2024S-T3 BDM 3035 - Big Data Capstone Project 01
(DSMM Group 1 & Group 3)

Milestone Report 4

AI Image Remastering

Guide
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Overview

This week, we focused on evaluating the performance of our image restoration model and visualizing its results. Additionally, we began developing a web UI using Flask to allow users to interact with the image restoration model through a user-friendly interface.

Model Evaluation

1. **Objective**:
    - To assess the performance of the image restoration model on the validation dataset using metrics such as PSNR (Peak Signal-to-Noise Ratio) and VGG Loss.
2. **Methodology**:
    - **Model**: Real-ESRGAN model (RRDBNet architecture with a scale factor of 2x).
    - **Metrics**:
        - **PSNR**: Measures the quality of the restored images by comparing them with the high-resolution ground truth.
        - **VGG (Visual Geometry Group) Loss**: Evaluates perceptual quality using features extracted from a pre-trained VGG19 network.
    - **Process**:
        - Loaded the model and evaluated it on images from the validation set.
        - Calculated PSNR and VGG Loss for each image and aggregated the results.
3. **Results**:
    - **Average PSNR**: 32.65 dB
    - **Average VGG Loss**: 0.0628
    - **Observations**: The model performs well on general image content but shows some artifacts on human faces. Further fine-tuning or model enhancements may be necessary for improved performance in specific scenarios.
4. **Visual Inspection**:
    - Randomly selected five images from the validation set were displayed alongside their low-resolution, high-resolution, and restored versions with respective PSNR and VGG Loss values. The visual inspection confirmed that the restored images generally look good, but there are artifacts that need addressing.

Web UI Development

1. **Objective**:
    - To create a user interface that enables users to upload images, process them with the restoration model, and download the enhanced images.
2. **Current Status**:
    - Development of the Flask web UI has begun.
    - Key features include:
        - Image upload functionality
        - Image restoration processing
        - Download option for restored images
3. **Next Steps**:
    - Continue developing and testing the web UI to ensure it meets user requirements.
    - Integrate the image restoration model into the Flask application.
    - Implement additional features and refine the user experience based on feedback and testing.

Summary

This week's work involved comprehensive evaluation of the image restoration model and the beginning stages of developing a web interface for user interaction. The model's performance was assessed using PSNR and VGG Loss metrics, revealing promising results with some areas for improvement. The web UI development aims to provide an accessible platform for users to restore and download images, with further enhancements planned based on ongoing development and feedback.

GitHub Link: https://github.com/shanmugapriyan357/Big-Data-Capstone-Project-AI-Image-Remastering-

Reference Links:

https://github.com/xinntao/Real-ESRGAN

https://www.nature.com/articles/s41598-022-13658-4