Research Plan: Winter 2024: Image recognition: A brief review

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Summary

Overview

Computer vision is a crucial area within Artificial Intelligence (AI) that enables computers to 'see' the world in ways similar to humans. The image recognition component of this field allows computers to identify and categorize objects and actions. Participants in this project will engage with foundational concepts in AI, Machine Learning, and Deep Learning.

We will use tools like LaTeX, Python, and Git repositories to create materials, reproduce experiments, and implement solutions addressing current challenges. Several websites and GitHub repositories inspire us, and we will try them ourselves for different purposes.

The next generation of scientists must be equipped to explain and implement solutions using classical AI and emerging technologies. In this project, we will develop an image recognition application across various scenarios, exploring foundational concepts in Machine Learning and Deep Learning. We will implement AI algorithms to propose solutions to societal challenges.

Intellectual Merit

This project will introduce students to the exciting field of computer vision and image recognition. Students will develop strong programming, algorithmic, and machine-learning skills by exploring diverse research topics.

Broader Impacts

This project will enhance students' expertise in machine learning, specifically computer vision and image recognition. Additionally, it will foster participation in scientific and outreach activities, promoting the dissemination of knowledge and inspiring future generations of researchers.

Objective

Develop a straightforward and engaging repository utilizing OpenCV, Scikit-image, TensorFlow for image recognition, and Keras or PyTorch for deep learning applications. Additionally, we will explore Python-based computer vision tools, focusing on image recognition.

Particular Objectives

Our team has three undergraduates, Michelle Marchesini, Jenny Perez, and Christopher Saldana, and one principal investigator, Javier Orduz, all from Earlham College. Besides, we will have two people from VillaOso [1], Juan Rivas and Diana Vanegas, who will mainly be working on the second phase of this project. All students will be working on the following objectives:

1. Review literature and repositories to assess the current state of image recognition.

2. Explore foundational concepts in image recognition and their implementation on specific devices.

3. Study neural networks, including key concepts and applications.

4. Examine convolutional neural networks, focusing on principles and applications.

5. Investigate Python packages specialized for computer vision.

Deliverables

Each student should produce one of the following documents poster to be presented in the next version of the EPIC expo, one manual to be shared online on the website [2], a repository to be shared via revise [3]; or as an alternative, a student might be part of a paper to participate in a conference.

References

[1] Colombian-community. This organization makes effort to take care of nature in Colombia. Here is the URL: `https://villaoso.org/`.

[2] Orduz, Javier. This group and its website is part of the organizations created by JO. Here is the URL: `https://quaker-ece.cs.earlham.edu/`.

[3] Orduz, Javier. This repository is part of the organizations created by JO. Here is the URL: `https://github.com/Earlham-College/`.