CHRIST (Deemed to be University)
Department of Computer Science
Master of Artificial Intelligence and Machine Learning

Course: MAI371 – Deep Learning
Exercise No: LAB Exercise – 5
Date: 23 – 03 – 2024
Duration: 2 Hrs

Question (10 Marks)

1)You are leading a project aimed at developing a CNN-based model to classify images of animals into their respective species. The dataset contains images of animals from five different classes: cats, dogs, birds, fish, and reptiles (or any other 5 animals). Design a comprehensive approach that encompasses data preprocessing, model architecture, and training strategy. Additionally, integrate input augmentation techniques, batch normalization, and visualization methods to enhance model performance and interpretability.

1. Data Preparation:

- Acquire a dataset comprising images of animals from various species, categorized into the five specified classes.
- Preprocess the images by resizing them to a uniform size, applying normalization, and partitioning them into training, validation, and test sets.

2. Model Architecture:

- Devise a CNN architecture tailored for image classification tasks, incorporating convolutional layers, pooling layers, fully connected layers, and suitable activation functions.
- Embed batch normalization layers after convolutional layers to expedite model convergence and improve performance.

3. Input Augmentation:

- Implement input augmentation techniques, such as random rotations, translations, flips, and changes in scale or brightness, to augment the training dataset and enhance the model's ability to generalize.

4. Training Strategy:

- Train the CNN model using an appropriate optimizer (e.g., Adam) and a relevant loss function (e.g., categorical cross-entropy).
- Monitor the training process by tracking essential metrics like training and validation accuracy, loss, and any other pertinent metrics.

5. Visualization:

- Utilize visualization tools such as TensorBoard or equivalent libraries to visualize the CNN model's architecture and parameters.

- Create visualizations, such as training/validation accuracy and loss curves, confusion matrices, and class activation maps, to facilitate the interpretation of model predictions and evaluation of performance.

Evaluation Rubrics:

- The effectiveness of the CNN architecture in accurately classifying images of animals across diverse species.**(3 Marks)**
- Proper implementation of input augmentation techniques to augment the training dataset and improve model generalization. **(2 Marks)**
- Integration of batch normalization layers and their impact on model convergence and performance. **(3 Marks)**
- Clarity and effectiveness of visualization methods in interpreting model predictions and assessing performance. **(2 Marks)**

Total:10 Marks

General Instruction:

1. Ensure that your code includes relevant comments to enhance readability and understanding. Subsequently, upload your code to GitHub for version control and collaborative access.
2. Include descriptive comments within the code, explaining its functionality and logic.
3. In the Google Classroom submission, include the GitHub URL where your code is hosted.
4. Attach a PDF document named "your_register_number_exercise_No.pdf" to the submission.The PDF document should include screenshots of the code and the output screen.
5. Upload the answer document&GitHub URL in Google Classroom on or before the deadline mentioned.Evaluation will not be considered for late submission