Data Article

Dataset for identifying paracentral acute middle maculopathy lesions in spectral-domain optical coherence tomography images

Tianqiao Zhang [a,b,c], Mengjiao Zhang [a], Dexun Zhang [a], Wenjing Meng [d], Zhenzhen Li [e,*], Zhengwei Zhang [f,g,**]

[a] School of Life and Environmental Sciences, Guilin University of Electronic Technology, Guilin, China
[b] Guangxi Human Physiological Information Non Invasive Detection Engineering Technology Research Center, Guilin, China
[c] Guangxi Colleges and Universities Key Laboratory of Biomedical Sensors and Intelligent Instruments, Guilin, China
[d] Department of Library Services, Guilin University of Electronic Technology, Guilin, China
[e] School of Information Engineering, Nanchang Institute of Technology, Nanchang, China
[f] Department of Ophthalmology, Jiangnan University Medical Center, Wuxi, China
[g] Department of Ophthalmology, Wuxi No.2 People's Hospital, Affiliated Wuxi Clinical College of Nantong University, Wuxi, China

A R T I C L E   I N F O

A B S T R A C T

This paper introduces a comprehensive dataset of spectral-domain optical coherence tomography (SD-OCT) images of human eyes affected by paracentral acute middle maculopathy (PAMM). Acquired with an SD-OCT device (Optovue, Fremont, California, USA), the dataset includes 133 OCT images of lesions. Each image is paired with a corresponding YOLO label in TXT format, representing manually annotated lesion regions of PAMM, created with the assistance of ophthalmologists. This dataset is invaluable for developing and evaluating automatic algorithms for diagnosing PAMM lesions. By providing detailed annotations and high-quality images, it facilitates advancements in understanding the morphology, progression, and potential treatments of PAMM. Furthermore, it supports the improvement of diagnostic accuracy and the

* Corresponding author.
** Corresponding author at: Department of Ophthalmology, Jiangnan University Medical Center, Wuxi, China.
   E-mail addresses: 2021994799@nit.edu.cn (Z. Li), weir2008@ntu.edu.cn (Z. Zhang).

development of targeted therapeutic interventions for retinal diseases. This resource addresses a significant gap in the availability of public datasets focused on PAMM lesions, promoting further research in automated intelligent analysis systems for retinal OCT images.

Specifications Table

Subject	Ophthalmology
Specific subject area	Human retina, Paracentral acute middle maculopathy
Type of data	Raw optical coherence tomography images (3 × 3, or 6 × 6 mm) with dimensions of 933 × 424 pixels at 96 DPI in BMP format, with lesion labels stored in the YOLOLabels folder (.txt) and the JSON folder (.json)
Data collection	These images, examined at Wuxi Second People's Hospital from January 2015 to May 2020, were acquired using a spectral-domain optical coherence tomography device (Optovue, Fremont, California, USA). Only images featuring paracentral acute middle maculopathy were selected for the data.
Data source location	Institution: Wuxi No.2 People's Hospital City/Town/Region: Wuxi City, Zhongshan Road Country: China
Data accessibility	Repository name: Mendeley Data Data identification number: 10.17632/mkwxn7rjpm.2 Direct URL to data: https://data.mendeley.com/datasets/mkwxn7rjpm/2
Related research article	[1] Zhang T, Wei Q, Li Z, et al. Segmentation of paracentral acute middle maculopathy lesions in spectral-domain optical coherence tomography images through weakly supervised deep convolutional networks[J]. Computer Methods and Programs in Biomedicine, 2023, 240: 107,632.

1. Value of the Data

- These data can be used for analyzing the characteristics of paracentral acute middle maculopathy (PAMM) lesions in the retina.
- This comprehensive collection allows for detailed examination and location of PAMM lesions, can facilitate advancements in understanding their morphology, progression, and potential treatments.
- The bounding box labels (YOLO format) provided in this dataset can be used for developing and enhancing automated algorithms for detecting abnormalities in SD-OCT images.
- Researchers and clinicians can utilize these data to improve diagnostic accuracy and develop targeted therapeutic interventions for retinal diseases.

