** | |
| Loading Data |  |
| Resizing |  |
| Normalization |  |
| Data Augmentation |  |
| Denoising | The dataset (Stanford Dogs) contains high-quality, pre-curated images with minimal noise. Deep learning models like NASNet are robust to minor noise and often perform their own feature extraction. Adding denoising might blur fine breed-specific textures like fur patterns, which are important for accurate classification. |
| Edge Detection | Edge detection techniques like Canny or Sobel are designed for traditional computer vision pipelines — not deep learning. Convolutional Neural Networks (CNNs) automatically learn edge-like filters in their early layers. Explicit edge detection preprocessing can strip raw pixel information and reduce model performance. |
| Color Space Conversion | NASNet and most pre-trained CNN architectures are designed for RGB inputs (same as ImageNet, which they're trained on). Converting images to grayscale or other color spaces like HSV would remove valuable breed-identifying color patterns (like coat shades or markings), potentially lowering model accuracy. |
| Image Cropping | The images in the dataset are already fairly centered on the dog. Manual or automatic cropping might accidentally cut off important breed features like ears, tail, or posture. Instead, resizing with preserved aspect ratio and padding ensures that the entire dog remains in view for the model. |
| Batch Normalization | **NASNet** already includes batch normalization in its architecture. |