Electron ML & AI Hackathon: Image Enhancement & Object Detection Challenge

Overview

The digital world is transforming at an unprecedented pace, calling for skilled innovators to tackle complex challenges. The Electron Hackathon invites you to unleash your expertise in image processing and artificial intelligence to push the limits of what's possible.

Challenge

Your mission is to develop algorithms for image enhancement and object detection that excel even when images are degraded. The challenge is divided into two distinct but connected tasks:

Task 1: Image Enhancement

- Dataset: You'll be given training and validation sets containing degraded images.
- Goal: Develop a model that significantly improves the quality of these degraded images.
- Success Metric: Your model must achieve a Peak Signal-to-Noise Ratio (PSNR) of at least 20 dB to qualify for the leaderboard. The higher your PSNR score, the more points you earn.

Task 2: Object Detection

- Dataset: You'll work with the degraded image sets. You have two options:
  - Option 1: Attempt to detect and label objects directly within the degraded images.
  - Option 2: First, use your image enhancement model (from Task 1) to improve the degraded images, and then perform object detection on the enhanced images.
- Goal: Accurately detect and label objects within the images, whether they are degraded or enhanced.
- Success Metric: Achieve an Average Precision (AP) at IoU 0.5 and Average Recall (AR) across IoU thresholds 0.5:0.95, where both scores exceed 0.35. Higher scores mean a better position on the leaderboard.

Key Points:

- The image degradation process is intentionally hidden to make the challenge realistic.
- You can use any tools and libraries you deem appropriate.

Scoring and Leaderboards

There will be five leaderboards for the competition. During the event, participants must continuously update their results on the CyberEdu platform, and there will be a public visible leaderboard. After the competition ends, the participants' models will be tested on the hidden set. The final leaderboards will be created based on these results.

Electron features several leaderboards where you can showcase your skills:

- **Image Enhancement Leaderboard:** Based on your model's PSNR performance.
- **Object Detection Leaderboard:** Based on your model's AP@IoU0.5 scores.
- **Efficiency Leaderboard for Image Enhancement:** This leaderboard focuses on inference time. Your model's efficiency will be evaluated using the following command in Windows Powershell on the test set:

```
Plaintext
Measure-Command { python inference.py --input_path input --
output_path output }
```

- **Efficiency Leaderboard for Object Detection:** This leaderboard focuses on inference time. Your model's efficiency will be evaluated using the following command in Windows Powershell on the test set:

```
Plaintext
Measure-Command { python inference.py --input_path input --
output_path output }
```

- **Presentation Leaderboard:** Evaluates your team's understanding of the technologies used, its contribution to the project, and the impact of those contributions on the results.

Important: Only the Image Enhancement Leaderboard & Object Detection Leaderboard will be available to be edited by the participants during the competition. The participants will be given evaluation scripts in order to assess their progress.

The flag is: iknowhowtoread

Final Score Calculation

Your final Electron score is calculated using a weighted formula that considers your performance across all leaderboards:

- **0.25 * Points from Image Enhancement Leaderboard**

- **0.25 * Points from Object Detection Leaderboard**
- **0.1 * Points from First Efficiency Leaderboard**
- **0.1 * Points from Second Efficiency Leaderboard**
- **0.1 * Points from Non-Technical Flags**
- **0.2 * Points from Presentation Leaderboard**

The Bigger Picture

Electron isn't merely about technical prowess; it's a testament to the power of collaboration and relentless innovation. The leaderboard is a way to gain recognition, but the true reward lies in the journey of pushing the boundaries of image processing and AI.

Let the Electron Hackathon ignite your creative spark and drive you to achieve excellence in the realms of image enhancement and object detection!