Exploring Semi-Supervised Learning for Precise Ophthalmic Image Classification

Project Management and Software Development
for Medical Applications

General Info

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Project Abstract

Explore advanced semi-supervised and self-learning models, reducing manual annotation efforts. Contribute to global healthcare accessibility and gain practical AI and image classification skills. Be part of the future of healthcare innovation.

Background and Motivation

At Custom Surgical [1], we're dedicated to revolutionizing ophthalmology and making eye care accessible worldwide. We are on a mission to transform the landscape of ophthalmology and ensure equitable access to eye care diagnoses. With a core focus on anterior eye diagnosis, our vision is anchored in the belief that every individual, regardless of their geographical location or economic resources, deserves timely and accurate eye care assessments.

The significance of our mission cannot be understated. Globally, eye conditions, particularly cataracts and refractive pathologies, are leading causes of preventable blindness [2]. However, a major barrier to early diagnosis and intervention is the limited access to specialized ophthalmologists. Many eye pathologies can be effectively treated through surgery, but late diagnosis remains a persistent challenge [3].

We are currently building the world's largest ophthalmology database, and our platform is already in use by various medical professionals, including ophthalmologists, odontologists, and neurosurgeons.

The aim is not only to find the most effective model but also to develop an efficient and scalable workflow that can be integrated into our larger project.

The ultimate goal of this task is to develop a model that can reliably classify images while minimizing the dependency on manual data annotation.

Success in this endeavor will not only enhance the efficiency of our project but also contribute to the broader field of medical image analysis and healthcare accessibility. It's an exciting opportunity for the student to make a meaningful impact in the world of artificial intelligence and healthcare innovation

Student's Tasks Description

The assigned student will work on:

- Exploring methods for image classification in ophthalmology using the existing dataset.
- Investigating supervised, semi-supervised, or self-learning models to reduce data annotation efforts.
- Collaborating with the team to develop and implement the algorithm.

- Annotating a portion of the dataset for training and testing purposes.
- Documenting and presenting findings and recommendations.

The student will gain:

- Practical experience in developing AI algorithms for healthcare.
- Skills in image classification and machine learning.
- Insight into the challenges and opportunities in medical data analysis.
- An opportunity to contribute to a meaningful project with global impact.

Technical Prerequisites

The student should have:

- Proficiency in programming languages such as Python.
- Familiarity with machine learning and deep learning frameworks (e.g., TensorFlow, PyTorch).
- Strong problem-solving and data analysis skills.
- A willingness to learn and contribute to data annotation efforts.

References

[1] *Custom surgical* (no date) *Custom Surgical - Microscope Adaptor and Applications*. Available at: https://customsurgical.co/ (Accessed: 10 October 2023).

[2] Who.int. 2021. Vision impairment and blindness. [online] Available at: https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment [Accessed 19 August 2021].

[3] Glaucoma, *Role of artificial intelligence and machine learning in... : Kerala Journal of Ophthalmology*, *LWW*. Available at: https://journals.lww.com/kjop/Fulltext/2019/31020/Role_of_artificial_intelligence_and_machine.12.aspx (Accessed: 10 October 2023).