2. Background

PAMM is a rare capillary ischemic lesion in the macula characterized by paracentral scotoma and a hyperreflective band in the inner nuclear layer (INL) on SD-OCT images [2,3]. The subtle and varied appearance of PAMM lesions on SD-OCT images makes accurate identification and delineation challenging for clinicians [4]. Therefore, it is crucial to develop and optimize automated systems to detect and quantify PAMM lesions in retinal OCT images. The development and optimization of these systems typically rely on large databases [5]. As a feature of retinal ischemic disease, PAMM has the potential to function as an early warning indicator for various retinal vascular diseases and systemic vasculopathies. While the PAMM signature alone may not offer adequate specificity to differentially diagnose distinct retinal vascular diseases, it still holds
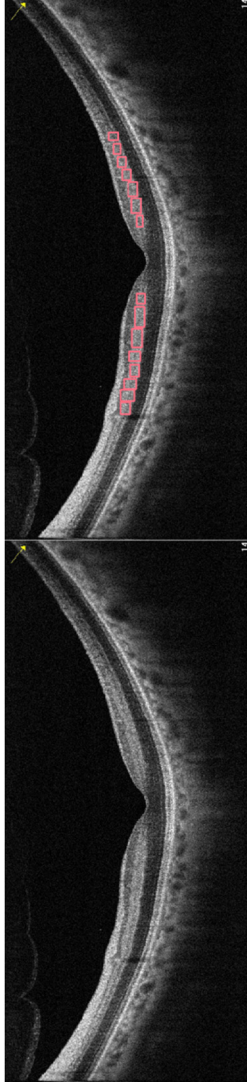
Fig. 1. Original SD-OCT image and PAMM annotation result image.

significance as a crucial marker in clinical diagnosis [6]. Despite many related research reports [7], there are currently no public datasets specifically focusing on PAMM lesions, which hampers research efforts in automatic intelligent analysis systems. This new dataset, a high-quality annotated retinal image dataset centered on PAMM lesions, addresses this gap, providing a valuable resource for research. Moreover, it can be leveraged to develop, refine, and evaluate new automatic lesion detection algorithms, potentially leading to earlier and more accurate diagnosis of PAMM-related diseases in clinical settings.

3. Data Description

The dataset includes original SD-OCT images in BMP format, YOLO tags in TXT format, and COCO tags in JSON format. The multiple types of tags provided can be utilized for the identification and quantification of PAMM regions in SD-OCT images. These annotations were manually delineated under the guidance of professional ophthalmologists and subsequently converted into various formats using relevant Python code. The dataset showcases PAMM features of varying sizes, thereby supporting research on the diagnosis and treatment of PAMM.

4. Experimental Design, Materials and Methods

The image acquisition was conducted using an SD-OCT device (Optovue, Fremont, California, USA) with the following specifications: a light source wavelength of 840 nm, a bandwidth of 45 nm, and an A-scan rate of 70 kHz. The axial resolution of the imaging system was determined to be 5.3 μm (full width at half maximum amplitude curve), and the tissue imaging range covered a distance of 2.9 mm. For each eye, scanning was performed using a central horizontal line spanning 10 mm with intervals of 10° to obtain a total of 18 images. At each of the 304 raster positions, two B-scans were acquired for two volume raster scans employing orthogonal fast scanning directions—horizontal and vertical—resulting in a cube scan measuring 3 × 3, or 6 × 6 mm. To eliminate any motion artifacts, the results from both scans were merged together, while signal-to-noise ratio enhancement was achieved using the frequency separation amplitude decorrelation technique (SSADA). Each B-scan consisted of 304 A-scans. To facilitate the use of subsequent datasets, the original images were cropped and adjusted to a size of 933 × 424 pixels. Under the guidance of professional ophthalmologists, ITK-SNAP software [8] was used to manually annotate the images after resizing, marking the characteristic areas of PAMM. The original SD-OCT image and a sample image of the annotated lesion area are shown in Fig. 1. Automatic segmentation methods evaluated using this dataset can be found in Reference [1], and other work using all or part of this data includes Reference [3].

Limitations

It is important to note that in our experiment, the PAMM feature represents just one type of retinal pathological feature and serves as an observable external manifestation of various ophthalmic diseases. It does not denote a specific ophthalmic disease. Consequently, our annotations solely cover PAMM abnormalities and do not encompass other abnormal features. Furthermore, this dataset exclusively contains SD-OCT images with PAMM features and does not include normal SD-OCT images or other pathological SD-OCT images lacking PAMM features.

Ethics Statement

The data collection protocol was approved by the Institutional Review Board of Wuxi No 2 People's Hospital (approval number: 2022-Y-98) and adhered to the tenets of the Declaration of

Helsinki. Each participant provided written informed consent permitting the use of their collected data for educational and scientific purposes.

Data Availability

FociSet: Dataset of raw and manually annotated SD-OCT images for paracentral acute middle maculopathy lesions detecting (Original data) (Mendeley Data).

CRediT Author Statement

Tianqiao Zhang: Methodology, Writing – original draft, Conceptualization, Funding acquisition; **Mengjiao Zhang:** Writing – original draft, Data curation; **Dexun Zhang:** Data curation; **Wenjing Meng:** Investigation; **Zhenzhen Li:** Investigation, Writing – review & editing, Methodology, Supervision; **Zhengwei Zhang:** Resources, Funding acquisition, Supervision.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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