Dog vs Cat vs Bird Classifier

CSE669 Tahir Syed - Assignment 3

1. Competition Overview

This assignment requires designing an image classification model to distinguish between **dogs, cats, and birds**. Participate in the Kaggle competition hosted at:

https://www.kaggle.com/t/571920ea0e2f4c9b99b725b667afdd69.

Prepare a report detailing your approach, results, and insights.

2. Dataset Details

The dataset includes:

- **Training Set:** 40,000 labeled images (`32x32 PNG` format).
- **Test Set:** 20,000 unlabeled images.
- **Sample Submission:** Format provided in `sample_submission.csv`.

The dataset is balanced across classes. Use the `train/` and `test/` directories for development.

3. Tasks and Guidance

3.1 Data Preparation and Exploration

- Load data using `torchvision.datasets.ImageFolder` or a custom dataset loader.
- Normalize pixel values and apply standard transformations:

```
transforms.Compose([
    transforms.ToTensor(),
    transforms.Normalize(mean=[0.5], std=[0.5])
])
```

- Use augmentations like rotation, flipping, and color jitter for robustness.
- Visualize a grid of sample images from each class.

3.2 Model Development and Training

- Begin with a simple CNN as a baseline.
- Train using Cross-Entropy Loss with optimizers like SGD or Adam.
- Experiment with improvements such as:
  - Advanced architectures (e.g., ResNet, VGG).
  - Regularization (dropout, weight decay).
  - Learning rate schedulers and batch normalization.
  - Ensembling of Models.
- Split the training data into training/validation subsets to tune hyperparameters.
- Track your Experiments and show the results. You may use excel or explore tools such as `MLFlow` or `Wandb` to track your experiments.

3.3 Model Evaluation and Submission

- Generate predictions for the test set and save as: `filename,label`
- The Evaluation Metric will be Accuracy
- Maximum 10 Submissions allowed per day

3.4 Report and GitHub Repository

- **Report Structure:**:
  - Dataset preprocessing and exploration.
  - Baseline Model Development
  - Optimization Techniques
  - Transfer Learning
  - Optimization of Transfer Learning
  - Results, metrics, and insights.

4. Grading Rubric

Component	Points
Leaderboard Score & Submissions	5
Preprocessing & Model Development	5
Report	10

5. Submission Instructions

Link to a properly formatted GitHub repository containing:

- Python scripts and notebook files.
- A detailed report.

Write your report in LaTeX
Use the following template for writing your report: Template.
Groups will be of max 2 members. Deadline 31 December.