הטכניון מכון טכנולוגי לישראל
TECHNION Israel Institute of Technology
Faculty of Mechanical Engineering
הפקולטה להנדסת מכונות

MECHANICAL ENGINEERING MSc SEMINAR (30 min.)

Thursday, February 26 2026 at 13:30-14:00, Lady Davis Building, Auditorium 250

Deep Learning-Based Classification for Eye Diseases using OCT Images

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Optical Coherence Tomography (OCT) is a key imaging modality for the diagnosis and monitoring of retinal diseases, enabling high-resolution visualization of retinal micro-structures. However, the complexity and growing volume of OCT data place a significant burden on clinicians and increase the risk of differences between observers. This motivates the development of automated and reliable decision-support tools for retinal disease classification.

A deep learning-based framework is presented for retinal disease classification using OCT images. The method focuses on clinically relevant conditions such as choroidal neovascularization (CNV), diabetic macular edema (DME), and drusen, in addition to normal cases.

The study begins with a two-dimensional single-slice analysis using convolutional neural networks (CNNs) and transfer learning, establishing a strong baseline for disease classification. In addition, a hierarchical classification strategy is evaluated to align the classification process with clinically motivated decision processes.

To address the limitations of single-slice analysis, the framework is extended to a multi-slice approach that incorporates volumetric context. In this setting, multiple adjacent OCT B-scans from the same patient are processed through a shared CNN encoder, followed by sequential aggregation using hybrid architectures based on recurrent networks (BiLSTM) and attention mechanisms (Transformers). This design enables the model to capture inter-slice dependencies while preserving analysis efficiency.

Comprehensive evaluation demonstrates that incorporating multi-slice information improves classification robustness and stability compared to single-slice models. Model interpretability is further investigated using Grad-CAM visualizations, highlighting anatomically meaningful retinal regions that contribute to the model’s predictions.

The results indicate that deep learning-based multi-slice analysis of OCT data holds significant potential for reliable and interpretable clinical decision support.

Seminars Coordinator: Prof. Sefi Givli

Note: the seminar will be given in Hebrew